WH1.0 WHITEMAN AIR FORCE BASE OVERVIEW

Whiteman Air Force Base (AFB) is located in Johnson County, Missouri, approximately 2 miles south of the City of Knob Noster and 70 miles southeast of Kansas City, Missouri. The installation encompasses approximately 5,520 acres and is predominantly surrounded by agricultural land use, with some minor residential development to the east (Figure WH1-1). The primary runway at Whiteman AFB, Runway 01/19, is 12,400-feet long and 200-feet wide (Figure WH1-2).

The 509th Bomb Wing (509 BW) of the U.S. Air Force (USAF) Global Strike Command is the host unit at Whiteman AFB. As the host unit, the mission of the 509 BW is to (1) develop and sustain the world's best stealth war fighting capability through innovative planning, training, and exercising; (2) develop and maintain the highest level of readiness to support worldwide contingency operation; (3) create and foster a 509 BW quality culture through leadership and teamwork; (4) make safety a priority in the air, on the ground, on or off duty; (5) provide resources, time, and opportunity to promote wellness and continually improve; and (6) improve the environment through comprehensive education and aggressive compliance. The 509 BW flies the B-2 Stealth bomber and T-38 Talon trainer at Whiteman AFB.

The primary tenants at Whiteman AFB include the Air Force Reserve Command (AFRC) 442nd Fighter Wing (442 FW), the 1-135th Attack Reconnaissance Battalion (1-135 ARB) of the Missouri Air National Guard (MO ANG), the 131st Bomb Wing (131 BW), the 72nd Test and Evaluation Squadron (72 TES), the 325th Weapons Squadron (325 WPS), the USAF Office of Special Investigations (OSI), and the 20th Reconnaissance Squadron (20 RS) Remote Split Operations. The 442 FW operates 24 A-10 Thunderbolt II aircraft and the 1-135 ARB flies AH-64 Apache helicopters at Whiteman AFB.

Refer to Chapter 1 for the purpose and need for the AFRC F-35A mission, a description of the F-35A aircraft characteristics, and information about public involvement and agency coordination. Refer to Chapter 2 for the description of the proposed action and alternatives, and a description of the strategic basing and alternative identification processes. In the base-specific sections that follow, Section WH2 presents the description of the proposed action at Whiteman AFB. Section WH3 addresses baseline conditions and environmental consequences that could result from implementation of the proposed action at Whiteman AFB. Section WH4 identifies other, unrelated past, present, and reasonably foreseeable future actions in the affected environment and evaluates whether these actions would cause cumulative effects when considered along with the AFRC F-35A beddown. This section also presents the irreversible and irretrievable resources that would be committed should the proposed action be implemented at Whiteman AFB.

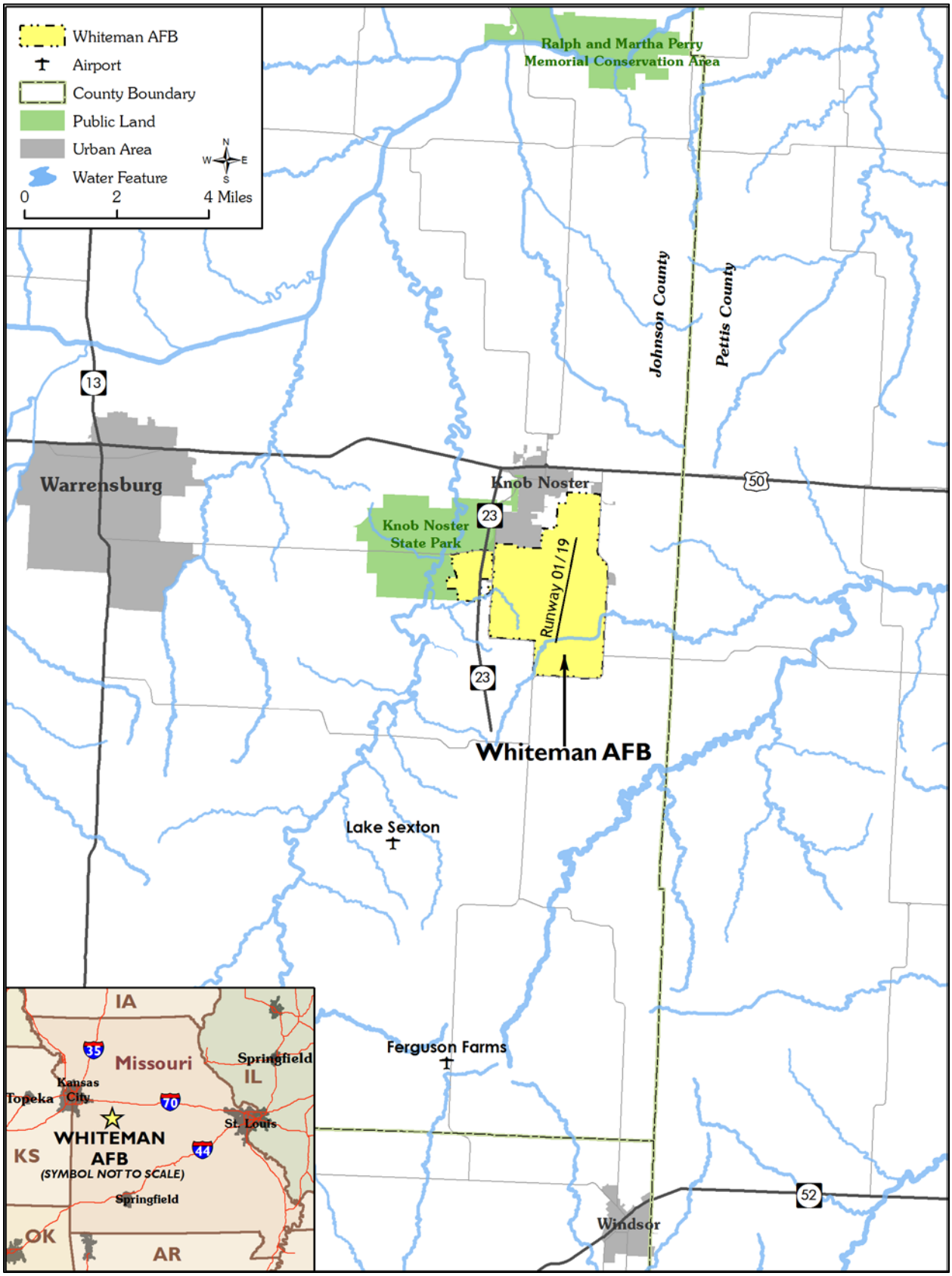

Figure WH1-1. Regional Location of Whiteman AFB

Figure WH1-2. Primary Runways at Whiteman AFB

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WH2.0 WHITEMAN AIR FORCE BASE ALTERNATIVE

This section presents the specifics of the proposed action at Whiteman AFB. Four elements of the proposed action have the potential to affect the base and associated airspace: (1) facility and infrastructure projects to support the F-35A beddown; (2) personnel changes necessary to meet F-35A requirements; (3) airfield operations conducted by AFRC F-35A pilots; and (4) airspace and range use by AFRC F-35A pilots. Each element is explained in the following subsections. In addition, this section also presents state and federal consultation efforts and associated permits that would be required should Whiteman AFB be selected to receive the AFRC F-35A mission.

Under the proposed action, 24 Primary Aerospace Vehicles Authorized (PAA) F-35A aircraft would start to arrive at Whiteman AFB in early 2024. Delivery of the full complement of 24 F-35A aircraft and 2 Backup Aircraft Inventory (BAI) is anticipated to take 2 years. At that time, the F-35A aircraft would completely replace the existing 24 A-10 aircraft assigned to the 442 FW. The A-10 aircraft that would be replaced by the F-35A aircraft would be reassigned or removed from the USAF inventory.

WH2.1 FACILITIES AND INFRASTRUCTURE

To support the AFRC F-35A mission, additional infrastructure and facility modifications would be required at Whiteman AFB (Table WH2-1). A total of 12 different improvement projects and 1 demolition project would be implemented in 2021 (Figure WH2-1). The USAF estimates that $32.5 million in Military Construction (MILCON) expenditures would be required to implement the proposed AFRC F-35A mission at Whiteman AFB.

Table WH2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Whiteman AFB

Project[a]	Size (ft^2)[b]
Demolition	
Building 706	29,400
Demolition Total	**29,400**
Renovation	
Building 41 renovation for squadron operations	10,497[c]
Building 91 renovation for engine repair	NA[d]
Building 1117 electrical and ventilation upgrades	NA[d]
Building 1118 electrical upgrade	NA[d]
Building 1119 egress shop – relocation from building 1117	NA[d]
Airfield pavement repair	500
A-10 parking apron repair	14,348
North ramp repair	699,654
Renovation Total	**724,999**
New Construction	
Recessed arresting cable and barriers	500
Construct an F-35A flight simulator building	13,650
Construct six sunshades	38,400
Construct a munitions maintenance building (not shown)	5,000
New Construction Total	**57,500**

[a] Data in this table were obtained from interviews conducted at Whiteman AFB (Whiteman AFB 2017).
[b] Size is the area covered by the footprint of the proposed facilities and consists of the designed limits of the structure, facility, apron, road, access, and/or parking lot.
[c] Interior renovation only.
[d] Includes minor interior upgrade projects that do not have a square footage.

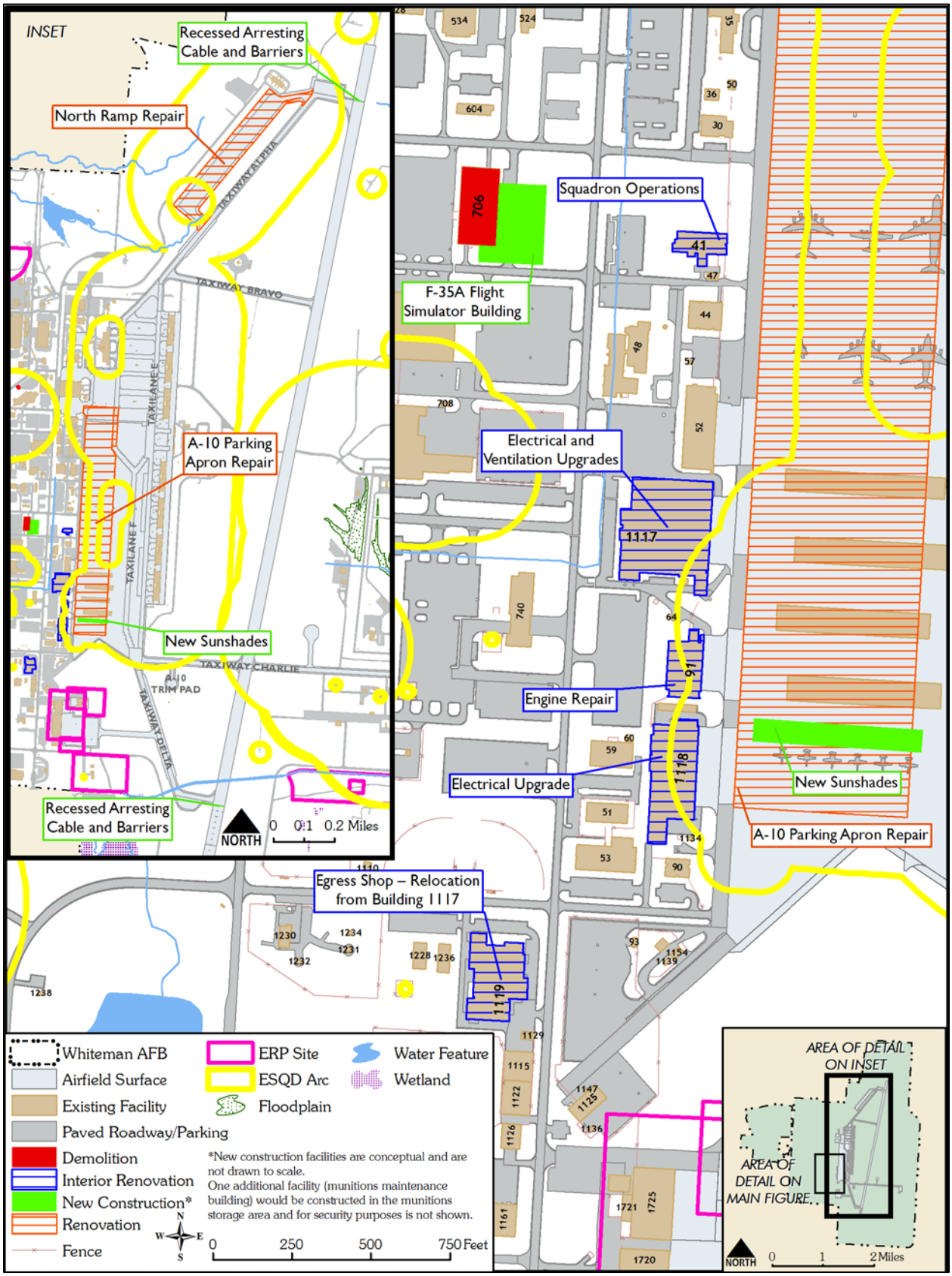

Figure WH2-1. Facilities and Infrastructure Projects for the AFRC F-35A Mission at Whiteman AFB

New construction and facility additions would require construction grading, clearing, and equipment laydown space. To account for this disturbance, this analysis also includes disturbance areas in addition to the facility size. These disturbance areas encompass 20 feet adjacent to linear features (e.g., roads, utility extensions, etc.) and 50 feet around the facility footprint for all other facilities. Repairs of existing aircraft concrete aprons or ramps are not included in these calculations because these repairs would occur on paved or concrete surfaces. Interior renovations are also not included in these calculations because these renovations would not create ground disturbance or a change in impervious surfaces.

New construction and facility additions would also result in changes to existing impervious surfaces. It is assumed that any demolition would include demolition of the building slab and result in a reduction in impervious surfaces. In some cases, demolished facilities would be replaced by new construction or pavements. This increase in impervious surfaces is accounted for in the new construction. Table WH2-2 provides a summary of the ground disturbance and changes in impervious surfaces.

Table WH2-2. Summary of Facility and Infrastructure Projects for Whiteman AFB

Project Type	Ground Disturbance (Acres)	Change in Impervious Surfaces (Acres)
Demolition	1.7	-0.7
Renovation[a]	0	0
New Construction[b]	1.2	+0.3
Total	**2.9**	**-0.4**

[a] Does not include interior renovation, runway or ramp renovation projects.
[b] Does not include the arresting barrier and cables or construction of the sunshades.

Facility siting on military installations is predominantly functional use-based (i.e., locating facilities with like functional uses adjacent to one another). However, safety and compliance with policies and regulations are also used as planning factors. During the planning phase for a new aircraft mission beddown, military planners consider a variety of alternatives necessary to meet the requirements of the new mission, including the use of existing facilities that can be partially or entirely used to meet mission requirements. Depending on available infrastructure, facilities, and, to some degree, personnel available to support the AFRC F-35A mission, proposed construction, demolition, and renovation projects vary between alternatives. The facility siting analysis for each alternative base considered the functional requirements of the AFRC F-35A mission and compared them with the existing infrastructure and environmental constraints at each alternative base.

New construction siting is a stepwise process that includes identifying suitable sites relative to existing facilities and base infrastructure to provide operational efficiencies and suitable cost-benefit values. Utility siting, including the re-routing of existing utilities or the installation of new utility infrastructure (e.g., power, water, sewer, and communication lines), could also be required to accommodate the new mission. The siting process for utilities focused on using existing conduits and previously disturbed areas or areas that would also be disturbed for facility modifications. Temporary construction laydown areas could also be required to support construction. Construction laydown areas would be located in developed or semi-developed areas, or previously disturbed or paved areas. Construction laydown areas not proposed for permanent disturbance would be returned to their pre-construction state upon completion of construction. All construction contracts would be managed under Unified Facilities Criteria (UFC) 3-101-01, *Best Management Practices*, and attainment of a Leadership in Energy and Environmental Design (LEED) Silver certification.

Construction and renovation projects within the 65-decibel (dB) noise contour would include acoustical design considerations for façade elements and interior design requirements per UFC 3-101-01. Land use would be consistent with Department of Defense Instruction (DoDI) 4165.57, *Air Installations Compatible Use Zones*, and Air Force Handbook (AFH) 32-7084, *AICUZ Program Manager's Guide.*

WH2.2 PERSONNEL

Implementation of the AFRC F-35A mission at Whiteman AFB would require sufficient and appropriately skilled military and civilian personnel to operate and maintain the F-35A aircraft and to provide other necessary support services. Implementation of the AFRC F-35A mission at Whiteman AFB would require an additional 11 positions. This would constitute a 0.1 percent increase in base staffing (Table WH2-3).

Table WH2-3. Personnel Changes for the AFRC F-35A Mission at Whiteman AFB

Baseline Personnel			Proposed F-35A Authorized Personnel			Percent Change to Total Personnel
Total Authorized Personnel	AFRC Authorized Personnel	Percent of Total Authorized Based Personnel	AFRC F-35A	Change to AFRC Unit Personnel Positions	Percent Change to AFRC Unit Personnel	
12,642	1,009	7.98%	1,020	11	1.09%	0.1%

WH2.3 AIRFIELD OPERATIONS

The 442 FW is an integral part of the Combat Air Forces (CAF). The CAF defends the homeland of the United States and deploys forces worldwide to meet threats and ensure the security of the nation. To fulfill this role, the 442 FW must train as it would fight.

The USAF anticipates that once the full complement of aircraft is received, the 24 F-35A aircraft would be used to fly 11,580 airfield operations per year from the airfield. Based on the proposed requirements and deployment patterns, AFRC F-35A pilots would fly additional operations during deployments, or at other locations for exercises or in preparation for deployments. In addition, AFRC F-35A pilots stationed at Whiteman AFB could participate in remote training exercises. Some of these missions could involve ordnance delivery training or missile firing exercises within the scope of existing (National Environmental Policy Act [NEPA] documentation) at ranges approved for such use (e.g. Cannon Range on Fort Leonard Wood, Missouri).

Conducting 11,580 F-35A operations per year at Whiteman AFB would represent an increase of 5,770 annual airfield operations compared to current A-10 aircraft operations (Table WH2-4). Of the 33,180 total airfield operations currently conducted at Whiteman AFB, 17.5 percent are conducted by the 442 FW. Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 17.4 percent increase in annual total airfield operations.

Table WH2-4. Whiteman AFB Baseline A-10 and Proposed F-35A Annual Airfield Operations

Total Baseline Operations[a]		Proposed AFRC F-35A Mission
Based A-10	5,810	0
Proposed F-35A	0	11,580
Other Aircraft	27,370	27,370
Total Airfield Operations	33,180	38,950
	Percent Change	**17.4%**

[a] Total baseline operations is for the last year. Data in this table were collected from the operations staff at Whiteman AFB in 2017.

AFRC F-35A pilots would perform departure and landing procedures similar to those currently conducted by the A-10 pilots at the installation. Due to differences in aircraft characteristics and performance, the flight profiles and tracks used by AFRC F-35A pilots would slightly vary from those currently used by A-10 pilots. A-10 pilots from the 442 FW average 260 flying days per year. For the purposes of this analysis and to compare the alternatives on an equal basis, the total number of possible flying days for AFRC F-35A pilots is also assumed to be 260, including both Saturday and Sunday (on Unit Training Assembly [UTA] weekends).

Although the AFRC A-10 aircraft do not have afterburners, other military aircraft operating at Whiteman AFB use afterburners on occasion when additional power is needed. As described in Chapter 2, Section 2.3.3, the USAF evaluated three different scenarios for afterburner use. Scenario A is afterburner use on 5 percent of takeoffs. Scenario B is afterburner use on 50 percent of takeoffs. Scenario C is afterburner use on 95 percent of takeoffs.

AFRC F-35A pilots would operate similar to the A-10 pilots. Currently, A-10 operations primarily begin at 7:00 A.M. and conclude by 10:00 P.M. on weekdays and UTA weekends (except when weather contingencies or special exercises cause operations to occur after 10:00 P.M.). After-dark training is normally scheduled to be completed before 10:00 P.M. After-dark training for AFRC F-35A pilots would also be scheduled to be completed before 10:00 P.M. Because of the capabilities and expected tactics of the F-35A aircraft, AFRC F-35A pilots are predicted to generally follow the same night requirement as AFRC A-10 pilots depending on weather or special exercises.

WH2.4 AIRSPACE AND RANGE USE

Table WH2-5 identifies the Federal Aviation Administration (FAA)-designated airspace currently used by Whiteman AFB A-10 pilots that is also proposed for use by AFRC F-35A pilots. Implementation of the AFRC F-35A mission would not require any new airspace or changes to existing airspace boundaries, and the type and number of ordnance used at the any of the ranges approved for such use could decrease.

Table WH2-5. Whiteman AFB Training Airspace

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Ada East & West MOAs	7,000	UTBNI 18,000
Bison MOA	1,000 AGL	UTBNI 18,000
Cannon A MOA	300 AGL	UTBNI 18,000
Cannon B MOA	100 AGL	UTBNI 18,000
Eureka Low MOA	6,000	UTBNI 18,000
Eureka High MOA	2,500	UTBNI 6,000
Lindbergh A MOA	7,000	UTBNI 18,000
Lindbergh B & C MOAs	8,000	UTBNI 18,000
Lindbergh D and West ATCAA[c]	39,000	UTBNI 43,000
Riley MOA	7,000	UTBNI 18,000
Salem MOA	Surface	UTBNI 7,000
Shirley A, B, & C MOAs	11,000	UTBNI 18,000
Smoky High MOA	5,000	UTBNI 18,000
Smoky Low MOA	500 AGL	UTBNI 5,000
Truman A & B MOAs	8,000	UTBNI 18,000
Truman C MOA	500 AGL	UTBNI 18,000
Cannon Range R-4501A	Surface	UTBNI 2,200
Cannon Range R-4501B	Surface	4,300
Cannon Range R-4501C	2,200	5,000

Table WH2-5. Whiteman AFB Training Airspace (Continued)

FAA-Designated Airspace[a]	Floor[b] (feet MSL unless otherwise noted)	Ceiling (feet MSL unless otherwise noted)
Cannon Range R-4501D	5,000	12,000
Cannon Range R-4501E	12,000	UTBNI 18,000
Cannon Range R-4501F & H	Surface	3,200 AGL
Fort Riley Range R-3602A & B	Surface	29,900
Smoky Hill Range R-3601A	Surface	UTBNI 18,000

[a] Airspace used by F-35A pilots would include Air Traffic Control Assigned Airspaces (ATCAAs) that occur over the Military Operations Areas (MOAs) included in the table. The ATCAAs will accommodate training above 18,000 feet mean sea level (MSL).

[b] Floor altitudes could exclude certain areas. See FAA Sectional Charts for exclusions.

[c] Lindbergh ATCAAs are called out in the table and figures for reference because no MOAs are located beneath these areas.

Note: MSL is the elevation (on the ground) or altitude (in the air) of an object, relative to the average sea level. The elevation of a mountain, for example, is marked by its highest point and is typically illustrated as a small circle on a topographic map with the MSL height shown in either feet or meters or both. Because aircraft fly across vast landscapes, where points above the ground can and do vary, MSL is used to denote the "plane" on which the floors and ceilings of Special Use Airspace (SUA) are established and the altitude at which aircraft must operate within that SUA.

Key: AGL = above ground level; UTBNI = Up To But Not Including

Source: FAA Kansas City 2018 and Wichita 2018 Sectional Charts

WH2.4.1 Airspace Use

AFRC F-35A pilots would conduct missions and training activities necessary to fulfill the multi-role responsibility of this aircraft. All F-35A flight activities would occur in existing airspace. AFRC F-35A pilots would operate in the airspace used by A-10 pilots from the 442 FW, but at higher altitudes. A-10 pilots from the 442 FW use Military Operations Areas (MOAs), Restricted Areas (RAs), and Air Traffic Control Assigned Airspace (ATCAA) (Table WH2-5 and Figure WH2-2). To support realistic training, A-10 pilots schedule and use multiple adjacent airspaces together.

The FAA-designated airspace identified in Table WH2-4 is also used by other USAF pilots operating A-10, F-15, and F-16 aircraft. A-10 pilots from the 442 FW conduct approximately 35 percent of the total sorties flown in the airspace identified in Table WH2-5. Although AFRC F-35A pilots would conduct missions similar to those of A-10 pilots, the capabilities of the F-35A aircraft allow for supersonic and higher altitude flight. Regardless of the altitude structure and percent use indicated in Table WH2-6, AFRC F-35A pilots (as do existing military aircraft pilots) would adhere to all established floors and ceilings of existing FAA-designated airspace. For example, the floor of the Riley MOA is 7,000 feet mean sea level (MSL). While in this MOA, AFRC F-35A pilots would not fly below that altitude. Rather, AFRC F-35A pilots would adapt training to this and other airspace with lower floors.

Table WH2-6. Current and Proposed Aircraft Altitude Distribution in the Airspace

Altitude (feet)	Percentage of Use	
	A-10	AFRC F-35A
100 – 500 AGL	7%	0%
500 AGL – 2,000 AGL	30%	1%
2,000 – 5,000 AGL	26%	0%
5,000 AGL – 10,000 MSL	33%	5%
10,000 – 18,000 MSL	4%	23%
18,000 – 30,000 MSL	0%	60%
+30,000 MSL	0%	11%

A-10 pilots from the 442 FW generally operate 100 percent of the time at or below 18,000 feet MSL. In contrast, AFRC F-35A pilots would operate 71 percent of the time at or above 18,000 feet MSL, with 11 percent of the flight time above 30,000 feet MSL.

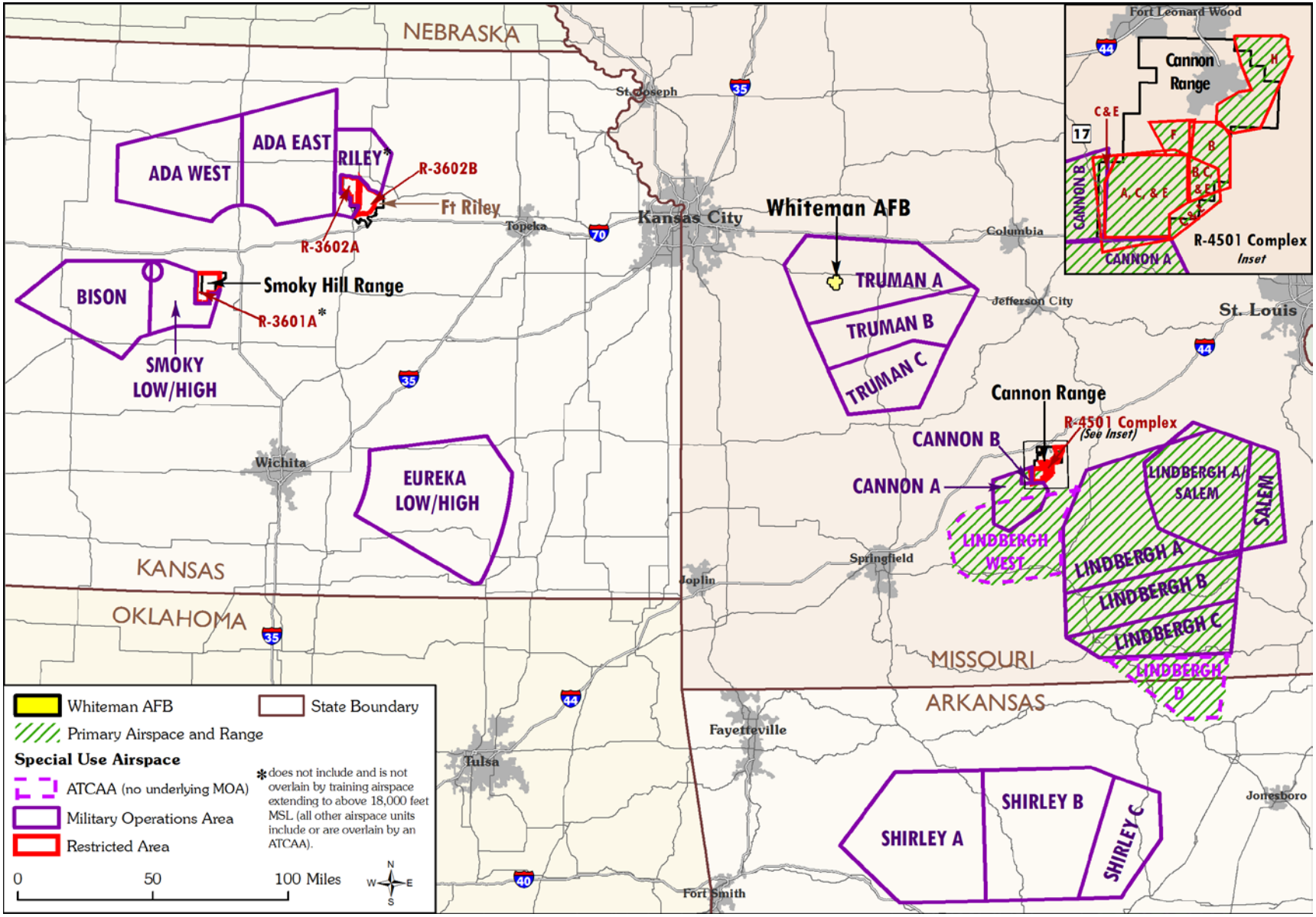

Figure WH2-2. Airspace Associated with Whiteman AFB

By 2030, total annual sorties would decrease by 5.9 percent from baseline levels (Table WH2-7).

Table WH2-7. AFRC F-35A Airspace Sorties Flown from Whiteman AFB

Airspace[a]	Total Baseline	A-10 Baseline	AFRC F-35A Sorties	Net Change (Total)	Percent Change (Total)
Central United States	15,739	5,563	4,632	-931	-5.9%
Total	**15,739**	**5,563**	**4,632**	**-931**	**-5.9%**

[a] Includes all airspace identified in Table WH2-5.

To train with the full capabilities of the aircraft, AFRC F-35A pilots would conduct supersonic flight at altitudes and within airspace already authorized for such activities. Due to the capability of the F-35A aircraft, the USAF anticipates that approximately 10 percent of the time spent in air combat training would involve supersonic flight.

AFRC F-35A missions would last approximately 45 to 115 minutes, including takeoff, transit to and from the training airspace, training activities, and landing. Depending upon the distance and type of training activity, AFRC F-35A pilots would fly approximately 20 to 60 minutes in the training airspace. Occasionally, AFRC F-35A pilots could fly up to 90-minute long missions. AFRC F-35A pilots would not fly in Special Use Airspace (SUA) during environmental night (10:00 P.M. to 7:00 A.M.), except for rare contingencies and special mission training.

WH2.4.2 Range Use

AFRC F-35A pilots would only use existing ranges. AFRC F-35A pilots stationed at Whiteman AFB would use the Cannon Range at Fort Leonard Wood in Missouri and the Smoky Hill and Fort Riley Ranges in Kansas.

Most air-to-ground training would be simulated (i.e., nothing is released from the aircraft and electronic scoring is used). However, as described in Chapter 2, Section 2.3.4.2, the F-35A (like the A-10) is capable of carrying and using several types of air-to-air and air-to-ground ordnance, and pilots would require training in their use. The type and number of ordnance used by AFRC F-35A pilots could decrease from that currently used by A-10 pilots. If in the future the USAF identifies weapon systems that are either new or could exceed currently approved levels, appropriate NEPA documentation would be completed prior to their use.

Similar to A-10 pilots, AFRC F-35A pilots would use flares as defensive countermeasures in training. Flares are one of the defensive mechanisms dispensed by military aircraft to avoid attack by enemy aircraft and air defense systems. For the purposes of this analysis, it is estimated that flare use by AFRC F-35A pilots would be less than or equal to that of A-10 pilots. Chapter 2, Section 2.3.4.2.1, provides details on the composition and characteristics of flares. Flares would only be used in areas currently approved for such use. Current restrictions on the altitude of flare use would also apply. Use of flares by AFRC F-35A pilots would either increase or decrease in proportion to net changes in aircraft operations. Approximately 70 percent of F-35A flare releases would occur above 15,000 feet MSL. At this altitude, most flares would be released more than 21 times higher than the minimum altitude required (700 feet) to ensure complete combustion of each flare.

WH2.5 PUBLIC, AGENCY, AND TRIBAL INVOLVEMENT

WH2.5.1 Scoping Process

The public scoping period for the AFRC F-35A Environmental Impact Statement (EIS) began on 22 March 2018 with publication of the Notice of Intent (NOI) in the *Federal Register*. During the

following weeks, notification letters were mailed to federal, state, and local agencies; elected officials; federally recognized tribes (tribes)[1]; nongovernmental organizations; and interested individuals as a part of an interagency/intergovernmental coordination process. Through this process, concerned federal, state, and local agencies are notified and allowed sufficient time to evaluate potential environmental impacts of a proposed action.

Volume II, Appendix A, provides sample notification letters, the notification mailing lists, and the agency comments and concerns received by the USAF during the public scoping period. For the Whiteman AFB alternative, newspaper advertisements announcing the intent to prepare an EIS and hold a public scoping meeting were published in three different local newspapers. These advertisements were published in the weeks preceding the scheduled public scoping meeting.

For the Whiteman AFB alternative, one public scoping meeting was held on 26 April 2018 at Knob Noster High School (504 South Washington, Knob Noster, Missouri 65336). This meeting was held in an open-house format where attendees could sign in, if desired, review display boards about the proposed AFRC F-35A mission, and provide written comments on the project. During this meeting, USAF personnel presented information on the project through the use of display boards and fact sheets. The Whiteman AFB public scoping meeting was attended by 26 people, including residents, an elected official, local business leaders, military affairs committee members, base employees, local media, and others.

Throughout the public scoping period, the USAF offered multiple ways in which comments could be submitted. Comments were submitted at the public scoping meeting and through the project website, via email, and via regular mail or courier. The public scoping period closed on 11 May 2018, and seven comments were received regarding the Whiteman AFB alternative. Some comments were received after the public scoping period closed but were still considered during development of the Draft EIS.

After the public scoping period closed, the USAF was made aware that the address provided for submittal of courier-delivered (e.g., Federal Express or United Parcel Service) public scoping comments was incorrect. Consequently, the USAF provided the correct address and an additional 10 working days to resubmit scoping comments from the time resubmittal instructions were published in the *Federal Register* on 13 August 2018 and in three different local newspapers. During this second public scoping period, no additional comments were received regarding the Whiteman AFB alternative.

The majority of comments received for the Whiteman AFB alternative were generally supportive of the proposed mission. Some people expressed concerns about airspace, air quality, biological resources, hazardous materials and hazardous waste, infrastructure, land use, and soil and water resources.

WH2.5.1.1 Airspace Management and Use

Comments related to airspace included those that requested the EIS analyze any changes in airspace use, creation of new airspace, or alterations in flight paths.

[1] Per DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes*, "tribe" refers to a federally recognized Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges (DoDI 4710.02, Section 3.5). Although not included as federally recognized tribes in the list, the USAF similarly must consult with Native Hawaiian organizations in accordance with DoDI 4710.03, *Consultation with Native Hawaiian Organizations (NHOs).*

WH2.5.1.2 Air Quality

A comment was submitted expressing concern about jet fuel, exhaust, and the potential for adverse health effects to areas surrounding the base. The same commenter expressed concerns about tree removal and carbon footprint offsets.

WH2.5.1.3 Soil and Water Resources

A comment was received regarding stormwater run-off from the runway and potential impacts to water supplies, local creeks, and streams.

WH2.5.1.4 Biological Resources

A commenter expressed concern regarding the installation's carbon footprint and the potential for offsets through the creation of greenspace. Concern was expressed about light pollution and potential impacts to wildlife corridors.

WH2.5.1.5 Land Use and Recreation

One commenter expressed concern about the new mission potentially requiring land acquisition. The commenter wanted to know if land would be acquired through eminent domain.

WH2.5.1.6 Infrastructure

A commenter asked if the USAF would use solar power in the new construction to supply some of the power to the new facilities, and if buildings would incorporate green building practices and be LEED-certified.

WH2.5.1.7 Hazardous Waste

The Missouri Department of Natural Resources (MDNR) indicated that most of the legacy cleanup sites are at or nearing the response complete phase.

WH2.5.1.8 Socioeconomics

A commenter asked if there would be efforts to actively recruit local citizens for employment during and after construction.

WH2.5.2 Draft EIS Public and Agency Review

A Draft EIS public hearing was held on 12 March 2020 at Knob Noster High School in Knob Noster, Missouri. A total of seven people signed in at the public hearing, but some attendees did not sign in. The verbatim transcript of the Whiteman AFB public hearing is contained in Appendix A, Section A.6.4. Five comments were received from the public and agencies regarding the proposed AFRC F-35A mission at Whiteman AFB prior to close of the comment period. See Chapter 1, Section 1.5, of the EIS for more details on the public involvement process. A synopsis of the comments received specific to Whiteman AFB on the Draft EIS are listed as follows. See Appendix A, Section A.2, for responses to the substantive Draft EIS comments.

1) General support of the proposed beddown.
2) General complaint about air quality, noise, land use, and associated socioeconomic impacts to adjacent landowners and schools.

WH2.5.3 Consultation

WH2.5.3.1 Government-to-Government Consultation

In January 2012 the U.S. Department of Defense (DoD) updated its Annotated American Indian and Alaska Native Policy, which emphasizes the importance of respecting and consulting with tribal governments on a government-to-government basis. This policy requires an assessment, through consultation, of the effect of proposed DoD actions that may have the potential to significantly affect protected tribal resources, tribal rights, and Indian lands before decisions are made by the respective DoD services. In an ongoing effort to identify significant cultural resources, tribal resources, or other issues of interest to tribes, and as part of the NEPA scoping process, combined notification and Section 106 consultation letters were submitted to the federally-recognized American Indian tribes associated with Whiteman AFB.

Following standard USAF practice for government-to-government correspondence, tribal consultation was initiated by base Commanders who represent key leadership points of contact. Whiteman AFB initiated Section 106 government-to-government consultation with eleven tribes to identify traditional cultural properties. These tribes along with a record of consultations are listed in Volume II, Appendix A, Section A.7.2. Additional direct communication efforts (phone calls and emails) occurred for tribes that did not respond to USAF mailings. All communications with tribes will be completed in accordance with 54 *United States Code (USC)* 300101 *et seq.*, *National Historic Preservation of Act of 1966, as amended* (NHPA); 36 *Code of Federal Regulations (CFR)* § 800, *Protection of Historic Properties;* Executive Order (EO) 13175, *Consultation and Coordination with Indian Tribal Governments;* and DoDI 4710.02, *DoD Interactions with Federally-Recognized Tribes.*

WH2.5.3.2 State Historic Preservation Officer Consultation

Whiteman AFB has determined that no historic properties would be affected by implementing the AFRC F-35A mission at the installation. The Missouri State Historic Preservation Officer (SHPO) concurred with this finding in a letter dated 13 June 2018 (Volume II, Appendix A, Section A.7.3).

WH2.5.3.3 U.S. Fish and Wildlife Service Consultation

Because no federal listed threatened, endangered, or candidate species and/or designated critical habitat occur in the Region of Influence (ROI) near Whiteman AFB, no impacts would result from implementation of the proposed AFRC F-35A mission in the areas surrounding Whiteman AFB. On 14 May 2018, the U.S. Fish and Wildlife Service (USFWS) indicated that should this project involve the removal of less than 10 acres of suitable bat habitat, and should the trees be cleared during the bat hibernation season (1 November to 31 March), the USFWS does not anticipate adverse effects to the three listed bat species. In a follow-up email dated 24 May 2018, the USFWS indicated that it was not within the USFWS's purview to concur with findings of no effect, but they had no concerns regarding the project (see email dated 14 May 2018, Volume II, Appendix A, Section A.2.7.4).

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WH3.0 WHITEMAN AIR FORCE BASE AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

WH3.1 AIRSPACE MANAGEMENT AND USE

WH3.1.1 Base Affected Environment

WH3.1.1.1 Airfield Operations

Baseline annual airfield operations at Whiteman AFB are described in Section WH2.3 and shown in Table WH2-4. The primary runway at Whiteman AFB, Runway 01/19, is described in Section WH1.0 and shown on Figure WH1-2. Runway 19 is the primary use runway for noise abatement considerations.

The Whiteman AFB air traffic control (ATC) tower is responsible for controlling and managing airfield operations within the Class D airspace depicted on the FAA Kansas City Sectional Aeronautical Chart (FAA Kansas City 2018). The Whiteman AFB Class D airspace abuts or is within close proximity to Class E airspace surrounding the Skyhaven Airfield to the west and the Sedalia Regional Airport to the east. These charted airspace areas, along with the coordinated efforts of the respective airfield managers and ATC facilities, ensure the separation of the differing airfield flight activities.

The FAA Kansas City Air Route Traffic Control Center (ARTCC) manages the airspace in this region and has delegated terminal airspace to the Whiteman AFB Radar Approach Control (RAPCON) facility. The RAPCON is responsible for providing radar ATC services for all instrument flight rules (IFR) aircraft operations at Whiteman AFB and within 30-50 NM of the base from the surface up to 9,000 feet MSL. Control of this airspace reverts to the Kansas City ARTCC during those later periods when the RAPCON is not operational. Both runways 01 and 19 have Instrument Landing System (ILS) and Tactical Air Navigation (TACAN) navigational aid coverage that provide 10 published instrument approach procedures for this runway environment.

WH3.1.2 Base Environmental Consequences

WH3.1.2.1 Airfield Operations

The Whiteman AFB alternative for the AFRC F-35A mission would result in the changes to the airfield operational levels noted in Table WH2-4. Replacing the 5,810 A-10 operations with a projected 11,580 AFRC F-35A operations while other aircraft operations remain constant would increase overall airfield operations by about 17.4 percent. Such increase could be accommodated by the tower, RAPCON and Kansas City ARTCC within this airfield, Class D, and approach control airspace environment without adversely affecting other airspace uses. The percentage of operations flown during environmental night by AFRC F-35A pilots would be less than the percentage currently conducted by A-10 pilots. This beddown would not require any modifications to the current airspace structure nor those operating procedures that support present airfield and airspace operations at this location.

WH3.1.3 Airspace Affected Environment

WH3.1.3.1 Airspace and Range Use

The MOAs, ATCAAs, RAs, and range training areas currently used by pilots from Whiteman AFB and projected for AFRC F-35A operations are listed in Table WH2-5. This table also notes the floor and ceiling altitudes for each MOA, ATCAA, and RA in which all flight training activities must be

contained. Table WH3-1 notes the baseline and projected AFRC F-35A sortie operations for each airspace/range area. While the MOAs are in close proximity to the base with the Truman MOAs directly overlying this area, the ranges are approximately 100-200 NM from the base where Smoky Hill is the more highly used range. Kansas City ARTCC is the controlling agency for the airspace encompassing these training areas. Table WH3-1 notes the military agency responsible for coordinating and scheduling the airspace and range uses with the requesting units for meeting individual and joint training requirements.

Table WH3-1. Baseline and AFRC F-35A Annual Sorties

Training Airspace/Ranges[a]	Using/Scheduling Agency	Baseline Total	AFRC A-10	AFRC F-35A	Proposed Total	Percent Change
Ada East & West MOAs	ANG, 184th Intelligence Wing, Detachment 1, Smokey Hill	37	0	472	509	1,275.7
Eureka Low & High MOAs	ANG, 138 FW, Tulsa	1,208	0	157	1,365	13.0
Shirley A, B, & C MOAs	Arkansas ANG, 188 FW, Ft. Smith	140	0	306	446	218.6
Truman A, B, & C MOAs	509 BW, Whiteman AFB	6,554	-3,999	158	2,713	-58.6
Salem/Cannon/Lindbergh MOAs	131st Tactical Fighter Wing, MO ANG Lambert-St. Louis International	608	-280	459	787	29.4
Cannon Range R-4501A, B, C, D, E, F, & H, & Salem/Cannon/Lindbergh MOAs[b]	U.S. Army, Ft Leonard Wood/ 131st Tactical Fighter Wing	1,395	-1,284	2,031	2,142	53.5
Fort Riley Range R-3602A & B with Riley MOA	U.S. Army, Fort Riley	4	0	736	740	18,400.0
Smoky Hill Range R-3601A with Bison & Smoky Low and High MOAs	ANG, 184th Detachment 1, Air Refueling Wing, Salina	5,793	0	313	6,106	5.4
Total		**15,739**	**-5,563**	**4,632**	**14,808**	**-5.9**

[a] AFRC F-35A training airspace and ranges also includes the high-altitude ATCAA above the MOAs. Airspace areas in this table have been grouped due to similarity of training use and for noise modeling purposes.
[b] Primary Use Airspace and Ranges

WH3.1.4 Airspace Environmental Consequences

WH3.1.4.1 Airspace and Range Use

Table WH3-1 shows that the AFRC F-35A sorties projected for the different MOAs/ATCAAs, RAs, and ranges coupled with loss of the A-10 sorties would result in a 5.9 percent decrease in overall annual sorties. The projected distribution of those AFRC F-35A sorties would differ from how the A-10s currently use these areas. With the exception of the Truman MOAs, all airspace areas would experience an increase in annual sorties. The largest increases by percentage would be in the Fort Riley Range and Riley MOA and in the Ada MOAs. While the increases in these MOAs are large in terms of percentage, the actual number of sorties is small compared to the large areas available for training in these airspace areas. The percent increases are also inflated due to the small number of sorties currently occurring in the airspace. For example, the Fort Riley Range and Riley MOA currently have a baseline of four annual sorties. Since this MOA is currently used on an infrequent basis, the proposed increase of 736 sorties requirements could be effectively coordinated and scheduled to meet F-35A and other user training requirements.

The Canon Range, Shirley MOA, and the Salem/Cannon/Lindbergh MOAs would also see large percentage increases in the number of annual sorties. Mission requirements in these airspace areas

would require coordination and scheduling with existing USAF units to meet training requirements for both the AFRC F-35A mission and the mission of existing units.

Implementation of the AFRC F-35A mission would not result in the creation of new SUA or change the boundaries of existing SUA. Therefore, no major changes to civilian operations are anticipated. The Kansas City ARTCC would continue to manage all military and civilian aircraft within activated MOAs to ensure no conflicts with civil aviation.

WH3.1.5 Summary of Impacts to Airspace Management and Use

Implementation of the AFRC F-35A mission would involve a one-for-one exchange of A-10 aircraft with F-35A aircraft, and would not require any changes to airspace or to how the airfield is managed. Eventual replacement of A-10 aircraft at Whiteman AFB with F-35A aircraft would result in a 17.4 percent increase in airfield operations. This operational increase would not affect how local air traffic is managed. In addition, the AFRC F-35A sorties proposed for the airspace could be accommodated in the training airspace, ranges, and while en route to/from these areas without adversely affecting other airspace uses throughout the affected region. Therefore, impacts to airspace around Whiteman AFB and the airspace proposed for use would not be significant.

WH3.2 NOISE

Although noise can affect several resource areas, this section describes potential noise impacts on human annoyance and health, physical effects on structures, and potential impacts to animals in the care of humans. Noise impacts on biological resources (e.g., wildlife), cultural resources, land use and recreation, socioeconomics (e.g., property values), and environmental justice /protection of children are discussed in sections dedicated to those resources. Chapter 3, Section 3.2, defines terms used to describe the noise environment as well as methods used to calculate noise levels and assess potential noise impacts. These terms and analytical methods are uniformly applied to all four bases. A summary of noise metrics used in this EIS is also provided in Table WH3-2.

For consistency, the dB unit is used throughout this EIS. However, all subsonic aircraft noise levels described in this EIS are measured in dBA. In compliance with current DoD Noise Working Group (DNWG) guidance, the overall noise environment is described in this EIS using the day-night average sound level (DNL) metric. During scoping, people submitted comments expressing concern about use of the DNL metric. The DNL metric is used because it is the preferred noise metric of the U.S. Department of Housing and Urban Development (HUD), FAA, U.S. Environmental Protection Agency (USEPA), and DoD. Studies of community annoyance in response to numerous types of environmental noise show that there is a correlation between DNL and the percent of the population that can be expected to be highly annoyed by the noise. In addition to the DNL metric, supplemental noise metrics are used to provide a more complete picture of noise and particular types of noise impacts (Table WH3-2). Operations occurring during environmental nighttime hours are assessed a 10-dB penalty applied in calculation of DNL (refer to Chapter 3, Section 3.2.3, for more detailed resource definition and methodology used to evaluate impacts).

Comments received during scoping indicated a broad range of concerns and requested a comprehensive presentation of noise impacts. Therefore, this analysis covers a wide variety of potential noise impact categories. Additional details are provided in Volume II, Appendix B.

Table WH3-2. Summary of Noise Metrics Used in this EIS

Different noise measurements (or metrics) quantify noise. These noise metrics are as follows:

- The A-weighted decibel (dBA) is used to reflect a weighting process applied to noise measurements to filter out very low and very high frequencies of sound in order to replicate human sensitivity to different frequencies of sound and reflect those frequencies at which human hearing is most sensitive. Environmental noise is typically measured in dBA.
- Day-Night Average Sound Level (DNL) combines the levels and durations of noise events, the number of events over a 24-hour period, and more intrusive nighttime noise to calculate an average noise exposure.
- Onset Rate-Adjusted Day-Night Average Sound Level (L_{dnmr}) adds to the DNL metric the startle effects of an aircraft flying low and fast where the sound can rise to its maximum very quickly. Because the tempo of operations is so variable in airspace areas, L_{dnmr} is calculated based on the average number of operations per day in the busiest month of the year.
- C-Weighted Day-Night Average Sound Level (CDNL) is a day-night average sound level computed for impulsive noise such as sonic booms. Peak overpressure, measured in pounds per square foot (psf), characterizes the strength of impulsive noise.
- Sound Exposure Level (SEL) accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
- Maximum Noise Level (L_{max}) is the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight).
- Equivalent Noise Level (L_{eq}) represents aircraft noise levels decibel-averaged over a specified time period and is useful for considering noise effects during a specific time period such as a school day (denoted $L_{eq(SD)}$ and measured from 8:00 A.M. to 4:00 P.M.).

In this EIS, multiple noise metrics are used to describe the noise environment at each alternative base. This approach, which is in accordance with DoD policy (DoD 2009), provides a more complete picture of the current and expected noise experience than can be provided by any one noise metric alone.

WH3.2.1 Base Affected Environment

This section discusses noise impacts near the installation. Noise generated in the training airspace and during training to and from the training airspace is discussed in Section WH3.1.

Under baseline conditions, 33,180 airfield operations are conducted annually at Whiteman AFB. This includes 5,810 operations by the 442 FW AFRC A-10 pilots. Pilots from the 509 BW and 131 BW conduct 6,198 B-2 operations and 15,284 T-38 operations annually. MO ANG pilots conduct 4,808 H-60 operations annually. Transient aircraft pilots conduct 1,080 operations annually. Transient aircraft pilots use the airfield for a variety of purposes (e.g., stop-over during cross country flights, unfamiliar airfield for practice approaches, divert landing location during severe weather), and transient aircraft could potentially include any aircraft type. Approximately 7 percent of total airfield operations are conducted between 10:00 P.M. and 7:00 A.M. Approximately 4 percent of 442 FW A-10 airfield operations are conducted between 10:00 P.M. and 7:00 A.M.

WH3.2.1.1 Noise Exposure

Several comments received during scoping requested the USAF provide individual overflight noise levels quantified using the sound exposure level (SEL) metric. The information on SELs shown in Table WH3-3 was calculated based on local flying procedures and conditions using methods described in Chapter 3, Section 3.2.3.1. Specifically, Table WH3-3 lists only the highest SEL generated by any flight procedure (e.g., departure, arrival or closed pattern) by any based or transient

aircraft type. The table also states the number of times per year that the flight procedure occurs during "acoustic day" (7:00 A.M. to 10:00 P.M.) and "acoustic night" (10:00 P.M. to 7:00 A.M). It is worth noting that the noise environment at a particular location is complex and the highest SEL is only one descriptor of this complex situation. In addition, actual flight paths vary, due to weather, winds, aircrew technique, and other factors, from the most-frequently followed (representative) flight paths used in noise modeling. Therefore, individual flight events could be closer to, or be farther away from, the representative noise-sensitive location, resulting in noise levels being slightly higher or lower than indicated in Table WH3-3.

Table WH3-3. Highest SEL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline Conditions

Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB) [a,b]
						Annual Operations at this SEL		
Type	ID	Description	Aircraft Group	Aircraft	Operation Type	7:00 A.M. to 10:00 P.M.	10:00 P.M to 7:00 A.M.	
Park	P01	Knob Noster State Park campground	T	F/A-18A/C	Departure	103	3	91
Residential	R01	Residential Area 1	B	B-2A	Closed Pattern	151	101	109
	R02	Residential Area 2	T	F/A-18A/C	Arrival	65	4	109
	R03	Residential Area 3	T	F/A-18A/C	Departure	103	3	102
School[c]	S01	Knob Noster Elementary	B	B-2A	Closed Pattern	41	27	109
	S02	Knob Noster High School	B	B-2A	Closed Pattern	41	27	99

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.
[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.
[c] For the purposes of this noise analysis, noise levels at schools are described throughout this EIS using representative schools; discussion of noise at schools may not include all schools in the area.
Key: T = Transient aircraft or non-Whiteman AFB-based aircraft involved in training exercise; B = Based aircraft

Several factors, including, but not limited to, weather conditions, the precise flight path followed, and whether the aircraft is flying in formation, affect the noise level of individual overflights (Chapter 3, Section 3.2.3). Formation flights involve multiple aircraft, usually of the same type, flying together. The maximum noise level experienced during a formation overflight depends on the spacing and arrangement of the formation's member aircraft. If the aircraft are spaced close together, then doubling the number of aircraft would add as much as 3 dB to the maximum sound level (L_{max}) of the event. Since the SEL metric is an exposure-based metric, doubling the number of aircraft of a single aircraft type adds 3 dB to the event noise level.

Figure WH3-1 shows baseline DNL contours in 5-dB increments. Areas with the highest DNL are located along the runway, beneath the most heavily-used flight paths, and in areas near the airfield where aircraft static engine runs are conducted.

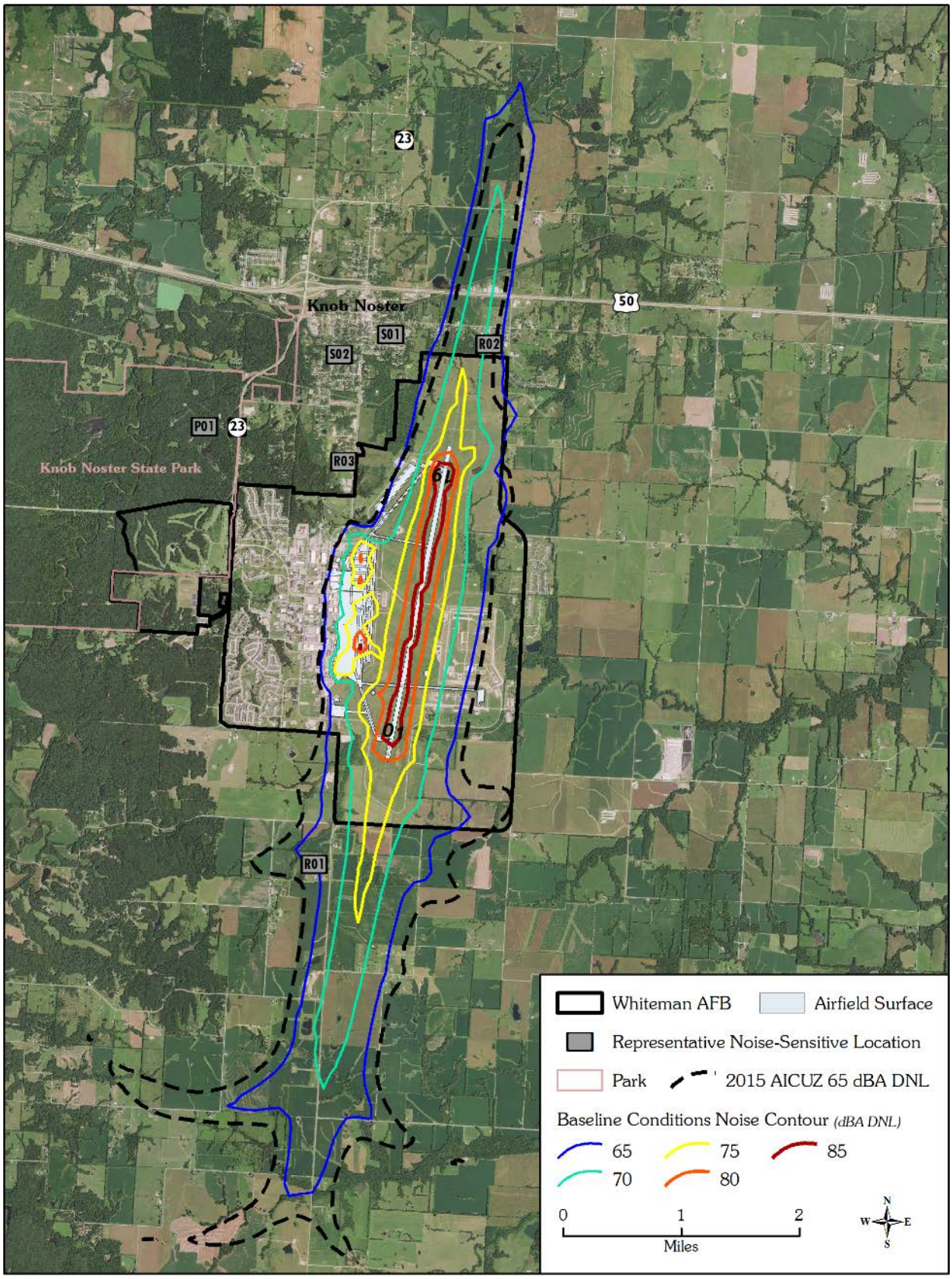

Figure WH3-1. Baseline DNL Contours at Whiteman AFB

Under baseline conditions, 2,089 acres and an estimated 580 residents are currently exposed to DNL of 65 dB or greater (Table WH3-4). People living in areas exposed to higher DNL are more likely to become highly annoyed by the noise. USAF land use guidelines state that residences are incompatible with DNL of 65 to 69 dB unless the structure provides at least 25 dB noise level reduction, and the same recommendations state that residences are incompatible with DNL of 70 to 74 dB unless the structure provides at least 30 dB noise level reduction. Additional details on annoyance and land use recommendations for areas exposed to elevated noise levels are contained in Chapter 3, Section 3.2.3, and Volume II, Appendix B.

Table WH3-4. Off-Base Acres and Population Exposed to DNL of 65 dB or Greater Under Baseline Conditions at Whiteman AFB

DNL (dB)	Acres	Estimated Population
65 – 69	1,500	462
70 – 74	537	118
75 – 79	52	0
80 – 84	0	0
≥85	0	0
Total	**2,089**	**580**

Table WH3-5 lists baseline DNL at several representative noise-sensitive locations, which include a state park, residential areas, and schools. Baseline DNLs at the representative noise-sensitive locations are similar to and indicative of DNLs in surrounding areas. The DNLs at Residential Area 1 and Residential Area 2 are 65 dB or greater.

Table WH3-5. DNL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline Conditions

Type	ID	Description	DNL (dB)
Park	P01	Knob Noster State Park campground	48
Residential	R01	Residential Area 1	65
	R02	Residential Area 2	68
	R03	Residential Area 3	57
School	S01	Knob Noster Elementary School	61
	S02	Knob Noster High School	55

Areas outside the 65 dB DNL contour line could also experience noise that can be disturbing at times. Although noise events are less frequent and/or less intense in areas exposed to DNL less than 65 dB, loud and potentially disturbing noise events do occur. Some people are more noise-sensitive than others as a result of physical, psychological, and emotional factors. People with autism and people afflicted with post-traumatic stress disorder (PTSD) could be particularly sensitive to sudden loud noises such as those that occur near an airbase. The DNL metric is useful for describing the noise environment at a location with a single number, but it does not provide a complete description of the noise environment. In accordance with current DoD policy (DoD 2009), this EIS makes use of several supplemental noise metrics (e.g., SEL, L_{max}, number of events exceeding dB threshold) to provide a more complete description of the noise experience.

WH3.2.1.2 Speech Interference

Speech interference is possible when noise levels exceed 50 dB. For the purposes of this analysis, any change to normal speech patterns is counted as an interference event. Table WH3-6 lists the number of events exceeding L_{max} of 50 dB in buildings with windows open, in buildings with windows closed, and outdoors. Flight paths are variable and speech interference events sometimes occur far from standard Whiteman AFB flight patterns.

Table WH3-6. Potential Speech Interference Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour		
			Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Knob Noster State Park campground	1	<<1	3
Residential	R01	Residential Area 1	3	2	3
	R02	Residential Area 2	3	3	4
	R03	Residential Area 3	3	2	4

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

Key: <<1 indicates that the number of potential speech interference events (>50 dB) per hour resulting from Whiteman AFB-based aircraft overflights is low (rounding to zero)

WH3.2.1.3 Interference with Classroom Learning

Noise interference with learning in schools is of particular concern because noise can interrupt communication or interfere with concentration. When considering intermittent noise caused by aircraft overflights, guidelines for classroom interference indicate that an appropriate criterion is a limit of 35 to 40 dB (depending on classroom size) on indoor background equivalent noise levels during the school day ($L_{eq(SD)}$) and a 50 dB L_{max} limit on single events. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that American National Standards Institute (ANSI) criteria are being exceeded (DNWG 2013). The background $L_{eq(SD)}$ at Knob Noster Elementary School and Knob Noster High School both exceed 40 dB when windows are open, but do not exceed 40 dB with windows closed (Table WH3-7). Currently, at both schools, an average of one noise event per hour exceeds 50 dB indoors if windows are closed and an average of two events per hour exceed 50 dB indoors if windows are open. The number of outdoor events per hour with potential to interfere with speech between 7:00 A.M. and 10:00 P.M. is not directly related to classroom noise level, but is relevant during recess and to other activities that could occur outside the school building.

Table WH3-7. Indoor Classroom Learning Disruption Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Windows Open[a]		Windows Closed[a]		Outdoor
			$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
School	S01	Knob Noster Elementary School	43	2	<35	1	4
	S02	Knob Noster High School	40	2	<35	1	4

[a] Assumes standard values of 15 dB and 25 dB of noise level reductions for windows open and closed, respectively.

[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).

[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

Key*:* $L_{eq(SD)}$ is the equivalent noise level during a school day (defined as 8:00 A.M. to 4:00 P.M.).

WH3.2.1.4 Sleep Disturbance

Nighttime flying, which is required as part of training for certain missions, has an increased likelihood of causing sleep disturbance. The lack of quality sleep has the potential to affect health and concentration. The probability of being awakened at least once per night was calculated using a method described by the ANSI (ANSI 2008). The method first predicts the probability of awakening associated with each type of flying event (higher SELs yield higher probability of awakening) and then sums the probabilities associated with all event types. The overall probability of awakening at least once per night reflects all flying events that occur between 10:00 P.M. and 7:00 A.M., when most people sleep (Table WH3-8). Sleep disturbance probabilities listed for parks and schools are

not intended to imply that people regularly sleep in parks or schools, but instead are indicative of impacts in nearby residential areas. Results apply only to people who sleep during the night. People who sleep during the day experience additional noise events, resulting in higher probabilities of awakening.

Table WH3-8. Average Probability of Awakening Under Baseline Conditions at Whiteman AFB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)	
			Windows Open[a]	Windows Closed[a]
Park	P01	Knob Noster State Park campground	2	1
Residential	R01	Residential Area 1	7	4
	R02	Residential Area 2	9	6
	R03	Residential Area 3	5	2
School	S01	Knob Noster Elementary School	5	2
	S02	Knob Noster High School	5	2

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.1.5 Potential for Hearing Loss

Potential for Hearing Loss (PHL) applies to people living in high noise environments where they can experience long-term (40 years) hearing effects resulting from DNL greater than 80 dB (USD 2009). PHL is not an issue of concern because no residences are exposed to DNL greater than 80 dB.

WH3.2.1.6 Occupational Noise

In on-base areas with high noise levels, existing USAF occupational noise exposure prevention procedures, such as hearing protection and monitoring, are implemented to comply with all applicable Occupational Safety and Health Administration (OSHA) and USAF occupational noise exposure regulations.

WH3.2.1.7 Non-auditory Health Impact

During scoping, the question of the potential for non-auditory health effects from noise was raised. Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. Some of the highly publicized research reports on the impacts of noise on human health effects are unsubstantiated or not based on sound science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980), no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For

Disease Control performed a more thorough study near Hartsfield-Jackson Atlanta International Airport, no relationships were found for levels greater than 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires were administered for health, socioeconomic, and lifestyle factors, including diet and physical exercise. Hypertension was defined by World Health Organization (WHO) blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

The HYENA results were presented as an odds ratio (OR). An OR of 1 indicates there is no added risk, while an OR of 2 indicates risk is doubled. An OR of 1.14 was found for nighttime aircraft noise, measured by the equivalent noise level during nighttime hours (L_{night}). For daytime aircraft noise, measured by 16-hour equivalent noise level (L_{eq16}), the OR was 0.93. For road traffic noise, measured by 24-hour equivalent noise level (L_{eq24}), the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

For these studies, aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries. The result is therefore pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow Airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. During the Draft EIS public comment period, several commenters provided citations of research papers and requested additional information from these research papers be included in the Final EIS. Please refer to Chapter 3, Section 3.2.3.1.7, for additional information that has been added to the Final EIS.

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large-scale HYENA study (Jarup et al. 2005, 2008) and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

WH3.2.1.8 Structural Damage

Noise that does not exceed 130 dB in any 1/3-octave frequency band or last for more than 1 second does not typically have the potential to damage structures in good repair (CHABA 1977). The term "frequency bands" refers to noise energy in a certain range of frequencies and is similar in concept to frequency bands employed on home stereo equalizers to control relative levels of bass and treble. Noise energy in certain frequency bands has increased potential to vibrate and/or damage structures.

Noise exceeding 130 dB in any 1/3-octave frequency band and lasting for more than 1 second of that intensity and duration does not occur except on the flightline immediately adjacent to jet aircraft.

Noise-induced structural vibration and secondary vibrations (i.e., "rattle") of objects within structures can occur during loud overflights. Rattling of objects such as dishes, hanging pictures, and loose window panes can cause residents to fear damage. Rattling objects have the potential to contribute to annoyance along with other potential noise effects (e.g., speech interference, sleep disturbance).

WH3.2.1.9 Animals in the Care of Humans

Potential noise impacts on wildlife are discussed in Section WH3.6. However, pets, other domesticated animals, and animals kept in zoos live in different circumstances than wild animals and often react differently to human-generated noises, particularly when enclosed in small spaces. Negative reactions to loud overflights are possible under baseline conditions.

WH3.2.2 Base Environmental Consequences

Implementation of the AFRC F-35A mission would replace the 24 A-10 aircraft currently assigned to the 442 FW with 24 F-35A aircraft. The number of airfield operations flown annually by the 442 FW would increase from 5,810 to 11,580. The total number of airfield operations flown by all aircraft at Whiteman AFB would increase by 17.4 percent.

AFRC F-35A pilots would fly approximately 7 percent of initial approaches to the runway during the late-night time period between 10:00 P.M. and 7:00 A.M. This is the same percentage of initial approaches that are currently conducted by 442 FW A-10 pilots late at night. As is currently the case with A-10 pilots, AFRC F-35A pilots would not typically conduct departures or closed patterns (i.e., multiple practice approaches) between 10:00 P.M. and 7:00 A.M.

Based on context and intensity, noise impacts resulting from implementation of the proposed AFRC F-35A mission at Whiteman AFB would be considered significant. As described in Section 2.5, the USAF considered several potential noise mitigation measures. None of the measures considered were determined to be operationally feasible. Local flight procedures at Whiteman AFB are internally reviewed on a regular basis for changes that create the best balance between safety (paramount concern), mission and training effectiveness, and minimizing noise impacts. Furthermore, the base maintains open lines of communication with the City of Knob Noster and local community leaders to develop and implement potential noise abatement procedures when possible. Currently, no additional noise abatement procedures have been identified that would reduce noise impacts without also adversely affecting safety of flight and/or mission effectiveness.

Operating procedures already include several procedures to minimize noise impacts. These procedures, which have been developed over several years as part of regularly-occurring procedural review process, have been selected to minimize mission impacts while maintaining operational efficiency and flexibility; these procedures would be applied to any new aircraft at the installation, including the F-35A. Noise modeling conducted as part of this EIS analysis reflects the following procedures:

- Flying and static engine run activities are minimized between 10:00 P.M. and 7:00 A.M.;
- Flight paths are routed to avoid populated areas where practicable; and
- Aircraft conducting VFR second approach patterns must avoid direct overflight of the City of Knob Noster at less than 2,000 feet MSL.

Construction and demolition (C&D) projects in support of the proposed AFRC F-35 mission would generate short-term, localized increases in noise. However, the installation is currently exposed to elevated aircraft noise levels as well as noise generated by the day-to-day operation and maintenance (O&M) of vehicles and equipment. Construction would occur during normal working hours (i.e., 7:00 A.M. to 5:00 P.M.), and construction equipment would be equipped with mufflers. Workers would wear hearing protection in accordance with applicable regulations. Transportation of materials and equipment to and from the construction sites would generate noise similar to heavy trucks currently operating on base and along local roadways. In the context of ongoing frequent and intense aircraft noise events on an active military installation, construction noise generated by the AFRC F-35A mission would not result in significant impacts.

WH3.2.2.1 Noise Exposure

WH3.2.2.1.1 Scenario A

The F-35A aircraft is substantially louder than the A-10 aircraft, although the precise difference in noise level depends on the specific flight configurations being used by each aircraft and the aircraft's location relative to the listener (both of which are heavily dependent on the aircraft's performance characteristics). Table WH3-9 compares A-10 and F-35A individual overflight noise levels at a representative noise-sensitive location northwest of the runway (Knob Noster Elementary School). The noise levels listed in Table WH3-9 reflect flight procedures at Whiteman AFB (e.g., pattern altitudes) and are not directly applicable to other installations. The specific types of flight departure, arrival, or closed pattern procedures listed in the table were selected because they generate the highest dB SEL of any departure, arrival, or closed pattern procedure flown by that aircraft at the location studied. The same set of Whiteman AFB-specific flight procedures used to calculate DNL noise contours was also used to calculate noise levels in Table WH3-9.

Table WH3-9. Comparison of A-10 and F-35A Noise Levels at the Knob Noster Elementary School near Whiteman AFB

Aircraft	Operation Type	Engine Power	Airspeed (knots)	Altitude (feet AGL)	Slant Distance (feet)	SEL (dB)	L_{max} (dB)
F-35A (Military Power)	Departure	100% ETR	300	2,305	3,865	102	94
F-35A (Afterburner Power)[a]		100% ETR	300	2,436	3,919	102	94
A-10[b]		100% NC	240	1,681	5,939	79	70
F-35A (Overhead Break)	Arrival	50% ETR	200	2,370	2,892	97	84
A-10[b]		85% NC	200	1,899	2,669	80	73
F-35A (VFR Low Approach)	Closed Pattern	60% ETR	190	1,787	1,747	105	94
A-10[b]		NA	NA	NA	NA	NA	NA

[a] For a detailed explanation of why F-35A afterburner departures might have lower SEL and L_{max} values than military power departures, see Chapter 3, Section 3.2.3.1. Essentially, during afterburner takeoffs, the aircraft reaches the required takeoff speed and leaves the ground sooner, and is at a slightly higher altitude throughout the flight profile. As a result, the aircraft altitude and slant distance at the location studied are both typically higher for the afterburner departure. Typically, the afterburner is turned off at approximately 10,000 feet from brake release, which occurs before the aircraft is over the location studied. The engine power (i.e., ETR) setting of the aircraft when it is above the location studied is the same for both the military power and the afterburner departure.

[b] A-10 aircraft are not equipped with afterburner and do not regularly fly closed pattern (i.e., multiple practice approach) operations at Whiteman AFB.

Notes: Noise levels presented were calculated at Knob Noster Elementary School for the departure, arrival, and closed pattern flight that has the highest SEL at this location. Actual individual overflight noise levels vary from the noise levels listed because of variations in aircraft configuration, flight track, altitude, and atmospheric conditions. Representative noise levels were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

Key: ETR = Engine Thrust Request; NC = core engine speed; NA = not applicable

AFRC F-35A pilots conducting afterburner departures would only use the afterburner for a short period of time (see Chapter 3, Figure 3-1), and then continue their climb in military power (i.e.,

the same power setting used throughout the departure during non-afterburner departures). During afterburner departures, the afterburner would be de-selected long before the aircraft would overfly Knob Noster Elementary School. Because afterburner and non-afterburner departures are at the same power setting as they pass near the school, overflight noise levels generated by the two types of departures are the same at this school.

As noted in Chapter 3, Section 3.2.3, computer noise modeling was conducted in compliance with current USAF and DoD-approved methods. The modeling accounted for the effects of terrain relief (e.g., hills and valleys) near Whiteman AFB as well as surface type on the propagation of sound. In accordance with standard modeling procedures, noise modeling at Whiteman AFB used median atmospheric conditions for sound propagation based on local climate records. The modeling does not reflect possible future climates in Missouri, in part because the degree to which the climate will change and the timeframe in which change would occur are not known at this time. Noise levels were calculated for an average annual day, which is a day with 1/365th of annual total operations. The computer noise model NOISEMAP references a database of field-measured sound levels for aircraft in various flight configurations. The model also uses data on flight procedures for current and proposed aircraft operations (e.g., where, how often, what time of day, and what configurations are used) based on recent inputs provided by Whiteman AFB pilots and ATC. Application of noise results generated for another airfield would be inappropriate because flight procedures, terrain, and several other factors are different at other airfields. F-35A flight parameters (e.g., altitude, airspeed, and engine power setting) that are expected to be used at Whiteman AFB were developed based on information provided by F-35A pilots at bases where the aircraft is operating currently, such as Luke, Hill, and Eglin AFBs. These flight parameters were used to generate results specific to Whiteman AFB.

Several comments received during scoping requested that the USAF provide individual predicted overflight noise levels using the SEL noise metric. Information is provided on the flight procedure with the highest SEL at several representative noise-sensitive locations in Table WH3-10. A flight procedure is a specific type of operation (e.g., afterburner departure) on a specific flight path, by a specific aircraft type. Actual flight paths vary as a result of weather, winds, aircrew technique, and other factors, and individual flights would deviate in position and noise level from those listed in Table WH3-10. In addition, the flight procedure with the highest SEL is one aspect of a complex sound environment which includes many other flight procedures (e.g., flaps or gear position) as well as other noise sources. At all of the representative noise-sensitive locations except for the Knob Noster Elementary School and the Knob Noster High School, the highest SEL would increase by 2 to 7 dB. The new procedure resulting in the highest SEL would be the arrival of an F-35A aircraft. At the Knob Noster Elementary School, the highest SEL is generated by a based B-2 departure and this would continue to be the case with implementation of the new mission. At the Knob Noster High School, the highest whole number SEL would remain the same, but a based F-35A arrival would generate a higher SEL (less than 1 dB higher) than the based B-2 closed pattern which generates the highest SEL at that location under baseline conditions.

Table WH3-10. Highest SEL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline and AFRC F-35A Mission Conditions

Scenario	Representative Noise-Sensitive Location			Flight Procedure with the Highest SEL					SEL (dB)[a,b]
	Type	ID	Description	Aircraft Group	Aircraft	Operation Type	Annual Operations at this SEL		
							7:00 A.M. to 10:00 P.M.	10:00 P.M. to 7:00 A.M.	
Baseline	Park	P01	Knob Noster State Park campground	T	F/A-18A/C	Departure	103	3	91
	Residential	R01	Residential Area 1	B	B-2A	Closed Pattern	151	101	109
		R02	Residential Area 2	T	F/A-18A/C	Arrival	65	4	109
		R03	Residential Area 3	T	F/A-18A/C	Departure	103	3	102
	School	S01	Knob Noster Elementary School	B	B-2A	Closed Pattern	41	27	109
		S02	Knob Noster High School	B	B-2A	Closed Pattern	41	27	99
AFRC F-35A Mission[c]	Park	P01	Knob Noster State Park campground	B	F-35A	Closed Pattern	3,465	0	96
	Residential	R01	Residential Area 1	B	F-35A	Closed Pattern	1,213	0	111
		R02	Residential Area 2	B	F-35A	Closed Pattern	397	0	114
		R03	Residential Area 3	B	F-35A	Closed Pattern	588	0	109
	School	S01	Knob Noster Elementary School	B	B-2A	Closed Pattern	41	27	109
		S02	Knob Noster High School	B	F-35A	Arrival	1,515	148	99

[a] SELs were calculated using NOISEMAP Version 7.3 and the same operational data (e.g., flight tracks and flight profiles) used to calculate the DNL contours.

[b] SEL accounts for the maximum sound level and the length of time a sound lasts by compressing the total sound exposure for an entire event into a single second.

[c] Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other and the numbers of annual operations include all three afterburner scenarios.

Key: T = Transient or non-Whiteman AFB aircraft involved in training exercise; B = Based aircraft

Figure WH3-2 shows the DNL contours in 5-dB increments that would result from Scenario A overlain on the baseline noise contours for comparison. An additional 2,421 acres and an estimated 2,226 additional residents would be newly exposed to DNL of 65 dB or greater (Table WH3-11). As described in Chapter 3, Section 3.2.3, the affected population was estimated based on U.S. Census data at the Block Group (BG) level with adjustments to remove non-residential areas from calculations (USCB 2016b).

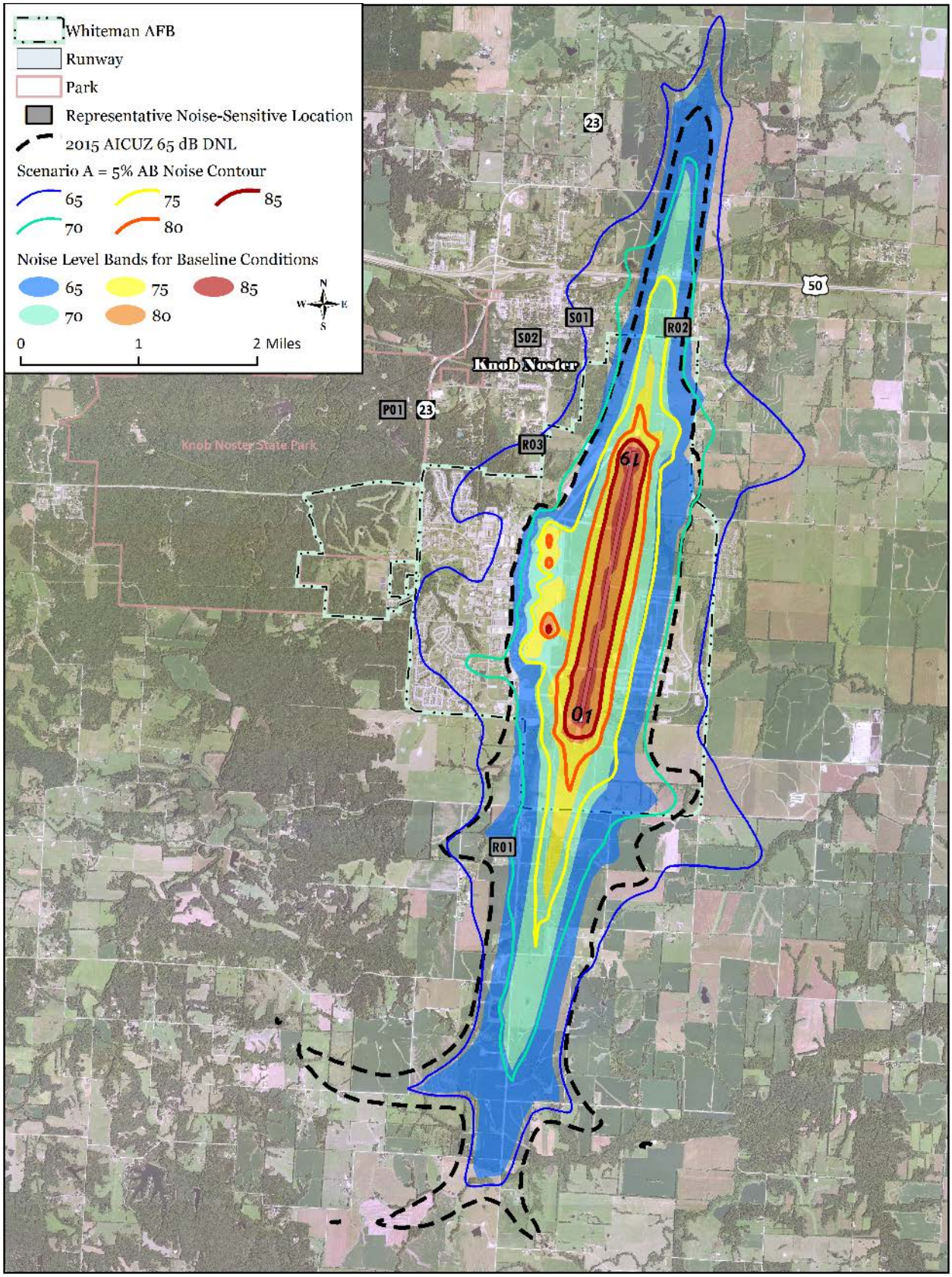

Figure WH3-2. AFRC F-35A Scenario A DNL Contours at Whiteman AFB

Table WH3-11. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario A at Whitman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario A	Change[a]	Baseline	Scenario A	Change[a]
65 – 69	1,500	3,351	1,851	462	2,353	1,891
70 – 74	537	959	422	118	449	331
75 – 79	52	200	148	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,510**	**2,421**	**580**	**2,806**	**2,226**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

As noted in Chapter 3, Section 3.2.3, the probability that an individual will become annoyed by noise is impossible to predict with confidence because of differing physical and emotional variables between individuals (Newman and Beattie 1985). These variables include, but are not limited to, the person's feeling about the necessity or preventability of the noise, the person's attitude about the environment, and any feelings of fear the person might have about the noise source. It can be said with confidence that people in communities exposed to increased DNL would be more likely to become highly annoyed by the noise (Schultz 1978, Finegold et al. 1994, Meidema and Vos 1998). Studies conducted by Schultz in 1978 and Finegold et al. in 1994 indicated that approximately 12 percent of people exposed to DNL of 65 dB and 36 percent of people exposed to DNL of 75 dB could be expected to be highly annoyed by the noise (Schultz 1978, Finegold et al. 1994). More recent studies suggest that the percentage of people highly annoyed by noise–and aircraft noise in particular–might be higher than previously thought. A study conducted by Meidema and Vos in 1998 indicated that 28 percent of people could be expected to be annoyed by DNL of 65 dB, and 48 percent of people could be expected to be highly annoyed by DNL of 75 dB (Meidema and Vos 1998). Additional details on the prevalence of annoyance in high noise communities are contained in Volume II, Appendix B.

USAF land use compatibility guidelines classify residential land uses as incompatible with DNL of 65 to 69 dB unless the structure provides at least 25 dB noise level reduction. Residences are considered incompatible with DNL of 70 to 74 dB unless the structure provides at least 30 dB noise level reduction. Structural elements with better-than-average temperature insulation properties (e.g., double-paned windows) tend to also provide better-than-average noise level reduction. At DNL greater than 75 dB, residential land uses are always considered to be incompatible. A more detailed discussion of land use compatibility is contained in Section WH3.8.

The DNL changes that would result from the proposed new mission are shown in Table WH3-11. Noise levels resulting from the new mission at non-residential locations listed (e.g., schools) are similar to noise levels in any nearby residential areas. Increases in DNL at the locations studied would range from 4 to 9 dB. The DNL at Residential Area 3 and Knob Noster Elementary School would increase from less than 65 dB to 65 dB or greater and both would become incompatible land uses due to this level of noise. The DNL at Residential Area 1 would remain between 65 and 69 dB. The DNL at Residential Area 2 would increase from 65 to 69 dB to 70 to 74 dB.

Table WH3-12. DNL at Representative Noise-Sensitive Locations near Whiteman AFB Under Baseline and Scenario A Conditions

Type	ID	Description	DNL (dB)		
			Baseline	Scenario A	Change
Park	P01	Knob Noster State Park campground	48	54	6
Residential	R01	Residential Area 1	65	69	4
	R02	Residential Area 2	68	73	5
	R03	Residential Area 3	57	66	9
School	S01	Knob Noster Elementary School	61	65	4
	S02	Knob Noster High School	55	62	7

WH3.2.2.1.2 Scenario B

Under Scenario B, 50 percent of F-35A departures would use afterburner power, whereas 5 percent of F-35A departures would use afterburner power under Scenario A. All other aspects of the F-35A mission would be the same under Scenario B as Scenario A. There would be no difference in the highest SELs experienced at noise-sensitive locations under Scenario B relative to those listed for Scenario A in Table WH3-10. Military power and afterburner power departure SELs at the noise-sensitive locations are within 1 dB of each other, and the numbers of annual operations in Table WH3-10 include all three afterburner scenarios.

As discussed in Section WH3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. The Scenario B 65 dB DNL contour is slightly larger than the Scenario A 65 dB DNL contour in areas to the right and left of the runway but slightly smaller in areas farther out along departure flight paths (Figure WH3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-29 in Appendix B, Section B.4. There would be 2,517 acres and an estimated 2,507 people newly exposed to DNL greater than 65 dB under Scenario B (Table WH3-13).

Table WH3-13. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario B at Whiteman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario B	Change[a]	Baseline	Scenario B	Change[a]
65 – 69	1,500	3,445	1,945	462	2,639	2,177
70 – 74	537	964	427	118	444	326
75 – 79	52	197	145	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,606**	**2,517**	**580**	**3,087**	**2,507**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

The DNL at representative noise-sensitive locations under Scenario B would be the same as under Scenario A (see Table WH3-12) except at Knob Noster Park, where DNL would be 55 dB rather than 54 dB.

WH3.2.2.1.3 Scenario C

Under Scenario C, 95 percent of F-35A departures would use afterburner power, but all other aspects of the AFRC F-35A mission would be identical to Scenarios A and B. The highest SELs experienced at noise-sensitive locations would be the same under Scenario C as under Scenario A (see Table WH3-10).

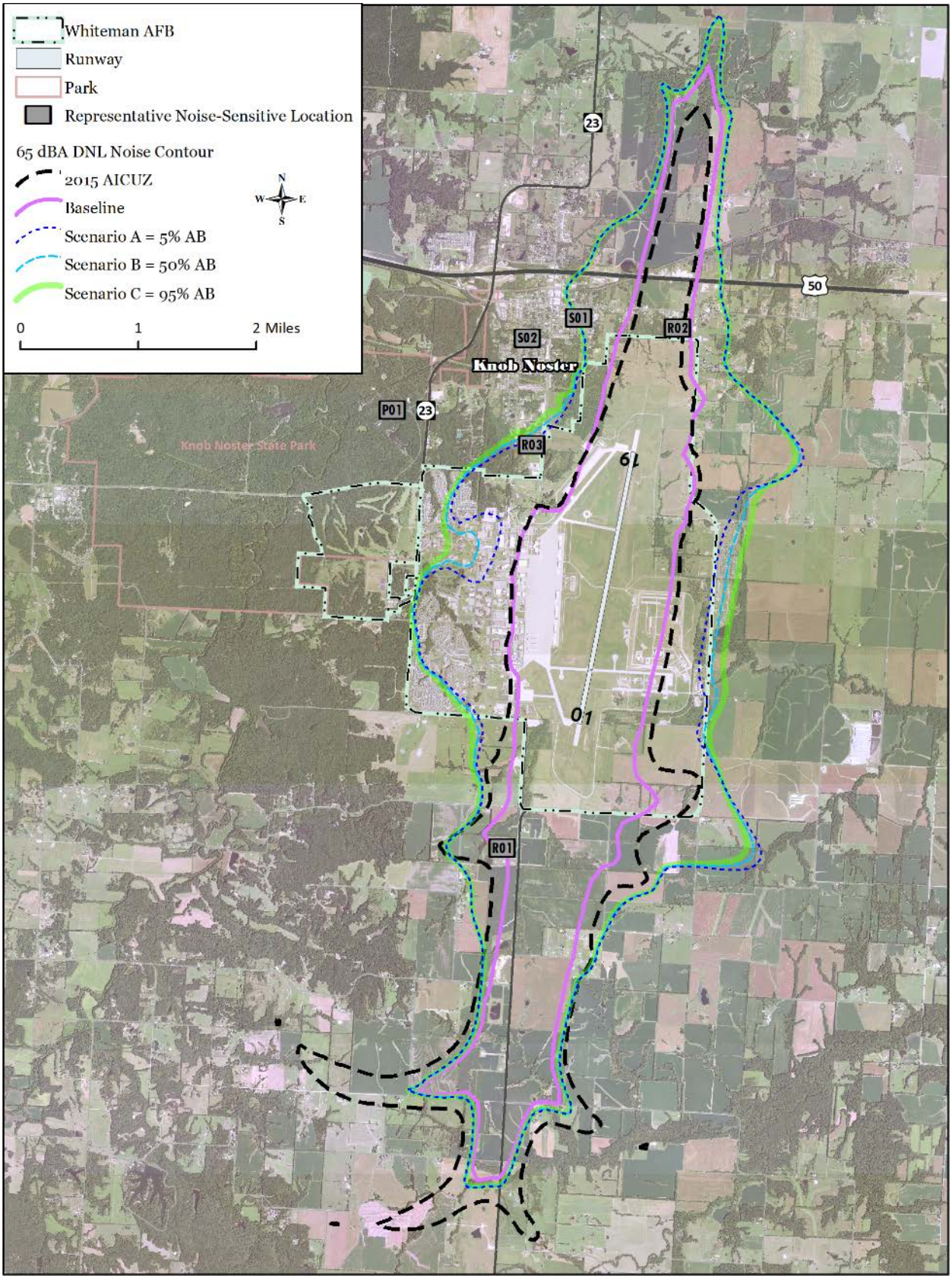

Figure WH3-3. AFRC F-35A Mission 65 dB DNL Contours (Scenarios A, B, and C) at Whiteman AFB

As discussed in Section WH3.2.2.1.1, people exposed to increases in DNL are more likely to become highly annoyed by the noise, and some land uses are not considered compatible at DNL greater than 65 dB. In areas to the right and left of the runway, the Scenario C 65 dB DNL contour is slightly larger than the Scenario A or B contours, but the Scenario C 65 dB DNL contour is slightly smaller than the Scenario A or B 65 dB DNL contour farther out along departure flight paths (see Figure WH3-3). The DNL contours are shown in 5-dB intervals ranging from 65 to 85 dB on Figure B-30 in Appendix B, Section B.4. There would be 2,620 acres and an estimated 2,804 people newly exposed to DNL greater than 65 dB under Scenario C (Table WH3-14).

Table WH3-14. Off-Base Acres and Estimated Population Exposed to DNL of 65 dB or Greater from Scenario C at Whiteman AFB

DNL (dB)	Acres			Estimated Population		
	Baseline	Scenario C	Change[a]	Baseline	Scenario C	Change[a]
65 – 69	1,500	3,547	2,047	462	2,942	2,480
70 – 74	537	968	431	118	438	320
75 – 79	52	194	142	0	4	4
80 – 84	0	0	0	0	0	0
≥85	0	0	0	0	0	0
Total	**2,089**	**4,709**	**2,620**	**580**	**3,384**	**2,804**

[a] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

The DNL at representative noise-sensitive locations under Scenario C would be the same as under Scenario A (see Table WH3-12) except at Knob Noster Park, where DNL would be 55 dB rather than 54 dB, and at Residential Area 3, where DNL would be 67 dB rather than 66 dB.

WH3.2.2.2 Speech Interference

WH3.2.2.2.1 Scenario A

The number of daytime (7:00 A.M. to 10:00 P.M.) events per hour that could potentially interfere with speech are listed in Table WH3-15. Any aircraft noise event exceeding 50 dB L_{max} was assumed to have some potential to interfere with speech. The interference would be for a few seconds for each overflight. Noise levels at the locations listed are similar to noise levels in nearby residential areas. The number of indoor events per hour with windows open, indoor events with windows closed, and outdoor events would increase by two or less. Any increases in the frequency of disruptions in communication have a high likelihood of being annoying.

Table WH3-15. Potential Speech Interference Resulting from Scenario A at Whiteman AFB

Type	ID	Description	Annual Average Daily Daytime (7:00 A.M. to 10:00 P.M.) Events per Hour					
			Scenario A			Change		
			Windows Open[a]	Windows Closed[a]	Outdoor	Windows Open[a]	Windows Closed[a]	Outdoor
Park	P01	Knob Noster State Park campground	3	1	4	2	1	1
Residential	R01	Residential Area 1	4	3	5	1	1	2
	R02	Residential Area 2	4	3	5	1	0	1
	R03	Residential Area 3	4	3	5	1	1	1

[a] Number of events per average hour with an indoor L_{max} of at least 50 dB; assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.2.2.2 Scenario B

The number of potential speech interference events under Scenario B would be the same as under Scenario A (see Table WH3-15) except that Residential Area 2 would experience four rather than three potential speech interference events per hour with windows closed.

WH3.2.2.2.3 Scenario C

Under Scenario C, the number of potential speech interference events would be the same as under Scenario B. The number of speech interference events would differ from Scenario A (see Table WH3-15) only in that Residential Area 2 would experience four rather than three events per hour with windows closed.

WH3.2.2.3 Interference with Classroom Learning

WH3.2.2.3.1 Scenario A

Table WH3-16 presents changes in classroom noise levels with windows open and closed. As described in Section WH3.2.1.3, both the Knob Noster Elementary School and the Knob Noster High School with windows open are currently exposed to $L_{eq(SD)}$ greater than 40 dB. In accordance with DNWG recommendations, estimated interior $L_{eq(SD)}$ exceeding 40 dB was taken as an indication that ANSI criteria are being exceeded (DNWG 2013). Under the proposed action, both schools would continue to be exposed to $L_{eq(SD)}$ greater than 40 dB when windows are open and the Knob Noster Elementary School would be exposed to $L_{eq(SD)}$ greater than 40 dB while windows are closed. Indoor background noise levels at Knob Noster High School would remain below 40 dB $L_{eq(SD)}$. The average number of events per hour that would exceed 50 dB would increase by one indoors with windows open, indoors with windows closed, and outdoors.

Table WH3-16. Indoor Classroom Learning Disruption Resulting from Scenario A at Whiteman AFB

ID	Description	Scenario A					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Knob Noster Elementary School	51	3	41	2	5	8	1	6	1	1
S02	Knob Noster High School	47	3	37	2	5	7	1	2	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reduction for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

WH3.2.2.3.2 Scenario B

Under Scenario B, the $L_{eq(SD)}$ at Knob Noster High School would increase to 48 dB with windows open and to 38 dB with windows closed (Table WH3-17). The $L_{eq(SD)}$ at Knob Noster Elementary School would be the same as under Scenario A with windows open or closed and the number of events with potential to interfere with speech would be the same under Scenario B as under Scenario A at both schools with windows open or closed.

Table WH3-17. Indoor Classroom Learning Disruption Resulting from Scenario B at Whiteman AFB

ID	Description	Scenario B					Change				
		Windows Open[a]		Windows Closed[a]		Outdoor	Windows Open[a]		Windows Closed[a]		Outdoor
		$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	$L_{eq(SD)}$ (dB)	Events per Hour[b]	Events per Hour[c]
S01	Knob Noster Elementary School	51	3	41	2	5	8	1	6	1	1
S02	Knob Noster High School	48	3	38	2	5	8	1	3	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reduction for windows open and closed, respectively.
[b] Average number of events per hour at or above an indoor L_{max} of 50 dB during an average 8-hour school day (8:00 A.M. to 4:00 P.M.).
[c] Average number of events per hour at or above an outdoor L_{max} of 50 dB during daytime (7:00 A.M. to 10:00 P.M.).

WH3.2.2.3.3 Scenario C

Under Scenario C, $L_{eq(SD)}$ and potential speech interference would be the same as under Scenario B (see Table WH3-17) except that the number of events per hour at Knob Noster High School with the potential to interfere with speech would be three rather than two.

WH3.2.2.4 Sleep Disturbance

As noted in Chapter 3, Section 3.2.3, the probability of sleep being disturbed at least once per night is estimated based on the number of overflight events and the SEL of each event. Although AFRC F-35A pilots would continue to conduct only initial approaches between 10:00 P.M. and 7:00 A.M., the noise level generated by the approaches would be higher and the number of sorties would increase. The probability of awakening would increase by 2 percent or less at the locations studied - and in any residential areas near the locations studied (Table WH3-18). Impacts to sleep disturbance resulting from implementation of the AFRC F-35A mission would be the same regardless of which afterburner scenario is selected. Results apply only to people who sleep during the night. People who sleep during the day would experience additional noise events, resulting in higher probabilities of awakening.

Table WH3-18. Average Probability of Awakening Resulting from the AFRC F-35A Mission at Whiteman AFB

Type	ID	Description	Annual Average Nightly (10:00 P.M. to 7:00 A.M.) Probability of Awakening (%)			
			AFRC F-35A Mission		Change	
			Windows Open[a]	Windows Closed[a]	Windows Open[a]	Windows Closed[a]
Park	P01	Knob Noster State Park campground	4	2	2	1
Residential	R01	Residential Area 1	8	5	1	1
	R02	Residential Area 2	11	7	2	1
	R03	Residential Area 3	6	3	1	1
School	S01	Knob Noster Elementary School	7	3	2	1
	S02	Knob Noster High School	6	3	1	1

[a] Assumes standard values of 15 dB and 25 dB noise level reductions for windows open and closed, respectively.

WH3.2.2.5 Potential for Hearing Loss

Implementation of the AFRC-F-35A mission (with any of the three afterburner scenarios selected) would not expose any on-base or off-base residences to DNL greater than 80 dB. Therefore, PHL would not result from implementation of the AFRC F-35A mission.

WH3.2.2.6 Occupational Noise

USAF occupational noise exposure prevention procedures (e.g., hearing protection and monitoring) would be implemented under the AFRC F-35A mission, regardless of which afterburner scenario is selected. These procedures would comply with all applicable OSHA and USAF occupational noise exposure regulations.

WH3.2.2.7 Non-auditory Health Impacts

As noted in Section DM3.2.1.7, the current state of scientific knowledge does not yet support a consistent causal relationship between exposure to aircraft noise and non-auditory health impacts (i.e., impacts other than hearing loss). Several types of potential health impacts have been investigated in multiple studies with contradictory results (Meecham and Shaw 1979; Frerichs et al. 1980; Jones and Tauscher 1978; Edmonds et al. 1979). The premise of the studies is that annoyance causes stress, and prolonged stress is known to be a contributor to a number of health disorders. The connection from annoyance to stress to health issues requires careful experimental design, and the resulting data are subject to different interpretations. A recent, large-scale study indicated that nighttime aircraft noise could be linked to increases in the likelihood of hypertension (Jarup et al. 2005, 2008). However, extensive reviews of recent literature conducted by several groups support the conclusion that it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence (Basner et al. 2017; FICAN 2018; van Kempen et al. 2018).

WH3.2.2.8 Structural Damage

Damage to structures is not anticipated to result from AFRC F-35A subsonic noise because noise resulting from implementation of the AFRC F-35A mission would not exceed 130 dB in any 1/3-octave frequency band at distances of greater than 250 feet (CHABA 1977).

Furthermore, studies conducted on vibrations induced by subsonic aircraft overflights generating noise levels similar to those that result from operation of the F-35A in ancient Anasazi ruins indicate that vibrations would not occur at or near potentially damaging levels (Battis 1983). Additional discussion of the effects of noise on cultural resources is contained in Section WH3.7. Noise-induced structural vibration and secondary vibrations (i.e., “rattle”) of objects in structures would continue to occur. Induced vibrations do not normally result in structural damage, but the rattling of objects does have the potential to contribute to annoyance. Although the risk posed to structures by noise would be minimal, a process exists for dealing with any such damage. Any claims from USAF-related damage would begin by contacting the Whiteman AFB Public Affairs Office with details of the claim. The USAF would then investigate the claim to establish the exact nature and extent of the damage.

WH3.2.2.9 Animals in the Care of Humans

The reactions of animals in the care of humans (e.g., pets, other domesticated animals, and animals kept in zoos) to an increased number of loud overflight events was a concern raised in several scoping comments. An animal’s reaction to noise depends on several factors including the animal’s

temperament, training, and past experiences associated with the noise. Certain domesticated animal species (e.g., horses) are more likely to have strong reactions to noise than others. Potential noise impacts on wildlife are discussed in Section WH3.6.

In the airfield environment, aircraft typically operate at slower speeds than are used in training airspace. Although these slower speeds mean that elevated overflight sound levels last longer, they also mean that there is a time lag between when the aircraft is first heard and maximum overflight noise level. Sounds with slow rise-times are less likely to induce panic than sudden onset noise (USAF 1994). Because F-35 and A-10 aircraft operate at similar speeds in the airfield environment, the rise times of noise generated by the two aircraft are similar.

One of the most important factors affecting an animal's reaction to noise is the level of familiarity with the noise source. As described in Section WH2.0, the replacement of A-10 aircraft with F-35A aircraft would occur over approximately 2 years, and the tempo of F-35A operations would increase slowly as the new airframe gets established at the base. Around the base, AFRC F-35A pilots would use similar flight paths and altitudes to those currently used by A-10 pilots. For the purposes of this analysis, all noise impacts show the full impact of 24 aircraft. Because the reactions of domestic animals depends on several factors (e.g., species, situation, predisposition) there is no single noise level below which behavioral reactions would never occur. However, if it is assumed that noise events with the potential to interfere with human conversation could also be bothersome to animals, then the number of noise events per hour with potential to interfere with speech (Table WH3-15) could be an indicator of how frequently animals could be bothered by noise. It is recognized that this metric of noise events per hour with potential to interfere with speech is an arbitrary metric for determining how frequently animals would be bothered by noise. The metric is used purely as a measure of relative change between the No Action Alternative and proposed action.

WH3.2.3 Airspace Affected Environment

This section presents noise levels in training airspace and ranges that would be used by AFRC F-35A pilots. As described in Section WH2.4.1, Whiteman AFB-based AFRC F-35A pilots would operate in existing MOAs, RAs, and ATCAAs performing combat training missions similar to those currently conducted by Whiteman AFB-based A-10 pilots currently. Because no supersonic-authorized airspace is available, AFRC F-35A pilots would not conduct supersonic training within the ROI. As noted in Chapter 3, Section 3.2.1.1, subsonic noise in training airspace is quantified using the onset-rate adjusted day-night average sound level (L_{dnmr}). The location, types and number of munitions used during AFRC F-35A training would be similar to that used during A-10 training. Therefore, munitions noise levels would remain approximately the same as under baseline conditions.

WH3.2.3.1 Subsonic Noise

Figure WH3-4 shows baseline subsonic noise levels beneath airspace proposed for use by AFRC F-35A pilots from Whiteman AFB. In the Smoky Low and High MOAs and R-3601, the noise levels are 48 and 53 dB L_{dnmr}, respectively. Noise levels beneath all of the other MOAs and RAs are below 45 dB L_{dnmr}.

WH3.2.3.2 Supersonic Noise

None of the airspace in the ROI is approved for supersonic flight. Therefore, sonic booms do not occur in the ROI under normal circumstances.

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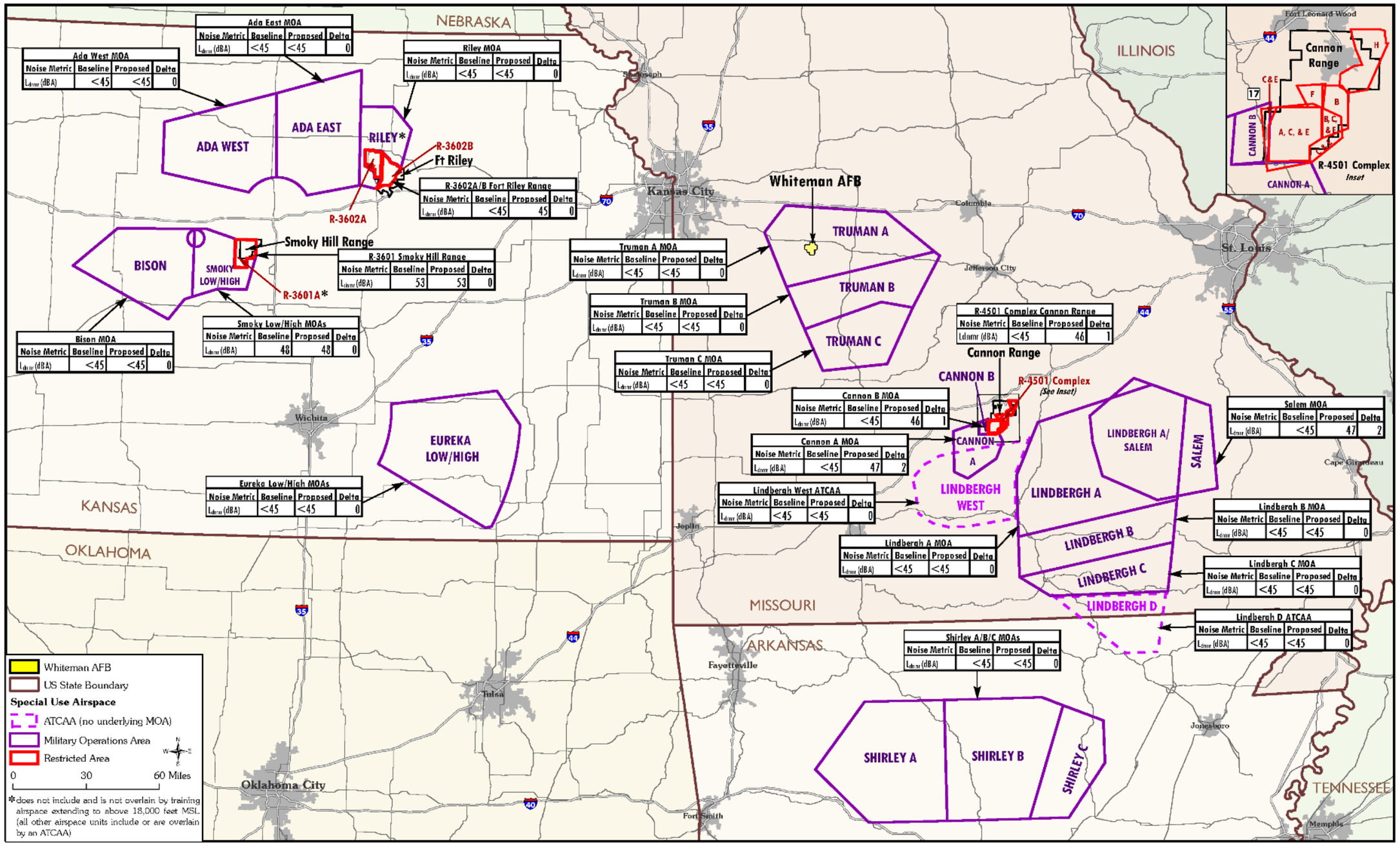

Figure WH3-4. Noise Levels in Training Airspace used by Whiteman AFB Pilots

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WH3.2.4 Airspace Environmental Consequences

WH3.2.4.1 Subsonic Noise

Changes in sortie tempo under the proposed action are discussed in Chapter 2, Section 2.3.4.1, and Section WH2.4.1. Late-night training (10:00 P.M. to 7:00 A.M.) by AFRC F-35A pilots would only be conducted in rare contingencies and as part of special mission training. Individual overflight noise levels (SEL) generated by A-10 and F-35A aircraft are listed in Chapter 3, Table 3-4. The proposed AFRC F-35A training sorties would occur in several large training airspace areas. Because training operations would be spread over a very large area, overflights of any particular location would be infrequent. As shown in Table WH2-6, approximately 94 percent of F-35A training time is spent at altitudes above 10,000 feet MSL. Because training would occur across a very large area, and because most of the training would be at high altitudes, the loudest of the overflights (i.e., overhead at low altitudes) would be rare. The L_{dnmr} in the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs would remain below 45 dB because the number of training sorties is low relative to the size of the training airspace. The Smoky MOAs and R-3601 are currently used for 6,067 sorties annually, and in this context the addition of 313 F-35A sorties would not increase L_{dnmr} by more than 1 dB. In the Cannon and Salem MOAs and in R-4501, the number of sorties would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB. Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise.

During scoping, several comments expressed concerns about overflight noise while the aircraft are transiting from the airfield to and from the airspace proposed for use. Pilots transiting from the installation to training airspace and back again typically use a set of existing prescribed routes. Actual ground tracks of transiting aircraft vary based on several factors, and non-standard routing may be used, as needed, in response to air traffic, weather, or other time-varying conditions. AFRC F-35A pilots would typically transit at high altitudes and in cruise configuration using lowered engine power settings to reduce noise impacts and improve fuel efficiency. In addition, flight at these altitudes allows the aircraft to arrive at the training airspace at an appropriate altitude to begin training. Single overflight event noise levels generated by F-35A aircraft in cruise configuration are listed in Chapter 3, Tables 3-3 and 3-4.

Although AFRC F-35A pilots would implement measures to reduce noise, the noise generated by transiting aircraft can be disturbing, particularly when overflight noise affects national parks and other noise-sensitive places where ambient noise levels are low. Detailed discussion of recreation impacts is contained in Section WH3.8.

WH3.2.4.2 Supersonic Noise

No supersonic-authorized airspace is located in the ROI. Therefore, no supersonic training or sonic booms would occur in the ROI with implementation of the proposed action.

WH3.2.5 Summary of Noise Impacts

Implementation of the AFRC F-35A mission would expose an additional 2,421 acres, 2,517 acres, and 2,620 acres of land to DNL of 65 dB or greater, respectively, under Scenarios A, B, and C. The estimated additional people exposed to DNL of 65 dB or greater would be 2,226 under Scenario A, 2,507 under Scenario B, and 2,804 under Scenario C. The DNL at Knob Noster Elementary School would increase from less than 65 dB to 65 dB under all three scenarios, and would become an incompatible land use due to this level of noise unless special measures are taken to reduce interior noise levels. DNL would increase from 4 dB to 9 dB at the representative noise-

sensitive locations around Whiteman AFB. DNL at 4 of the 6 representative noise-sensitive locations would increase to or exceed 65 dB under all three afterburner scenarios. Under Scenario A and B, both schools identified for evaluation in the EIS would experience an increase of one indoor event per hour causing speech interference (windows open and closed). Under Scenario C, Knob Noster High School would experience an additional two events per hour with windows closed that have the potential to interfere with speech.

Regarding noise under the airspace proposed for use, L_{dnmr} in the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs would remain below 45 dB because the number of training sorties is low compared to the size of the training airspace. The Smoky MOAs and R-3601 are currently used for 6,067 sorties annually, and in this context the addition of 313 F-35A sorties would not increase L_{dnmr} by 1 dB. In the Cannon and Salem MOAs and in R-4501, the number of operations would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB. Overflight noise events have the potential to interfere with activities. An increase in the number of loud events, as reflected in increased L_{dnmr}, would be expected to increase the percentage of the population that is highly annoyed by noise. No supersonic-authorized airspace is located in the airspace proposed for use. Therefore, no supersonic training or sonic booms would occur.

Based on context and intensity, noise impacts to the area surrounding Whiteman AFB resulting from implementation of the proposed AFRC F-35A mission would be considered significant.

WH3.3 AIR QUALITY

The proposed AFRC F-35A mission at Whiteman AFB would result in net changes in air emissions due to the replacement of existing aircraft operations with operations from the proposed mission in the base region and associated airspace. The following section describes the air quality affected environment and estimations of impacts due to proposed construction and operational activities within these project regions.

WH3.3.1 Base Affected Environment

Air emissions resulting from implementation of the proposed AFRC F-35A mission at Whiteman AFB would primarily affect air quality within Johnson County and to lesser extent, Pettis County to the east. The MDNR has adopted standards that are the same as the National Ambient Air Quality Standards (NAAQS) for purposes of regulating criteria air pollutant levels within Missouri. Table 3-6 in Chapter 3, Section 3.3, of this EIS presents the NAAQS.

WH3.3.1.1 Region of Influence and Existing Air Quality

Identifying the ROI for air quality requires knowledge of the pollutant type, source emission rates, the proximity of project emission sources to other emission sources, and local and regional meteorology. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to a few miles downwind from a source. The ROI for reactive pollutants such as ozone (O_3) can extend much farther downwind than for inert pollutants. Ozone is formed in the atmosphere by photochemical reactions of previously emitted pollutants called precursors. Ozone 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 their source.

The USEPA designates all areas of the United States in terms of having air quality better (attainment) or worse (nonattainment) than the NAAQS. An area is in attainment of a NAAQS if its pollutant

concentration remains below the standard value, as defined by the annual to tri-annual metrics described in Chapter 3, Section 3.3.1. Former nonattainment areas that have attained a NAAQS are designated as maintenance areas. Currently, Johnson County is in attainment of the NAAQS for all pollutants (USEPA 2018a).

WH3.3.1.2 Regional Air Emissions

Table WH3-19 summarizes estimates of annual emissions generated by activities in Johnson County for the year 2014. Emissions for Johnson County were obtained from the National Emissions Inventory (NEI) process (USEPA 2018b). The majority of emissions within this region occur from (1) on-road and nonroad mobile sources (VOCs, CO, NO_x, and carbon dioxide equivalent [CO_2e), (2) prescribed fires (CO and sulfur oxides [SO_x]), (3) solvent/surface coating usages (VOCs), and (4) fugitive dust from unpaved roads and agricultural activities (particulate matter less than or equal to 10 micrometers in diameter [PM_{10}]/particulate matter less than or equal to 2.5 micrometers in diameter [$PM_{2.5}$]).

Table WH3-19. Annual Emissions for Johnson County, Missouri, 2014

Source Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Stationary Sources	1,162	3,166	164	27	16,477	2,280	NA
Mobile Sources	792	7,655	1,633	6	101	74	224,743
Total Emissions[a]	**1,954**	**10,821**	**1,797**	**34**	**16,578**	**2,354**	**224,743**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not available
Source: USEPA 2018b

WH3.3.1.3 Whiteman AFB Emissions

The AFRC F-35A mission at Whiteman AFB would replace activities associated with the 442 FW. This unit operates 24 A-10 aircraft at Whiteman AFB. The proposed AFRC F-35A aircraft replacement action at Whiteman AFB would primarily affect existing emissions from (1) A-10 operations, (2) A-10 engine maintenance and testing, and (3) Aerospace Ground Equipment (AGE). While the addition of 11 personnel that would result from implementation of the AFRC F-35A mission at Whiteman AFB would result in virtually inconsequential changes in emissions from other base sources associated with the 442 FW (e.g., onsite government motor vehicles or privately-owned vehicles), those changes have been calculated as part of the build-out emission calculations for the action. Nonetheless, the main focus of the project air quality analysis remains emissions from existing and proposed aircraft-specific source categories to determine the net changes in emissions from the AFRC F-35A mission.

To estimate emissions from A-10 aircraft operations and AGE usages associated with the 442 FW mission at Whiteman AFB, the analysis employed the USAF Air Conformity Applicability Model (ACAM) version 5.0.13a (Solutio Environmental, Inc. 2019). Table WH3-20 summarizes the annual emissions estimated for the existing A-10 operations of the 442 FW. Volume II, Appendix C, presents details of the emission calculations presented in Table WH3-20. The net emissions change from the increase of 11 personnel (e.g., emissions from government and privately owned vehicle miles traveled by those 11 personnel) were included as part of the build-out emission calculations for the action.

Table WH3-20. Annual Emissions of Existing 442 FW A-10 Operations at Whiteman AFB

Activity Type	Air Pollutant Emissions (tons per year)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Flight Operations and Engine Trim Tests – A-10s	1.59	44.14	3.21	1.14	7.36	3.53	3,167
Aircraft Engine Test Cells – A-10	0.02	0.54	0.18	0.03	0.16	0.09	90
Aerospace Ground Equipment	27.25	37.95	57.86	2.83	7.38	7.15	1,860
Total Emissions[a]	**28.86**	**82.63**	**61.26**	**4.01**	**14.90**	**10.76**	**5,117**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons

WH3.3.1.4 Regional Climate

Meteorological data collected at Sedalia and Concordia, approximately 17 miles east and 17 miles north, respectively, of Whiteman AFB, are used to describe the climate of the Whiteman AFB project region (Midwestern Region Climate Center 2018).

Temperature. Johnson County is known for warm summer months and cool conditions during the winter. The average high and low temperatures during the summer months at Whiteman AFB range from about 87 to 55 degrees Fahrenheit (°F). The average high and low temperatures during the winter months range from 54 to 19 °F.

Precipitation. Average annual precipitation for Whiteman AFB is 44.3 inches. Annual precipitation in the region peaks in the last spring. The peak monthly average rainfall of 5.6 inches occurs in June. Winter is the driest season, as the lowest monthly average of 1.6 inches occurs in January. The region averages 15 inches of snow per year.

Prevailing Winds. Wind data collected in the Kansas City area, about 55 miles west-northwest of Whiteman AFB, are used to describe the wind climate of the Whiteman AFB project region (National Climatic Data Center 1998). The annual average wind speed at Whiteman AFB is 11 miles per hour. March and April are the windiest months of the year and have monthly average speeds of 12 miles per hour. The winds prevail from the south for most of the year, expect in January and February, when they prevail from the south-southwest.

WH3.3.1.5 Applicable Regulations and Standards

The MDNR Air Pollution Control Program is responsible for enforcing air pollution regulations in Missouri. The Air Pollution Control Program enforces the NAAQS by monitoring air quality, developing rules to regulate and to permit stationary sources of air emissions, and overseeing air quality attainment planning processes. The air quality regulations for the State of Missouri are found in Title XL, Chapter 643 (Air Conservation) of the State of Missouri Revisor of Statutes and Title 10, Division 10 (Air Conservation Commission) of the Missouri *Code of State Regulations (CSR).*

WH3.3.2 Base Environmental Consequences

The air quality analysis estimated the magnitude of emissions that would result from construction and operation of the proposed AFRC F-35A mission at Whiteman AFB. The estimation of operational impacts is based on the net change in emissions due to the replacement of existing A-10 aircraft operations with those of the proposed AFRC F-35A mission. Volume II, Appendix C, of this EIS presents the calculations used to estimate air pollutant emissions from proposed construction and operational sources at Whiteman AFB.

The air quality analysis for the AFRC mission at Whiteman AFB evaluates F-35A takeoff operations based on the three afterburner scenarios. Activity levels and resulting emissions for all other proposed operational activities would remain the same under each afterburner scenario.

The immediate area surrounding Whiteman AFB within Johnson and Pettis Counties currently attains all of the NAAQS. Therefore, the analysis compares the annual net change in emissions to the 250 tons per year prevention of significant deterioration permitting threshold. The prevention of significant deterioration permitting threshold represents the level of potential new emissions below which a new or existing minor, non-listed, stationary source may acceptably emit without triggering the requirement to obtain a permit. Thus, if the intensity of any net emissions increase for a project alternative is below 250 tons per year in the context of an attainment criteria pollutant, the indication is the air quality impacts would be insignificant for that pollutant.

WH3.3.2.1 Construction

The AFRC F-35A mission at Whiteman AFB would require C&D and/or renovation of airfield facilities such as training facilities, airfield surfaces, and maintenance facilities. Air quality impacts resulting from the proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) from the operation of equipment on exposed soil.

Construction activity data were developed to estimate construction equipment usages and areas of disturbed ground due to the proposed mission. These data were used as inputs to ACAM, which was used to estimate air emissions from proposed construction activities at Whiteman AFB. The air quality analysis assumed that all construction activities for the proposed AFRC F-35A mission would begin in 2021 and be completed in 2023.

During scoping, one commenter expressed concern about green building practices. As part of the beddown process, the USAF would require LEED Silver certification into proposed construction activities. Requiring LEED Silver certification along with standard construction practices would potentially reduce fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels. Chapter 3, Section 3.3.3.1, of this EIS describes the standard construction practices that would control fugitive dust.

Table WH3-21 presents estimates of emissions from the infrastructure improvements for the AFRC F-35A mission at Whiteman AFB. These data show that even if total construction emissions occurred in one year, the construction emissions would be well below the annual indicator thresholds. Therefore, temporary construction emissions associated with the proposed AFRC F-35A mission would not result in significant air quality impacts.

Table WH3-21. Total Construction Emissions from the AFRC F-35A Mission at Whiteman AFB

Construction Activity	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Demolish Buildings	0.02	0.11	0.12	0.00	0.19	0.00	28
Renovate/Construct Buildings	0.47	2.42	2.15	0.01	0.19	0.09	470
Street/Ramp/Runway Repairs	0.28	1.54	1.77	0.00	4.06	0.08	411
Total Emissions[a]	**0.77**	**4.07**	**4.04**	**0.01**	**4.45**	**0.18**	**909**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable

WH3.3.2.2 Operations

The proposed AFRC F-35A mission at Whiteman AFB would primarily generate air emissions from (1) F-35A aircraft operations, (2) F-35A engine maintenance and testing, and (3) AGE. The analysis also includes emissions that would occur from the net change in commuting activities between the proposed F-35A and existing A-10 missions at Whiteman AFB. Because the mission would result in a net increase of 11 personnel, this would produce a net increase in emissions from commuting activities. To estimate emissions from the AFRC F-35A mission at Whiteman AFB, the analysis employed the ACAM. The air quality analysis assumed that the proposed mission would reach full operations and resulting emissions in 2024 after the completion of all required infrastructure improvements.

The analysis of proposed aircraft operations is limited to operations that would occur within the lowest 3,000 feet of the atmosphere, as this is the typical depth of the atmospheric mixing layer, where the release of aircraft emissions would affect ground-level pollutant concentrations. In general, aircraft emissions released above the mixing layer would not appreciably affect ground-level air quality.

During scoping, people submitted comments regarding the air pollutant impacts that could result from implementation of the proposed AFRC F-35A mission. Table WH3-22 summarizes the annual operational emissions that would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB. The data in Table WH3-22 show that the replacement of existing A-10 aircraft operations with the proposed F-35A operations would result in reductions of VOC, CO, and PM_{10}, emissions and increases in all other pollutant emissions for the three afterburner scenarios. The data in Table WH3-22 also show that scenario emissions would increase with increasing afterburner use rates. Implementation of Scenario C (95 percent afterburner rate) would result in the most emissions, but the emissions would increase by less than 6 percent for any criteria pollutant compared to Scenario A (5 percent afterburner rate). The emission increases of NO_x, SO_x, and $PM_{2.5}$ would not exceed any annual indicator threshold. Therefore, operational emissions associated with the proposed AFRC F-5A mission at Whiteman AFB would not result in significant air quality impacts.

Table WH3-22. Projected Annual Emissions from AFRC F-35A Mission Operations at Whiteman AFB, 2024 – All Afterburner Scenarios

Afterburner Scenario/Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Scenario A							
Flight Operations and Engine Trim Tests – F-35A	0.14	61.22	55.35	6.14	9.76	8.77	16,975
Aircraft Engine Test Cells – F-35A	0.00	0.41	1.95	0.13	0.17	0.15	375
Aerospace Ground Equipment	8.20	14.39	23.60	1.65	2.43	2.36	1,130
Net Commuting Activities (F-35A - A-10 staff)	0.02	0.22	0.02	0.00	0.00	0.00	17
Total AFRC F-35A Mission Emissions	**8.36**	**76.24**	**80.92**	**7.91**	**12.36**	**11.28**	**18,497**
Existing 442 FW Emissions	**28.86**	**82.63**	**61.26**	**4.01**	**14.90**	**10.76**	**5,117**
AFRC F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(6.38)**	**19.67**	**3.91**	**(2.54)**	**0.51**	**13,380**
Scenario B							
Total F-35A Mission Emissions	**8.29**	**77.61**	**81.17**	**8.01**	**12.45**	**11.37**	**18,368**
F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(4.27)**	**19.97**	**4.01**	**(2.45)**	**0.60**	**13,318**
Scenario C							
Total F-35A Mission Emissions	**8.29**	**79.73**	**81.55**	**8.11**	**12.55**	**11.46**	**18,322**
F-35A Mission Minus 442 FW Emissions	**(20.50)**	**(2.15)**	**20.35**	**4.11**	**(2.35)**	**0.69**	**13,272**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

The VOC, CO, and PM_{10} emission reductions estimated to result from the proposed AFRC F-35A mission at Whiteman AFB would result in the following positive effects within the Johnson/Pettis County region:

- VOC emission reductions would result in a net benefit to ambient O_3 levels, because the decrease in VOC emissions that would result from implementation of the proposed mission would be greater than the resulting increase in NO_x emissions.
- Reductions in VOC and PM_{10} emissions would reduce the potential for people off base to be exposed to odors from fuel combustion.
- CO and PM_{10} emission reductions would result in net benefits to these ambient pollutant levels.
- Proposed operations would generate hazardous air pollutants (HAPs), primarily in the form of VOCs and particulates from the combustion of aviation fuel in F-35A aircraft and AGE. The reduction in VOC and PM_{10} emissions would result in a corresponding net reduction of HAPs. These emission reductions would result in similar net benefits to ambient HAP levels.

WH3.3.3 Airspace Affected Environment

Projected AFRC F-35A aircraft operations in the airspace proposed for use and along the flight routes between these locations and Whiteman AFB would affect air quality within these portions of Missouri, eastern Kansas, and northern Arkansas. All of the regions below and adjacent to these areas currently attain all of the NAAQS, except that the immediate area surrounding the intersections of Iron, Dent, and Reynolds Counties in Missouri currently does not attain the NAAQS for lead (known as the Buick/Viburnum Trend lead nonattainment area) (DNR 2009 and USEPA 2018a).

WH3.3.4 Airspace Environmental Consequences

AFRC F-35A pilots operating from Whiteman AFB would operate in the same airspace and training areas as existing 442 FW pilots, but at higher altitudes. The proposed AFRC F-35A operations in these areas would occur above 3,000 feet above ground level (AGL) about 99 percent of the time (Table WH2-6) and therefore these operations would not appreciably affect ground-level air quality. Compared to existing 442 FW operations, A-10 operations occur below 3,000 feet AGL 46 percent of the time.

To quantify the air quality effects of the F-35A mission within the Whiteman AFB airspaces and training areas, the analysis employed the ACAM to estimate the net change in emissions between the replacement of existing A-10 aircraft operations with proposed F-35A aircraft operations within these areas. The analysis used aircraft flight profiles developed by the project noise analyses as inputs to the ACAM. The analysis focused on operations within the lowest 3,000 feet of the atmosphere.

Table WH3-23 presents the annual operational emissions that would result from implementation of the F-35A mission within the Whiteman AFB airspaces and training areas. These data show that the proposed changes in aircraft operations within these areas would result in net reductions in all air pollutant emissions within 3,000 feet AGL. Therefore, the AFRC F-35A mission at Whiteman AFB would result in a net improvement to ground-level air quality in the existing airspace and training areas, which would not result in significant air quality impacts. This also would be the case for potential impacts from the AFRC F-35A mission to the Buick/Viburnum Trend lead nonattainment area.

Table WH3-23. Projected Annual Emissions from the AFRC F-35A Mission Operations within Whiteman AFB Airspaces and Training Areas - 2024

Activity Type	Air Pollutant Emissions (tons per year)[a]						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Existing 442 FW Flight Operations – A-10	(0.90)	(17.19)	(83.59)	(8.36)	(20.78)	(13.13)	(25,266)
AFRC Mission Flight Operations – F-35A	0.00	0.22	11.89	0.58	0.63	0.57	1,748
F-35A Mission Minus 442 FW Emissions	**(0.90)**	**(16.97)**	**(71.70)**	**(7.78)**	**(20.15)**	**(12.56)**	**(23,518)**
Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

[a] Calculated values and totals have been rounded; therefore, sum totals may not match the totals row.
Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

WH3.3.5 Summary of Impacts to Air Quality

Johnson County is in attainment for all criteria pollutants. As shown in Table WH3-24, calendar year annual emissions from construction activities and the net change in aircraft operations around the base would not exceed the indicator threshold levels. Emissions would decrease in training airspace. Impacts to air quality resulting from the AFRC F-35A beddown would not be significant.

Table WH3-24. Summary of Calendar Year Annual Emissions from the AFRC F-35A Mission at Whiteman AFB

Activity/Year	Air Pollutant Emissions (tons)						
	VOCs	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	CO_2e (mt)
Construction – Year 2021	0.14	0.99	0.90	0.00	0.32	0.04	203
Construction – Year 2022	0.63	3.08	3.14	0.01	4.12	0.14	705
Construction – Year 2023	0.00	0.00	0.00	0.00	0.00	0.00	0
Net Change in Operations – Most Emissive Afterburner Scenario C – Year 2024+	**(20.50)**	**(2.15)**	**20.35**	**4.11**	**(2.35)**	**0.69**	**13,272**
Annual Indicator Threshold	**250**	**250**	**250**	**250**	**250**	**250**	**NA**

Key: CO_2e (mt) = carbon dioxide equivalent in metric tons; NA = not applicable; ( ) = negative values and net reductions in emissions

WH3.4 SAFETY

Air Force Instruction (AFI) 90-801 *Environment, Safety, and Occupational Health Councils*, implements the risk management guidance within Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health Management and Risk Management*. All USAF missions and daily routines involve risk. Requirements outlined in this document provide for a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The safety analysis contained in the following sections addresses issues related to the health and well-being of both military personnel and civilians living on or near Whiteman AFB and under the training airspace.

Specifically, this section provides information on explosive safety; fire risk and management; hazards associated with aviation safety (Accident Potential Zones [APZs]); aircraft mishaps; and Bird/Wildlife Aircraft Strike Hazard [BASH]).

The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. To fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the DoD. The primary safety concern with regard to military training flights is the potential for aircraft mishaps (i.e., crashes) to occur, which could be

caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird-aircraft strikes.

WH3.4.1 Base Affected Environment

WH3.4.1.1 Explosive Safety

Two explosive safety quantity-distance (ESQD) arcs at Whiteman AFB cover approximately 1,490 acres (28 percent) of the installation and include the munitions storage area. The ESQD arcs are shown on Figure WH2-1.

WH3.4.1.2 Fire Risk and Management

Day-to-day O&M activities conducted at the base are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders (TOs), and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements including AFI 91-202, *The US Air Force Mishap Prevention Program*. Aircraft Rescue Firefighting services are available on a 24-hour basis. Upon notification of an in-flight or ground emergency, the crash and rescue services personnel would coordinate emergency services.

Whiteman AFB Fire Emergency Services responds to many different types of emergencies within their area of responsibility. These include, but are not limited to, aircraft and rescue firefighting emergencies, structural response, emergency medical services, hazardous material and technical rescue response such as confined space emergencies. The base is equipped with three structural fire engines, four ARFF units, one 5,000-gallon water tanker, two 1,000-gallon foam trailers, a specialized rescue vehicle, a special operations vehicle, a hazardous materials response trailer, and two command vehicles. The Fire Emergency Services Flight also has local mutual-aid agreements with the Johnson County and Pettis County Fire Protection Districts and the cities of Warrensburg, Knob Noster, and Sedalia.

Whiteman AFB adheres to specific emergency-response procedures contained in TO 00-105E-9, *Aerospace Emergency Rescue and Mishap Response Information,* for aircraft mishaps involving composite materials (USAF 2018). TO 00-105E-9 contains a section (Chapter 3) on Mishap Composite Awareness.

WH3.4.1.3 Accident Potential Zones

In accordance with DoDI 4165.57, APZs are established at military airfields to delineate recommended compatible land uses for the protection of people and property on the ground. APZs define the areas of a military airfield that would have the highest potential to be affected if an aircraft mishap were to occur. Air Installations Compatible Use Zones (AICUZ) guidelines identify three types of APZs for airfields based on aircraft mishap patterns: the Clear Zone (CZ), APZ I, and APZ II. The standard USAF CZ for Class B runways such as Runway 01/19 at Whiteman AFB is a rectangle area that extends 3,000 feet from the end of a runway, is 3,000 feet wide, and identifies the area with the highest probability for mishaps. APZ I, which typically extends 5,000 feet from the end of the CZ, has a lower mishap probability, and APZ II, which typically extends 7,000 feet from the end of APZ I, has the lowest mishap probability of the three zones. If needed, to reflect different departure and arrival patterns, both the shape and size of APZs can be modified.

The northern CZ is entirely within installation boundaries. Land in the northern APZ I consists primarily of open space/low-density use with some residential, commercial, and public/quasi-public uses. Residential land use is incompatible with APZ I. Commercial land use is conditionally compatible. Land in the northern APZ II consists primarily of open space/low-density use but

includes a large commercial parcel just north of Missouri Highway 50, which is conditionally compatible. The residential land in the northern APZ II along Highway NE 175 is compatible because it has density of less than one to two dwellings per acre (USAF 2015).

The southern CZ is entirely within installation boundaries. The majority of the southern APZs consist of open space/low-density land, which are compatible and however there are 37 acres of conditionally compatible residential land use in APZ II (USAF, 2015). Figure WH3-5 depicts the CZs and APZs at Whiteman AFB.

WH3.4.1.4 Aircraft Mishaps

Mishaps are defined as any damage that occurs on the ground or in flight. As shown in Table WH3-25, mishaps are classified into four categories, based on the severity of the mishap relative to property damage or personnel injury. Class A mishaps are the most severe with total property damage of $2 million or more or a fatality and/or permanent total disability. Comparison of Class A mishap rates for various engine types, as calculated per 100,000 flying hours provide the basis for evaluating risks among different aircraft and levels of operations. This safety section analyzes existing and projected Class A mishap potentials based on flying hours and aircraft types.

Table WH3-25. Aircraft Class Mishaps

Mishap Class	Total Property Damage	Fatality/Injury
A	$2,000,000 or more and/or aircraft destroyed	Fatality or permanent total disability
B	$500,000 or more but less than $2,000,000	Permanent partial disability or three or more persons hospitalized as inpatients
C	$50,000 or more but less than $500,000	Nonfatal injury resulting in loss of 1 or more days from work beyond day/shift when injury occurred
D	$20,000 or more but less than $50,000	Recordable injury or illness not otherwise classified as A, B, or C

Aircraft flight operations at Whiteman AFB are governed by standard flight rules. Aircrews ensure flight safety when operating at the airfield by complying with all safety and aircraft operating requirements. No Class A or B mishaps have occurred during the past 3 years at Whiteman AFB. The lifetime Class A mishap rate for the A-10 is 1.88 for every 100,000 hours of flight time (USAF 2019).

WH3.4.1.5 Bird/Wildlife-Aircraft Strike Hazard

Bird and wildlife-aircraft strikes and the hazards they present form another safety concern for aircraft operations. Bird/wildlife-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area.

According to the Air Force Safety Center (AFSEC) BASH statistics, from 1995 to 2016, where altitude at time of strike was known, more than 50 percent of the strikes occurred below 400 feet AGL, and 90 percent occurred below 2,000 feet AGL (USAF 2017). Waterfowl generally present the greatest BASH potential due to their flocking flight patterns and because, when migrating, they can be encountered at altitudes up to 20,000 feet AGL. Raptors also present a substantial hazard due to their size and soaring flight patterns. In general, the threat of bird-aircraft strikes increases during April and May and from August through November due to migratory activities. The USAF BASH Team maintains a database that documents all reported bird/wildlife-aircraft strikes. Historic information across the USAF for the past 20 years indicates that 11 USAF aircraft have been destroyed and five fatalities have occurred from bird/wildlife-aircraft strikes, with the last Class A mishap occurring in 2016 (USAF 2017).

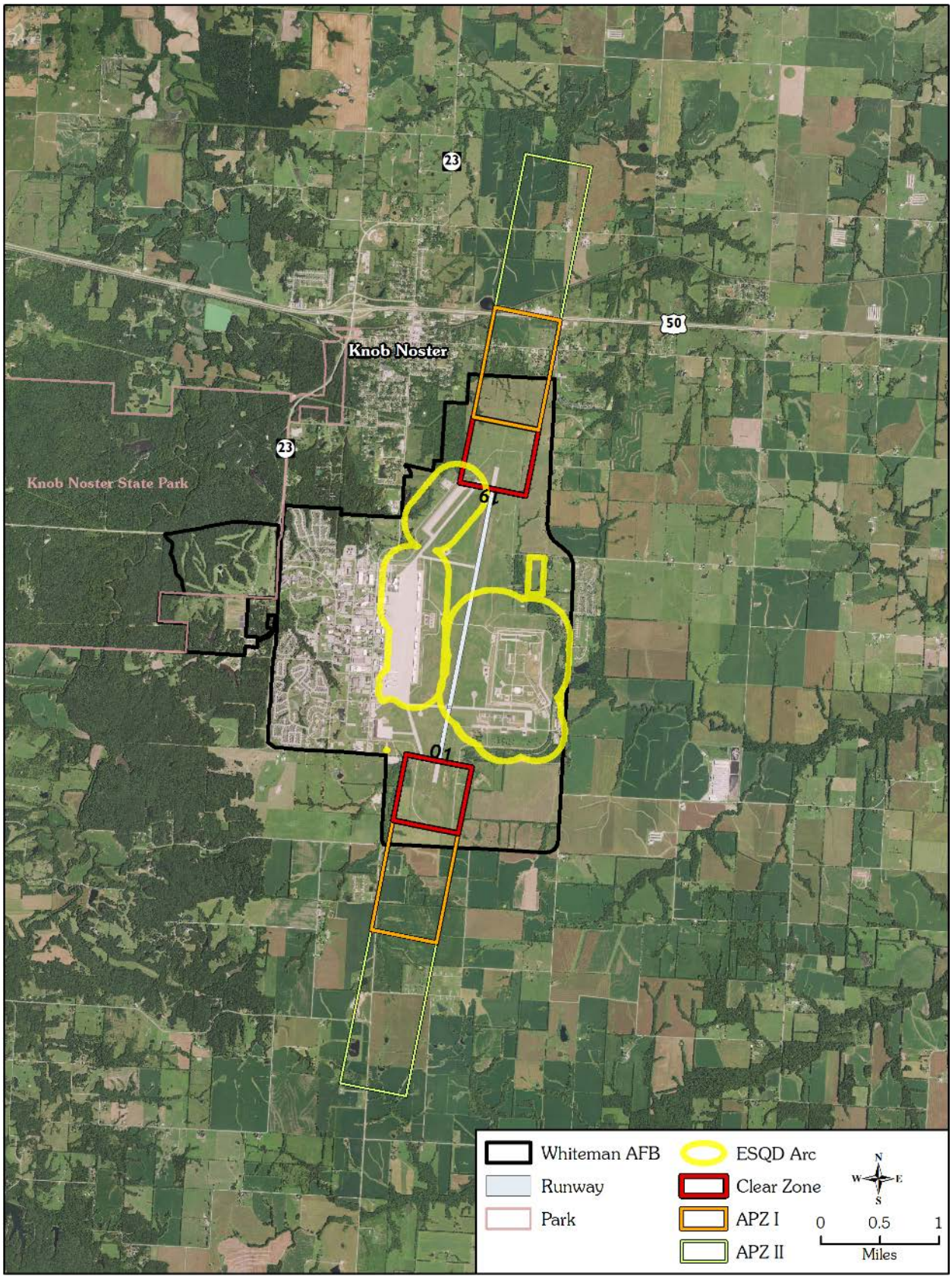

Figure WH3-5. CZs and APZs at Whiteman AFB

The USAF BASH program was established to minimize the risk for collisions of birds and aircraft and the subsequent loss of life and property. AFI 91-202 requires each flying unit in the USAF to develop a BASH plan to reduce hazardous bird/animal activity relative to airport flight operations. The intent of each plan is to reduce BASH issues at the airfield by creating an integrated hazard abatement program through awareness, avoidance, monitoring, and actively controlling bird and animal population movements. Some of the procedures outlined in the plan include monitoring the airfield for bird activity, issuing bird hazard warnings, initiating bird avoidance procedures when potentially hazardous bird activities are reported, and submitting BASH reports for all incidents. The Whiteman AFB BASH Plan provides specific guidance and assigns responsibilities in developing an effective bird strike hazard reduction program for Whiteman AFB (509 BW 2014).

The concentration of birds at and around Whiteman AFB poses a risk to flying operations. Whiteman AFB specific wildlife hazards to air operations historically include small perching birds, black birds, pigeons, waterfowl, and raptors (hawks and falcons). Whiteman AFB is also home to other wildlife including turkey, deer, and coyotes (509 BW 2014).

The Whiteman AFB BASH Plan is implemented in two phases. The first phase is implemented outside of migration season. During this phase aircraft are operated according to current Bird Watch Conditions (BWC), which are categorized as Low, Moderate, or Severe. BWC Severe or Moderate requires action from the installation's wildlife dispersal team to reduce the BWC to Low as soon as possible. BASH Phase II is implemented during migratory bird seasons and is in effect during the spring (1 April to 30 May) and fall (15 August to 15 November). Phase II periods could be adjusted from year to year due to seasonal weather changes and migratory bird movement. Phase II elements include procedures for operations that occur one hour before to one hour after sunrise/sunset and or any other designated BASH window (509 BW 2014).

The BASH Plan also establishes implementation procedures and actions to minimize the potential of bird-aircraft strikes. Such measures include eliminating broad-leaf weeds, maintaining grass heights between 7 and 14 inches, planning of bare areas, removing dead vegetation and animals. BASH reduction techniques currently employed by the base include abating nuisance avian species, pyrotechnics, and depredation when necessary (509 BW 2014).

WH3.4.2 Base Environmental Consequences

O&M activities conducted on Whiteman AFB would continue to be performed in accordance with all applicable safety directives. No specific aspects of F-35A O&M would create any unique or extraordinary safety issues. Refer to Chapter 3, Section 2.3.4.2 for a discussion of the types of defensive countermeasures and ordnance that would be used by AFRC F-35A pilots. Only approved weapons systems would be used by AFRC F-35A pilots on the impact training ranges and pilots would adhere to all flare and live-fire use restrictions.

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All renovation and construction activities would be completed in compliance with all applicable OSHA regulations to protect workers. In addition, the newly constructed buildings would be built in compliance with antiterrorism/force protection requirements and explosives safety requirements. The USAF does not anticipate any significant safety impacts to result from construction, demolition, or renovation if all applicable AFOSH and OSHA requirements are implemented. In addition, O&M of the new munitions buildings would not result in significant safety impacts.

Although emergency and mishap response plans would be updated, the proposed AFRC F-35A mission at Whiteman AFB is not expected to create new or unique ground safety issues. Emergency

and mishap response plans would be updated to include procedures and response actions necessary to address a mishap involving AFRC F-35A aircraft and associated equipment. With this update, airfield safety conditions would remain similar to baseline conditions. As indicated in Section WH3.5.2.1, base fire and emergency services would continue to participate in mutual-aid support agreements with nearby communities.

WH3.4.2.1 Explosive Safety

The construction and operation of the new munitions maintenance building would comply with Department of Defense Explosives Safety Board (DDESB) Standard 6055.09, *DoD Ammunition and Explosives Safety Standards* (DoD 2008), Air Force Manual (AFMAN) 91-201, *Explosives Safety Standards* and AFMAN 32-1084, *Facility Requirements*. The new buildings' ESQD arcs would be calculated and sited to remain within current ESQD arcs as well as be compatible with existing facilities. No changes to explosive safety would result from the construction and operation of the proposed facilities at Whiteman AFB.

WH3.4.2.2 Fire Risk and Management

Fire and crash response would continue to be provided by Whiteman AFB Fire and Emergency Services. TO 00-105E-9 provides guidance on fire response to aircraft containing composite materials, including the F-35A. Firefighters would continue to be fully trained and appropriately equipped for crash and rescue response and the proposed AFRC F-35A beddown would not change these abilities. Aircraft pre-incident plans would be developed for the F-35A. Aircraft pre-incident plans are required to be reviewed, validated and/or updated annually or anytime there is a change to TO 00-105E-9 for the applicable aircraft. Equipment and training specific to addressing F-35A mishaps would be obtained and conducted prior to beddown. Additionally, Whiteman AFB would keep local firefighting departments informed about any new information or firefighting techniques associated with composite materials should an accident occur.

WH3.4.2.3 Accident Potential Zones

No changes to existing APZs or CZs would be required to accommodate AFRC F-35A operations. For the reasons described in Section WH3.4.2.3, implementation of the AFRC F-35A mission would not increase the safety risk to these or other off-base areas. Whiteman AFB would continue to work with communities and developers to apply the AICUZ guidelines.

WH3.4.2.4 Aircraft Mishaps

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would replace the existing A-10 mission operated by the 442 FW. During public scoping, several commenters were concerned with the flight safety of the single-engine F-35A, as well as the increased use of composite aerospace materials in the construction of the F-35A. Although the A-10 does have some composite material in wing leading edges, composites were not extensively used in A-10 construction. Approximately 42 percent of the F-35A, by weight, is comprised of composite materials (Air Force Research Laboratory 2015).

WH3.4.2.4.1 Flight Safety

In general, twin-engine aircraft have a lower mishap rate than single-engine aircraft. However, it is also true that aircraft with newer engines and designs have a lower mishap rate than aircraft with older engines and designs (Table WH3-26) and that the safety and reliability of single-engine USAF fighter aircraft has increased substantially over time. Table WH3-26 demonstrates the decreases in engine-related and lifetime mishap rates for 11 historic and current single-engine aircraft. The Pratt &

Whitney F135 engine used in the F-35A was derived from the F119 engine, which is used in the F-22 Raptor. The F-22 features a 0.92 lifetime engine-related Class A flight mishap rate (USAF 2020).

Table WH3-26. Class A Flight Mishap Rates

Decade Introduced	Aircraft/Engine	Engine-Related Cumulative Class A Mishap Rate	Engine-Related Class A Mishap Rate Last 6 Quarters	Lifetime Class A Mishap Rate
1950s	F-100/ J57	5.61	No longer in service	21.22
	F-102/ J57	3.41	No longer in service	NA
	F-104/ J79	9.48	No longer in service	NA
	F-105/ J75	4.56	No longer in service	12.15
	F-106/ J75	2.04	No longer in service	NA
1960s	A-7/TF41	1.73	No longer in service	5.71
1970s	F-16/ F100-200	1.84	No longer in service	3.43
1980s	F-16/ F110-100	1.06	0.76	
	F-16/ F100-220	0.96	0	
1990s	F-16/ F110-129	0.85	0	
	F-16/ F100-229	0	0	

Key: NA = not available

Historical trends of USAF aircraft show that mishaps of all types decrease the longer an aircraft is operational. For example, when the last single-engine fighter fielded by the USAF (F-16) surpassed 100,000 hours in 1982, its Class A rate was 15.83 with four fatal mishaps (USAF 2018).

Since then, the mishap rate for the F-16 has decreased substantially. In 2019, the F-16 had a lifetime Class A mishap rate of 3.35, and its rate for the last 10 years is 1.84 (USAF 2019). Similarly, in 1979, when the A-10 surpassed 100,000 hours, its Class A rate was 9.24 with four fatalities recorded (USAF 2019). The A-10 has a lifetime Class A mishap rate of 1.88, and its rate for the last 10 years is 0.45 (USAF 2019).

As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with three Class A mishaps, resulting in a mishap rate of 3.11 (Table WH3-27). These mishaps included an engine failure during takeoff preparation (the aircraft was safely brought to a halt), an aborted takeoff with damage confined to the engine, and a hydraulic failure resulting in collapsed nose landing gear that occurred after landing and parking. No injuries occurred during these events.

Table WH3-27. F-35A Class A Flight Mishap History

Fiscal Year	Class A		Destroyed		Fatal		Hours Flown Per Year	Cumulative Flight Hours
	Number of Mishaps	Rate	Aircraft	Rate	Pilot	All		
2010	0	0.00	0	0.00	0	0	0	0
2011	0	0.00	0	0.00	0	0	0	0
2012	0	0.00	0	0.00	0	0	215	215
2013	0	0.00	0	0.00	0	0	1,283	1,498
2014	1	37.54	0	0.00	0	0	2,664	4,162
2015	0	0.00	0	0.00	0	0	7,467	11,629
2016	0	0.00	0	0.00	0	0	11,343	22,972
2017	0	0.00	0	0.00	0	0	22,714	45,686
2018	2	11.90	0	0.00	0	0	30,514	76,200
2019	0	0	0	0.00	0	0	20,113	96,313
Lifetime	**3**	**3.11**	**0**	**0.00**	**0**	**0**	**-**	**96,313**

Note: Flight "rates" are number of mishaps per 100,000 flight hours. Only Aviation "Flight" mishaps are reported here. An aviation "Flight" mishap is any mishap in which there is intent for flight and reportable damage to a DoD aircraft.
Source: USAF 2019

Because the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft (Chapter 3, Section 3.4.3) with more flying hours. However, this mishap rate does provide some indication of the overall safety of the F-35A aircraft. For example, this rate is lower than the 18.86 rate of the F-16 after a comparable amount of hours. It is also lower than the 9.24 rate of the A-10 after the A-10 reached 152,977 hours. The mishap rate for the F-35A is expected to decline as the aircraft becomes operationally mature.

During scoping, some comments were received regarding safety deficiencies of the F-35A aircraft. In a review of the production program for all models of the F-35 (A, B, and C), the Government Accountability Office, has noted various deficiencies as this advanced aircraft is developed and brought into production (GAO 2018). These deficiencies are being addressed as full-rate production is approached. The USAF recognizes that certain components have yet to reach full capability. The USAF would not operate any aircraft should safety-of-flight concerns be present.

WH3.4.2.4.2 Composite Aerospace Materials

Advanced composites have been used in aircraft construction since the late 1960s, when a boron-epoxy rudder was installed on the F-4 jet. As composite technology has advanced, the percentage of composite material used in modern aircraft has increased. Types of composites include carbon fiber (e.g., graphite used in sporting equipment), metal-matrix composites (e.g., materials used on spacecraft and racing bicycles), and ceramic-matrix composites (e.g., medical implants). As noted by members of the public during scoping, one disadvantage of certain composites is that these materials can degrade under extreme temperatures, resulting in the production of toxic fumes and airborne fibers. Because of these characteristics, composite aerospace materials present unique hazards to mishap responders. A burning aircraft could release toxic products, exposing personnel and the environment. Individuals exposed to a crash site could experience dermatological and respiratory problems. Exposure to these hazards would not necessarily end when a fire is extinguished; exposure to recovery crews, site security, the surrounding population, and others could continue (Navy 2016). Sampling at mishap sites of aircraft containing composite materials indicated the presence of respirable fibers/dusts in the air. In addition, laboratory studies have identified respirable fiber products and toxic gases (including high levels of CO, NO_x, and hydrogen cyanide) from burning composite materials (Navy 2016).

Due to the rarity of mishaps involving composite aerospace materials, no epidemiological data are available on personnel exposure to burning composites. Similarly, no studies have assessed the toxicology of carbon fibers generated in a fire scenario with extended post-exposure duration. Synergistic interactions between the solid, vapor, and gaseous combustion products have also not been determined. However, research and experience during several crash responses do indicate that composite fiber release is relatively low (Air Force Research Laboratory 2015).

In the event of a crash of an aircraft containing composite materials, the USAF would follow the guidance contained in the *Mishap Response Checklist for Advanced Aerospace Materials/Composites* (USAF Advanced Composites Program Office 1993).

- Areas in the immediate vicinity of the mishap site affected by direct and dense fallout from the fire/explosion-generated smoke plume would be evacuated, along with easily mobile critical equipment. Aircraft and flight operations exposed to the immediate fallout area would be altered or moved. All unprotected personnel would be restricted from assembling downwind of the crash site.
- The fire would be extinguished and composites cooled to below 300°F. Only firefighters equipped with a self-contained breathing apparatus would be authorized in the immediate

vicinity of a burning/smoking mishap site until the fire chief declares the area safe. If possible, high-pressure water break-up and dispersal of composite structures would be avoided.

- The mishap site would be roped or cordoned off and a single entry/exit point would be established upwind of the wreckage. Only sufficiently protected individuals would be authorized in the immediate mishap site and peripheral areas.
- Should personnel other than those at the accident site be directly and substantially exposed to adverse material hazards, the medical staff would be consulted for evaluation and tracking. Time permitting, the otherwise un-threatened populace in affected or fallout areas would be advised to do the following:
  - Remain indoors;
  - Shut external doors and windows;
  - Turn off forced air intakes; and
  - Await further notification.
- Specific aircraft hazards would be identified by inspection and consultation with the crew chief or aircraft specialists. Composite and other hazardous materials would be identified to mishap response personnel. The On-Scene Commander would be advised of all findings and recommendations.
- When exiting the crash site, personnel would use a high-efficiency particulate air-filtered vacuum, if available, to remove asbestos-containing materials (ACM) from their outer clothing, work gloves, boots, headgear, and equipment. If unavailable, efforts would be made to wipe or brush off as much contamination as possible. Clean sites (i.e., tent or trailer) would be set up for donning/removal of personal protective equipment if practical.
- Non-disposable clothing involved with crash/fire-damaged composite parts would be removed and laundered as determined by the base environmental engineer. Personnel should shower (in cool water) prior to going off-duty to preclude injury from loose fibers. Portable showers would be provided, if necessary.
- Burned/mobile composite fragments and loose ash/particulate residue would be secured with firefighting foam or a fine water mist until a hold-down fixant material is applied to immobilize the fibers. Initial actions should concentrate on debris containment. Investigators, specific aircraft authority, and the base environmental engineer would be consulted before applying any fixant.

WH3.4.2.4.3 Aircraft Mishap Summary

Aviation in all forms has inherent risk and it is not possible to guarantee the future flight-safety risk of any aircraft. However, due to the current F-35A record, the increasing safety trend for single-engine fighter aircraft, and increases in safety as an airframe matures operationally, it is reasonable to expect nominal changes in flight-safety risk to result from implementation of the AFRC F-35 mission at Whiteman AFB.

WH3.4.2.5 Bird/Wildlife-Aircraft Strike Hazards

The 17.4 percent airfield operations increase resulting from the AFRC F-35A mission could increase the risk of bird/wildlife-aircraft strikes. However, strict adherence to the BASH plan and continuation of active BASH program activities would minimize these risks. The BASH plan would remain in place to reduce the risk of bird/wildlife-aircraft strikes.

WH3.4.3 Airspace Affected Environment

The airspace proposed for use by AFRC F-35A pilots from Whiteman AFB includes RAs, MOAs, and ATCAAs (Table WH2-5 and Figure WH2-2). Aircraft flight operations are governed by standard flight rules. The volume of airspace encompassed by the combination of airspace elements constitutes the ROI for airspace safety. These training areas allow military flight operations to occur without exposing civil aviation users, military aircrews, or the general public to hazards associated with military training and operations. This section describes the existing safety procedures in the airspace proposed for use and the following section evaluates changes that would occur with the introduction of the F-35A.

WH3.4.3.1 Fire Risk and Management

Fires attributable to flares are rare for three reasons. First, the altitude and other restrictions on flare use minimize the possibility for burning material to contact the ground. Second, to start a fire, burning flare material must contact vegetation that is susceptible to burning at the time. The probability of a flare igniting vegetation is expected to be equally minimal. Third, the amount and density of vegetation, as well as climate conditions, must be capable of supporting the continuation and spread of fire.

Aircraft based at Whiteman AFB utilize three live fire ranges, the Cannon Range at Fort Leonard Wood in Missouri and the Smoky Hill and Fort Riley Ranges in Kansas. Fort Riley manages fires in accordance with an Integrated Wildland Fire Management Plan. The Directorate of Emergency Services, Fire and Emergency Services Division, is responsible for controlling wildland fires. The primary goal of the plan is to provide a safe, sustainable training platform. All prairie areas on post are burned at least two years out of every five to reduce wildfire likelihood and to maintain tall grass prairie (Fort Riley 2016).

WH3.4.3.2 Aircraft Mishaps

Aircraft flight operations are governed by standard flight rules. Specific safety requirements are contained in standard operating procedures that must be followed by all aircrews operating from the airfield to ensure flight safety.

WH3.4.3.3 Bird/Wildlife-Aircraft Strike Hazard

The primary threat to military aircraft operating in the airspace is migratory birds. The exact number of birds struck in the airspace areas is difficult to assess because small birds are not detected until post-flight maintenance checks and the location of such strikes cannot be determined. Refer to Section WH3.4.1.5 for more information regarding BASH and the actions that are implemented to minimize bird strikes.

WH3.4.4 Airspace Environmental Consequences

The addition of F-35A aircraft to the airspace would not require changes to the management or structure of the airspace. AFRC F-35A pilots would fly mission profiles similar to those currently flown by A-10 pilots operating from Whiteman AFB, only at substantially higher average altitudes, including air-to-ground ordnance delivery and air combat training operations. Implementation of the AFRC F-35A mission would result in a 5.9 percent decrease in overall airspace sorties in the existing airspace proposed for use. As described in Section WH3.1.4, total sorties would remain within the capability and capacity of the airspace and ranges proposed for use.

WH3.4.4.1 Fire Risk and Management

Flare and ordnance deployment in authorized ranges and airspace is governed by a series of regulations based on safety and environmental considerations and limitations. These regulations establish procedures governing the use of flares over ranges, other government-owned and -controlled lands, and nongovernment-owned or -controlled areas. Chapter 2, Section 2.3.4.2, details the flares and ordnance proposed for use by AFRC F-35A pilots.

The frequency of flare use would decrease or stay the same as baseline conditions. AFRC F-35A pilots would only use flares in compliance with existing airspace altitude and seasonal restrictions to ensure fire safety. Based on the emphasis of flight at higher altitudes, roughly 90 percent of F-35A flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires. Lands surrounding the air-to-ground training impact areas underlying airspace ensure public protection by restricting access to areas associated with laser use, emitters, and ordnance delivery. All guidance, regulations, and instructions for ordnance delivery at the ranges would be adhered to by AFRC F-35A pilots. Mutual fire response and suppression agreements would continue.

WH3.4.4.2 Aircraft Mishaps

Continued maintenance of situational awareness and use of available communications for tracking the scheduled and near real-time status of the SUAs would help maintain a safe flying environment for all concerned. Any changes to those capabilities and the current or future areas in which this service is provided would be appropriately addressed and communicated through those same venues. The majority of flight operations would be conducted over remote areas; however, in the unlikely event that an aircraft accident occurs, existing response, investigation, and follow-on procedures would be enforced to ensure the health and safety of underlying populations and lands. Implementation of flight safety procedures and compliance with all flight safety requirements would minimize the chances for aircraft mishaps.

WH3.4.4.3 Bird/Wildlife-Aircraft Strike Hazards

AFRC F-35A pilots would operate the aircraft in the same airspace environment as other pilots from Whiteman AFB, albeit at a higher altitude than current aircraft. Therefore, the overall potential for bird-aircraft strikes would be reduced following the beddown of the F-35A. When BASH risk increases due to time of year, limits are and would continue to be placed on low-altitude flights. Briefings are provided to pilots when the potential exists for greater bird-strike risks within the airspace; AFRC F-35A pilots would also be subject to these procedures. Implementation of the AFRC F-35A mission would not result in significant BASH risks in the airspace proposed for use.

WH3.4.5 Summary of Impacts to Safety

No unique construction practices or materials would be required as part of any of the demolition, renovation, or construction projects associated with the proposed AFRC F-35A mission. All new construction incorporates antiterrorism/force protection requirements. All construction would be conducted in compliance with DDESB Standard 6055.09, AFMAN 91-201, and AFMAN 32-1084, and the ESQD arcs would not change. As of November 2019, the F-35A has amassed more than 96,000 hours of flight time with a Class A mishap rate of 3.11. Since the F-35A has not yet reached 100,000 hours, this rate is not directly comparable to other aircraft. As the F-35A becomes operationally mature, the F-35 mishap rate would be expected to continue to decline, as supported by the documented decline in mishap rates for the F-16 and A-10. Whiteman AFB has an active BASH program and the 17.4 percent increase in aircraft operations at Whiteman AFB could increase

BASH incidents near the airfield. However, this increase is not anticipated to be significant. With regard to airspace, AFRC F-35A pilots would use the same airspace used by 442 FW pilots. Impacts to safety resulting from implementation of the new mission are not anticipated to be significant.

WH3.5 SOIL AND WATER RESOURCES

WH3.5.1 Base Affected Environment

WH3.5.1.1 Soil Resources

Whiteman AFB is located in the Central Lowlands physiographic province. This area is characterized by flat to gently rolling topography with soils that are composed of alluvium, loess, and residuum (Whiteman AFB 2015a). The alluvium consists of unconsolidated stratified sand and gravel, silty clay and silt loam. Silt, silty clay, and fine sandy silt comprise the loess. Weathering of bedrock has produced clayey silt or sandy silty clay soils derived from residuum (Whiteman AFB 2015a). The most common soil type found on Whiteman AFB is the Haplaquents-Urban land complex. Other common soils include Haig silt loam, Mandeville silt loam, and Sampsel silty clay loam. All these soils, except Mandeville silt loam, are deep, poorly drained soils. The Mandeville silt loam is a moderately deep, well-drained soil (Soil Survey Staff 2018). All these soils have a slight susceptibility to wind and water erosion. More detailed descriptions of the soils types on the base are available from the Web Soil Survey (Soil Survey Staff 2018).

WH3.5.1.2 Water Resources

WH3.5.1.2.1 Surface Water

The base is located within the Missouri River Drainage Basin and the Missouri River-Blackwater Subregion. A north south ridge divides the installation with the west side of the installation draining to Brewer's Branch and an unnamed creek. These drainages flow off the base and into Clear Fork Creek and eventually into the Blackwater River. The east side of the installation drains to Long Branch which then flows off base into Muddy Creek. Other surface water features on the installation include Nugent, Skelton, North West, and North Lakes.

Whiteman AFB has a general stormwater National Pollutant Discharge Elimination System (NPDES) permit issued to the installation under Permit No. MO-R80F035 by the State of Missouri. The MDNR Missouri Clean Water Commission administers the state's NPDES program. The MDNR requirements for stormwater permitting are contained in 10 *CSR* 20-6.200 and are not substantially different from the federal guidelines contained in 40 *CFR* 122 (Whiteman AFB 2010b). To satisfy the requirements of the NPDES permit the USAF has prepared and currently implements a Stormwater Pollution Prevention Plan (SWPPP) (Whiteman 2010). The plan is annually reviewed and revised as necessary. The Whiteman AFB SWPPP references the NPDES Permit No. MO-R10A000 which is a land disturbance permit that applies, in part, to construction or other projects that will have a land disturbance greater than 1 acre.

WH3.5.1.2.2 Groundwater

Whiteman AFB is located within the Central Midwest Regional Aquifer System and the Deep Ordovician and Cambrian aquifers provide the primary water source for Whiteman AFB and the surrounding areas. Whiteman AFB draws its water from nine wells drilled into these aquifers at depths down to 1,171 feet (Whiteman AFB 2015a).

WH3.5.1.2.3 Floodplains

No Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) are available for Whiteman AFB. A floodplain study conducted in 2006 concluded that portions of the installation near Long Branch are within the 100-year floodplain (Figure WH1-2). No other floodplains are known to occur on the installation.

WH3.5.2 Base Environmental Consequences

WH3.5.2.1 Soil Resources

Implementation of the projects identified in Table WH2-1 would disturb approximately 2.9 acres of land, most of which has been previously disturbed. Impacts to soil resources near each of the project sites would result from ground disturbance (e.g., compaction; vegetation removal; and excavation for foundations, footings or utilities). Onsite soils (predominantly Haplaquents-Urban land complex) have a slight potential for wind and water erosion (Soil Survey Staff 2018). Implementation of management practices would minimize impacts to soil resources. These actions could include, but would not be limited to, installation of silt fencing and sediment traps, application of water sprays to keep soil from becoming airborne, and revegetation of disturbed areas as soon as possible, as appropriate. Therefore, potential impacts to soil resources would be minimal, and no significant impacts to soil resources would result from implementation of the new mission.

WH3.5.2.2 Water Resources

WH3.5.2.2.1 Surface Water

During scoping, one individual submitted a comment regarding run-off from the runways and the resulting impacts to local creeks and streams. No changes to the runway stormwater management system would result from implementation of the AFRC F-35A mission. Stormwater runoff from construction sites would be managed as described below.

Impacts to surface water can result from land clearing, grading, and moving soil, resulting in localized increases in stormwater runoff volume and intensity. In accordance with UFC 3-210-10, *Low Impact Development* (LID) (as amended, 2016) and the Emergency Independence and Security Act (EISA) Section 438 (42 *USC* §17094), any increase in surface water runoff as a result of the proposed construction would be attenuated through the use of temporary and/or permanent drainage management features (i.e., use of porous materials, directing runoff to permeable areas, and use of detention basins to release runoff over time). The integration of LID concepts incorporates site design and stormwater management principles to maintain the site's pre-development runoff rates and volumes to further minimize potential adverse impacts. Implementation of the AFRC F-35A mission would result in a 0.4-acre net decrease in impervious surfaces.

Prior to construction, the contractor would be required to obtain coverage under NPDES Permit No. MO-R10A000 by filing a NOI with the MDNR and preparing a site-specific SWPPP to manage stormwater discharges during and after construction until the area is revegetated. Upon revegetation, the contractor would file the Notice of Termination with the MDNR to terminate permit coverage. The USAF would specify compliance with the stormwater discharge permit in all of the contractor construction requirements. Other management practices that would be considered include the use of water sprays during construction to keep soil from becoming airborne, use of silt fences, covering soil stockpiles, using secondary containment for hazardous materials, and revegetating the site in a timely manner.

The existing Whiteman AFB SWPPP also identifies control practices to be followed for spill prevention and response, routine inspection of discharges at sites, and proper training of employees. As part of the SWPPP, the base has identified individuals to be part of the Stormwater Pollution Prevention Team (SWPPT). The SWPPT meets annually, is responsible for all aspects of the SWPPP, and provides recommendations to the Environment, Safety, and Occupational Health Leadership Committee regarding the SWPPP status, any deficiencies, and deicing usage and outfall monitoring data.

No changes to the existing aircraft deicing operations would be necessary with implementation of the new mission. F-35A deicing activities would be conducted away from storm drains to prevent deicing effluent from entering the stormwater system.

WH3.5.2.2.2 Groundwater

Implementation of the AFRC F-35A mission would result in an increase (11) in personnel and a negligible increase in demand for potable water. No additional requirements for groundwater withdrawals are expected. Groundwater wells would not be disturbed as part of the proposed mission. No impacts to groundwater are anticipated.

WH3.5.2.2.3 Floodplains

No floodplains are located near any of the areas proposed for infrastructure development on Whiteman AFB. Therefore, no impacts to floodplains would result from implementation of the new mission.

WH3.5.3 Summary of Impacts to Soil and Water Resources

Implementation of the AFRC F-35A mission would disturb approximately 2.9 acres of land with a reduction of approximately 0.4 acres of impervious surface. No floodplains would be impacted and a SWPPP would be prepared for the proposed construction. Implementation of management practices would minimize impacts to soil resources, and projects would be designed and implemented in accordance with LID and EISA to minimize impacts to soil and water resources. Therefore, potential impacts to soil and water resources would be minimal, and no significant impacts to soil or water resources would result from implementation of the proposed action.

WH3.6 BIOLOGICAL RESOURCES

The ROI for biological resources is defined as the land area (habitats) that could be affected by the infrastructure and construction projects on the base, and the primary airspace where AFRC F-35A pilots would predominantly fly. For the purposes of this biological resources analysis, the ROI for the proposed action and No Action Alternative includes Johnson County, Missouri.

WH3.6.1 Base Affected Environment

WH3.6.1.1 Vegetation

Whiteman AFB is located in the Prairie Division of the Humid Temperate Domain ecoregion. Vegetation associated with this ecoregion includes a mosaic of oak-hickory woodland and bluestem prairie. Historical land use of the area included a mosaic of woodland, cropland, and grassland or rangeland habitat.

Current vegetative surface areas at Whiteman AFB are either improved or semi-improved grounds, primarily consisting of landscaped areas and mowed former agricultural fields. Unimproved

grounds at the installation include open prairie, mixed wood and hardwood urban forests, green belt areas, streams and ponds. Vegetation management at Whiteman AFB is guided by the Integrated Natural Resources Management Plan (INRMP), Urban Forest Management Plan, and the BASH Plan (Whiteman AFB 2014, 2015a).

WH3.6.1.2 Wildlife

Information on wildlife occurring on Whiteman AFB is provided in the INRMP (Whiteman AFB 2015a). Whiteman AFB supports a diversity of wildlife species common to an agricultural landscape. Common wildlife species include deer mice (*Peromyscus maniculatus*), fox (*Vulpes vulpes*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), coyote (*Canis latrans*), blackbirds (*Turdus merula*), robins (*Turdus migratorius*), crows (*Corvus brachyrhynchos*), barn swallows (*Hirundo rustica*), blue jays (*Cyanocitta cristata*), turkey vultures (*Cathartes aura*), downy woodpeckers (*Picoides pubescens*) and field sparrows (*Spizella pusilla*). Hardwood forests and riparian habitats support a wide variety of amphibian and reptile species, including toads, frogs, lizards, turtles, and snakes. Fish species are limited to the installation ponds that are periodically stocked with largemouth bass (*Micropterus salmoides*), crappie (*Pomoxis* spp.), and bluegill (*Lepomis macrochirus*) for recreational fishing.

WH3.6.1.3 Threatened, Endangered, and Special Status Species

WH3.6.1.3.1 Federally Listed Species

The USFWS's Information for Planning and Consultation (IPaC) online system was accessed on 8 February 2018 to identify current USFWS trust resources (e.g., migratory birds, species proposed or listed under the Endangered Species Act (ESA), inter-jurisdiction fishes, specific marine mammals, wetlands, and USFWS National Wildlife Refuge System lands) with potential to occur in the ROI for biological resources at Whiteman AFB.

On 8 February 2018, the USFWS provided an automated *Official Species List* via a letter that identified three threatened and endangered species protected under the ESA (16 *USC* § 1531 et seq.) and one USFWS National Wildlife Refuge near Johnson County, Missouri. Table WH3-28 presents these species.

No federally listed threatened, endangered, or candidate species are currently known to occur on Whiteman AFB. This assessment is based on historical surveys completed by the U.S. Department of Agriculture (USDA) in 1992, the Missouri Department of Conservation (MDC) in 1994, and subsequent survey work conducted in part of the INRMP (Whiteman AFB 2015a). Additionally, no critical habitat occurs on or near Whiteman AFB (USFWS 2018).

Table WH3-28. Federally Listed Species with Potential to Occur in Johnson County, Missouri

Common Name	Scientific Name	Federal Listing Status	Habitat	Historically Observed at Whiteman AFB?
Mammals				
Gray Bat	*Myotis grisescens*	Endangered	Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel.	No
Indiana Bat	*Myotis sodalis*	Endangered	The Indiana bat and northern long-eared bat hibernate in caves or mines during the winter. During the active season in Missouri (April 1 to October 31), these species roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and could also include some adjacent and interspersed non-forested habitats (e.g., emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures). This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags that are 5 inches in diameter at breast height for the Indiana bat and 3 inches in diameter at breast height for the northern long-eared bat, and that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Northern long-eared bats have also been observed roosting in human-made structures (e.g., buildings, barns, bridges, and bat houses); therefore, these structures should also be considered potential summer habitat and evaluated for use by bats.	No
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened		No

Key: FE = federally endangered; FT = federally threatened
Source: Whiteman AFB 2015a; USFWS 2016a,b; USFWS 2017; USFWS 2018

WH3.6.1.3.2 Migratory Birds

Migratory bird species protected under the Migratory Bird Treaty Act (MBTA) (16 *USC* §§ 703–712) could occur as residents or migrants near Whiteman AFB. Migratory birds, including waterfowl, raptors, and neo-tropical migrants, have been observed on base (Whiteman AFB 2015a). Under AFI 91-202 and AFI 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Program*, Whiteman AFB maintains a BASH Plan that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes. The BASH Plan delineates responsibilities for minimizing potential hazards in the areas where tasked units assigned to Whiteman AFB conduct flying operations. In coordination with the MDC, Whiteman AFB annually reports to the USFWS Migratory Bird Office regarding migratory bird activity and other wildlife control at the installation (Donaldson 2018). Additionally, a USDA wildlife biologist employed at Whiteman AFB manages potential wildlife hazards by removal, dispersal, and wildlife control methods to avoid any BASH incidents. Commonly controlled avian species include turkey vultures, pigeons (*Columba livia*), blackbirds, and wild turkeys (Whiteman AFB 2014). BASH habitat is managed intensively around the airfield environment to reduce the threat to human health and safety.

WH3.6.1.3.3 Bald and Golden Eagles

No bald or golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 *USC* 668-668c) have been observed at Whiteman AFB. Although suitable bald eagle habitat is present in the mixed forest and open water habitats near the vicinity of the base, bald eagles have not been reported in Johnson County, Missouri (MDC 2018a). Golden eagles do not live in Missouri year-round, but could occur as winter migrants in small numbers.

WH3.6.1.3.4 USFWS National Wildlife Refuge System Lands

The USFWS IPaC report identified the Big Muddy National Fish and Wildlife Refuge as a natural resource area of potential concern (USFWS 2018). The refuge encompasses more than 17,000 acres of riverine area along the Missouri River and provides valuable bottomland and wet prairie habitat to a wide variety of fish, amphibians, reptiles, migratory birds, and mammals (USFWS 2013).

WH3.6.1.3.5 State-Listed Species

The MDC Missouri Natural Heritage Program was accessed to identify state-listed species (protected under the Rule 3 *CSR* 10-4.111 of the Wildlife Code of Missouri) with potential to occur within the ROI for biological resources at Whiteman AFB (MDC 2018b). Two state-listed species have been historically observed at Whiteman AFB. Neither species has been seen at the installation since the early 1990s. These species include the northern crawfish frog (*Lithobates areolatus circulosus*) and the greater prairie-chicken (*Tympanuchus cupido*). In 1994 the MDC collected a northern crawfish frog from a mowed field within the cantonment area. The greater prairie-chicken was also observed and known to establish leks on the flightline; however, no occurrences have been confirmed since the spring of 1993 (Whiteman AFB 2015a; Donaldson 2018).

WH3.6.1.4 Wetlands

Wetland delineations were completed at Whiteman AFB in 1995 and 1999 (Whiteman AFB 2015a). Approximately 88.29 acres of wetlands were identified on the installation. The wetlands occur primarily within the airfield between the runway and the parking apron. Drainage ditches associated with the airfield and the ammunition storage area, two holding ponds, and two large lakes on the base were previously identified as non-jurisdictional wetland habitats. Bear Lake is the only jurisdictional wetland on the base (Whiteman AFB 2015a).

WH3.6.2 Base Environmental Consequences

WH3.6.2.1 Vegetation

Activities associated with construction, demolition, and renovation projects would occur in developed or disturbed areas within the Community Commercial land use area of Whiteman AFB. Revegetation of temporarily disturbed areas would be conducted as directed by the base natural resource manager to minimize the potential for erosion and dust generation. No significant impacts to vegetation are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB.

WH3.6.2.2 Wildlife

Potential impacts to wildlife could include ground disturbance and construction noise from the associated facility and infrastructure projects. In addition, airfield operations can result in bird/wildlife-aircraft strikes and noise impacts.

The areas planned for development for the proposed AFRC F-35A mission at Whiteman AFB are highly disturbed and provide little habitat for wildlife species. The existing turfgrass and landscaped areas provide some urban adapted wildlife species with limited habitat. This habitat would be lost with construction of the proposed facilities and infrastructure projects.

Noise resulting from the proposed construction, demolition, and renovation activities would be localized, short-term, and only occur during daylight hours. Areas proposed for construction are in a military industrial land use with frequent elevated noise levels. Impacts to wildlife from construction noise would be minimal.

Annual airfield operations are anticipated to increase by approximately 17.4 percent (Section WH2.3). Any increase in operations could increase the potential for bird/wildlife-aircraft strikes. Whiteman AFB would continue to adhere to the installation's BASH Plan and annually coordinate with the MDC regarding migratory bird activity and other wildlife control at the installation. Wildlife would continue to be controlled per the recommendations of MDC in coordination with the USFWS Migratory Bird Office and BASH habitat would be managed intensively around the airfield environment to minimize the risk of strikes.

Impacts to wildlife and domestic animals that could result from aircraft noise are summarized below and discussed in more detail in Section WH3.2.2 and in Volume II, Appendix B. As described in Section WH3.2.2, the number of acres exposed to DNL greater than 65 dB would increase. Because additional land would be exposed to DNL greater than 65 dB, additional animals would also be exposed to this noise. Animals hear noise at different levels, in different frequency ranges, and tolerate noise differently than humans. These differences make comparing the noise metrics created for evaluating human impacts to animal impacts difficult. However, the number of noise events per hour with potential to interfere with speech (Table WH3-15) can be used as an indicator of changing frequency noise events that could affect animals. For example, under baseline conditions, animals near the Knob Noster State Park campground currently experience four events per hour that are at a sufficient level to interfere with human speech. Implementation of the new mission would increase this number by one event per hour.

Volume II, Appendix B, summarizes a number of scientific studies that have been conducted on the effects of aircraft noise on animals. These studies have shown that animal species have a wide range of responses to aircraft noise. One conclusion of these studies is that a general response to noise by domestic animals and wildlife is a startle response. These responses vary from flight, trampling, stampeding, jumping, or running, to the movement of the head in the directions of the noise. These studies report that the intensity and duration of the startle response decreases with time, suggesting no long-term, adverse effects. The majority of the studies suggest that domestic animal species and wildlife show behaviors characteristic of adaptation, acclimation, and habituation to repeated aircraft noise (Volume II, Appendix B). Therefore, significant impacts to animals in the ROI would not result from implementation of the AFRC F-35A mission at Whiteman AFB.

WH3.6.2.3 Threatened, Endangered, and Special Status Species

WH3.6.2.3.1 Federally Listed Species

On 14 May 2018 the USFWS indicated that if this project involves the removal of less than 10 acres of suitable bat habitat and the trees would be cleared during the bat hibernation season (1 November to 31 March), they do not anticipate adverse effects to the three listed bat species. Because no trees would be cleared and no federally listed threatened, endangered, or candidate species and/or designated critical habitat occurs in the ROI near Whiteman AFB, no impacts to protected species are anticipated to result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 17.4 percent increase in annual total airfield operations. Any increase in operations could result in an increased opportunity for bird-aircraft strikes to occur. Adherence to the existing BASH program would minimize the risk of bird-aircraft strikes including those for migratory birds to negligible levels (Section 3.4.1.5). Noise-related impacts to migratory birds nesting near Whiteman AFB would be the same as those described for other wildlife. Minimal impacts to migratory birds would result from implementation of the proposed AFRC F-35A mission in the ROI near Whiteman AFB.

WH3.6.2.3.3 Bald and Golden Eagles

No bald or golden eagles occur on Whiteman AFB and therefore, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.4 USFWS National Wildlife Refuge System Lands

The Big Muddy National Fish and Wildlife Refuge was identified by the USFWS IPaC report as an area near the base. None of the airspace proposed for training use overlies the Big Muddy National Fish and Wildlife Refuge. No impacts to this refuge would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.3.5 State-Listed Species

No state-listed species are known to occur on Whiteman AFB and therefore, no impacts to state-listed species would result from implementation of the proposed AFRC F-35A mission.

WH3.6.2.4 Wetlands

Construction, demolition, and renovation projects associated with the proposed action would not occur within or near any wetland areas. Therefore, there would be no impacts to wetlands at Whiteman AFB.

WH3.6.3 Airspace Affected Environment

The ROI for biological resources under airspace is defined as the primary airspace and ranges where AFRC F-35A pilots would predominantly fly.

WH3.6.3.1 Vegetation

The airspace proposed for use by AFRC F-35A pilots from Whiteman AFB covers approximately 23,514 square miles of land over Missouri, Kansas, and Arkansas. Primary range and airspace proposed for use covers approximately 7,805 acres of land over Missouri (Figure WH2-2). Vegetation communities under the primary airspace proposed for use includes those of the Ozark Highlands ecoregion. Vegetation communities are dominated by open oak-hickory and shortleaf pine woodlands and forests, including an assemblage of various types of fens, forests, wetlands, fluvial features, and carbonate and siliceous glades (USGS 2009).

WH3.6.3.2 Wildlife

The Ozark Highlands ecoregion supports more than 200 species of terrestrial and aquatic fauna (USGWS 2009). Common mammal species known to the region include vole (*Microtus* sp.), chipmunks (*Tamias striatus*), squirrels (*Sciurus niger, S. carolinensis*), white-tailed deer, bobcats (*Lynx rufus*), coyotes, and multiple species of mice and bats. The region supports a wide diversity

of avian species including flycatchers, vireos, larks, wrens, finches, warblers, woodpeckers, and various waterfowl such as ducks, geese, and teals. Wooded and open habitats support a range of raptor species such as hawks, falcons, and various owl species. A wide variety of reptiles and amphibians are present including various species of turtles, snakes, lizards, frogs, toads, salamanders, and newts.

WH3.6.3.3 Threatened, Endangered, and Special Status Species

WH3.6.3.3.1 Federally Listed Species

Federally listed threatened, endangered, and/or candidate species that could occur within the 22 counties included in the analysis of primary airspace and range areas proposed for use are presented in Table WH3-29. Due to the limited nature of ground disturbance in the areas under the primary airspace, plant, invertebrate, and fish species were excluded from further analysis. No critical habitat was identified under the primary airspace and range areas.

Table WH3-29. Federally Listed Species with Potential to Occur Under Primary Airspace and Primary Ranges Associated with the Proposed Action at Whiteman AFB

Common Name	Scientific Name	Federal Listing Status	Habitat
Mammals			
Gray Bat	*Myotis grisescens*	Endangered	Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel.
Indiana Bat	*Myotis sodalis*	Endangered	Indiana bats and northern long-eared bats hibernate in caves or mines during the winter. During the active season in Missouri (April 1 to October 31) these species roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and could also include some adjacent and interspersed non-forested habitats (e.g., emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures). This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags 5 inches in diameter at breast height for the Indiana bat and 3 inches in diameter at breast height for northern long-eared bat, and that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Northern long-eared bats have also been observed roosting in human-made structures (e.g., buildings, barns, bridges, and bat houses); therefore, these structures should also be considered potential summer habitat and evaluated for use by bats.
Northern Long-eared Bat	*Myotis septentrionalis*	Threatened	
Birds			
Red-cockaded Woodpecker	*Picoides borealis*	FE	The red-cockaded woodpecker prefers relatively open, parklike stands of pure pine with sparse hardwood midstories. Active colonies can be found in pine stands with a wide range of overstory stocking, but the birds do not tolerate dense hardwood stocking in the midstory. The species typically forages in pine or pine hardwood stands 30 years old or older.
Amphibians			
Ozark Hellbender	*Cryptobranchus alleganiensis bishopi*	FE	Ozark hellbenders need cool, clear streams and rivers with many large rocks.

Key: FE = federally endangered; FT = federally threatened
Source: USDA 2018; USFWS 2011, 2016a,b, 2017, 2018; Whiteman AFB 2015a

WH3.6.3.3.2 Migratory Birds

The primary airspace and range areas proposed for use are located in the USFWS-designated Bird Conservation Region 24 Central Hardwoods under the Mississippi Flyway (USFWS 2008). Under AFI 91-202 and AFI 91-212, Whiteman AFB employs a BASH Program that establishes an overall bird/wildlife control program to minimize aircraft exposure to potentially hazardous wildlife strikes.

WH3.6.3.3.3 Bald and Golden Eagles

Bald eagles are common migrants and winter residents throughout Missouri. Habitat includes estuaries, large lakes, reservoirs, and rivers. During winter, eagles congregate near rivers and reservoirs with open water and often near large concentrations of waterfowl. Golden eagles are also winter migrants in Missouri, but occur in much smaller numbers than bald eagle populations. Wintering eagles are known to perch near open water that provides favorable foraging habitat (MDC 2015).

WH3.6.4 Airspace Environmental Consequences

Impacts to biological resources occurring under the airspace proposed for use by AFRC F-35A pilots could result from overflights and associated noise, the use of munitions and flares, and bird-aircraft collisions. A review of current literature evaluating potential noise effects on wildlife is presented in Volume II, Appendix B.

WH3.6.4.1 Vegetation

Ground disturbance beneath the airspace proposed for use would be limited to the use of flares and munitions, which would be less than or the same as what is currently being used by A-10 pilots from Whiteman AFB and would only occur in areas that are currently approved for such use. Significant impacts to vegetation would not result from implementation of the AFRC F-35A mission in the areas under the airspace proposed for use by AFRC F-35A pilots stationed at Whiteman AFB.

WH3.6.4.2 Wildlife

All airspace proposed for use by AFRC F-35A pilots is currently used as active military airspace by military jet aircraft; therefore, no new types of impact would be introduced into these areas as a result of introducing the F-35A aircraft. Potential impacts for overflights and associated noise, munitions and flares, and bird-aircraft collisions are described as follows.

As shown on Figure WH3-4, L_{dnmr} would remain less than 45 dB beneath the Ada, Bison, Eureka, Lindbergh, Riley, Shirley, and Truman MOAs. Wildlife that are under the path of training overflights would be exposed to short, but intense noise events from overflights. These training airspace areas are very large, and training sorties are sufficiently spread out such that intense overflight noise events at any one location are infrequent. The L_{dnmr} would not change below the Smoky MOAs and R-3601. In the Cannon and Salem MOAs and in R-4501, the number of sorties would increase by as much as 54 percent, and L_{dnmr} would increase by up to 2 dB.

Low time-averaged noise levels (e.g., L_{dnmr}) do not imply that loud overflights do not or would not occur. Rather, they should be interpreted to mean that intense overflight noise events occur less frequently than in other areas. Wildlife in the MOAs and airspace where the L_{dnmr} is unchanged with the implementation of the proposed action would be exposed to noise events less frequently than those where the L_{dnmr} is increasing. In the Cannon and Salem MOAs and in R-4501 wildlife would have a greater frequency of exposure to aircraft noise that is potentially of high intensity and short duration. AFRC F-35A pilots would train at higher altitudes than the current A-10 pilots and this would tend to reduce the noise exposure.

Some physiological/behavioral responses (from both subsonic and supersonic noise) such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species could be more sensitive than other species and/or could exhibit different forms or intensities of behavioral responses. For instance, the results of one study indicate that wood ducks appear to be more sensitive to noise and more resistant to acclimation to jet aircraft noise than Canada geese (Edwards et al. 1979). Similarly, wild ungulates (e.g., deer) seem to be more easily disturbed than domestic animals.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Other factors influencing response to jet aircraft noise could include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase. Proposed AFRC F-35A training would primarily occur at high altitudes, with 94 percent of total training time being spent at altitudes above 10,000 feet MSL. The higher flight profile could reduce the response of wildlife to aircraft noise.

The literature does suggest that common responses include the “startle” (or “fright”) response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise.

In summary, adverse behavioral responses ranging from mild to severe could occur in individual animals as a result of loud overflights. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate responses could include nervous behaviors, such as trotting a short distance. Escape is the typical severe response (Volume II, Appendix B).

None of the airspace proposed for use by AFRC F-35A pilots operating from Whiteman AFB is approved for supersonic flight. Therefore, AFRC F-35A pilots operating from Whiteman AFB would not conduct supersonic flights in the airspace proposed for use and no impacts related to supersonic noise would occur.

Flares would be used as a defensive countermeasure by AFRC F-35A pilots during training operations. Flares would only be used in airspace areas currently approved for such use. Flare use by AFRC F-35A pilots would conform to existing altitude and seasonal restrictions to ensure fire safety. Based on the emphasis on flight at higher altitudes for the F-35A, roughly 90 percent of flares released throughout the authorized airspace would occur above 15,000 feet MSL, further reducing the potential risk for accidental fires or adverse impacts to underlying land areas and habitats. Ordnance delivery would only occur in ranges authorized for use. AFRC F-35A pilots would use the same amount of flares and ordnance as the current A-10 pilots, resulting in no change to the potential for adverse impacts to wildlife under the training airspace.

AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, with the majority (99 percent) of operations occurring above 5,000 feet AGL (operations under 5,000 feet AGL would occur less frequently than baseline operations). Most birds fly below 500 feet, except during migration (Section WH3.6.4.3.2). No F-35A low-level flight training is expected to occur below 500 feet AGL and the potential for bird-aircraft collisions would be minor.

WH3.6.4.3 Threatened, Endangered, and Special Status Species

WH3.6.4.3.1 Federally Listed Species

Potential impacts to federally listed species and critical habitats that could occur under the airspace proposed for use would be the same as those described for wildlife. Therefore, it is anticipated that significant adverse impacts to federally listed species would not result from implementation of the AFRC F-35A mission.

WH3.6.4.3.2 Migratory Birds

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a 5.9 percent decrease in aircraft sorties. A decrease in sorties could result in a decreased opportunity for bird-aircraft strikes. The chances of such bird-aircraft strikes are considered unlikely for the following reasons. AFRC F-35A pilots would predominantly fly above 5,000 feet AGL. Most bird strikes (95 percent) occur below 5,000 feet AGL. Except during migration most birds spend the majority of their time below 500 feet. Migrations typically occur in ranges from 500 to 2,000 feet. The highest known flight of a North American migratory bird species is that of the mallard duck (*Anas platyrhynchos*), which has been observed to fly as high as 21,000 feet (World Atlas 2016). Vultures (*Aegypius monachus*) sometimes rise to elevations higher than 10,000 feet in order to scan larger areas for food and to watch the behavior of distant vultures for clues to the location of food sources (Stanford University 1988). Due to the predominant use of higher altitudes, implementation of the proposed AFRC F-35A mission would result in minimal impacts to migratory birds protected under the MBTA.

WH3.6.4.3.3 Bald and Golden Eagles

Potential impacts to bald and golden eagles and habitats that occur in areas under the primary airspace and range areas would be similar to those described in Section WH3.6.4.3.2. AFRC F-35A pilots would fly at higher altitudes than A-10 pilots, reducing the potential for BASH. As such, no impacts to eagles would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB.

WH3.6.5 Summary of Impacts to Biological Resources

Construction activities on the base would occur in previously disturbed areas. Impacts to wetlands and protected species would not result from implementation of the proposed action. Noise resulting from construction activities would not affect wildlife or protected species because areas where construction is proposed are currently exposed to high noise levels. Aircraft operations near Whiteman AFB and in the airspace proposed for use would expose some wildlife species to increased levels of noise and the 17.4 percent increase in aircraft operations near the base could result in increased bird-aircraft strikes. However, because these species are currently exposed to military and commercial aircraft noise, impacts to biological resources are not anticipated to be significant.

WH3.7 CULTURAL RESOURCES

Cultural resources are historic districts, sites, buildings, structures, or objects considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources, architectural/engineering resources, and traditional resources. Cultural resources that are eligible for listing on the National Register of Historic Places (NRHP) are known as historic properties.

WH3.7.1 Base Affected Environment

WH3.7.1.1 Architectural Resources

Historical building inventories at Whiteman AFB (Weitze et al. 2009; Klinger and Smith 1997) have identified two buildings that are eligible for listing in the NRHP, Building 1230 and Building 4017. Building 1230 is designated as Site Oscar-01 and is a former Minuteman missile alert facility. Building 1230 is located in the southern portion of the main installation, north of Skelton Lake. Building 4017 is designated as a Strategic Air Command special storage facility and was an ordnance storage igloo associated with the Cold War-era. Building 4017 is located east of the airfield. Whiteman AFB has concluded that no other NRHP-eligible buildings are present on the installation.

WH3.7.1.2 Archaeological Resources

Numerous archaeological surveys have been conducted on Whiteman AFB (Klinger and Smith 1997). No NRHP-eligible sites were identified in these surveys and the survey reports have concluded that there is a low probability for significant archaeological resources in the developed portions of the installation.

WH3.7.1.3 Traditional Resources

Eleven (11) tribes have been identified that are potentially affiliated with the installation. These tribes, listed in Table A-1 in Volume II, Appendix A, Section A.7.2, have been asked to provide information on any properties to which they attach religious and cultural significance. No known tribal sacred sites or properties of traditional religious and cultural importance are located on Whiteman AFB.

WH3.7.2 Base Environmental Consequences

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would include the construction of four new facilities, demolition of one building, and eight renovation projects (Table WH2-1 and Figure WH2-1). All buildings within the Area of Potential Effects (APE) have been evaluated for NRHP eligibility and determined non-eligible and Whiteman AFB has made a finding of no historic properties affected for this action. The Missouri SHPO has concurred with these findings (see letter dated 13 June 2018, Volume II, Appendix A, Section A.7.3).

No impacts to known archaeological resources would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB. All portions of the base with proposed construction are either in areas that have already been disturbed by previous construction or have been inventoried for archaeological resources. No NRHP-eligible archaeological resources have been identified in the APE. Because ground-disturbing activities would occur in previously disturbed and inventoried areas, it is extremely unlikely that any previously undocumented archaeological resources would be encountered during facility demolition, renovation, addition, or construction. In the case of unanticipated or inadvertent discoveries, the USAF would comply with NHPA and Native American Graves Protection and Repatriation Act (NAGPRA) regulations.

NRHP-eligible facilities located on the installation (Buildings 1230 and 4017) are located outside the APE and there would be no direct impact to historic properties. Indirect impacts on cultural resources from population changes, noise or visual intrusions would be extremely unlikely. The total authorized personnel at Whiteman AFB would increase (11 persons) with the proposed action. This small population change would not have an indirect impact on cultural resources at the installation. Both Buildings 1230 and 4017 would be located between the 70 and 75 dB DNL contour lines. As described in Section WH3.2.3 the noise levels in these zones would not be at high enough levels to cause structural impacts to buildings. Visual intrusion from the proposed action would not be a significant issue. Both NRHP-eligible buildings derive their historical significance from association with military activities and their setting within a military installation. New construction would occur in the context of an active USAF base, where changes in the infrastructure are common. The viewshed of remaining historic properties would not be affected by the proposed construction.

No Section 106 impacts to tribal resources or traditional cultural properties are anticipated to result from implementation of the AFRC F-35A mission. As required by Sections 101(d)(6)(B) and 106 of the NHPA; implementing regulations prescribed in 36 *CFR* Section 800.2(c)(2); EO 13175, *Consultation and Coordination with Indian Tribal Governments;* DoDI 4710.02; and AFI 90-2002, *Air Force Interactions with Federally Recognized Tribes*, Whiteman AFB initiated Section 106 government-to-government consultation with eleven tribes to identify traditional cultural properties. Volume II, Appendix A, Section A.2.7.2, contains a record of these consultations. The consultation correspondence included an invitation to participate in the NEPA process, and an invitation to consult directly with the Whiteman AFB Commander regarding any comments, concerns, and suggestions.

WH3.7.3 Airspace Affected Environment

Table WH3-30 presents the NRHP-listed sites and Native American Reservation lands under the airspace proposed for use. The Whiteman AFB training airspace overlies at least part of 29 Missouri counties (Benton, Camden, Carter, Cooper, Crawford, Dent, Henry, Hickory, Howell, Iron, Johnson, Laclede, Lafayette, Moniteau, Morgan, Oregon, Pettis, Phelps, Pulaski, Reynolds, Ripley, Saline, Shannon, St. Clair, St. Francois, Texas, Washington, Wayne, and Wright); 27 Kansas counties (Barton, Butler, Chautauqua, Clay, Cloud, Crowley, Dickinson, Elk, Ellsworth, Geary, Greenwood, Lincoln, McPherson, Mitchell, Montgomery, Osborne, Ottowa, Pottawatomie, Republic, Rice, Riley, Rush, Russell, Saline, Washington, Wilson, and Woodson) and 15 Arkansas counties (Baxter, Cleburne, Conway, Faulkner, Independence, Izard, Jackson, Johnson, Newton, Pope, Searcy, Sharp, Stone, Van Buren, and White).

Four hundred thirteen (413) NRHP-listed properties have been identified under the Whiteman AFB airspace. Fifty-five (55) of these are located under the primary airspace and range areas. No known traditional cultural resources have been identified under the airspace. It is possible that such resources could exist in the area as the exact location of some traditional cultural resources is confidential.

Table WH3-30. NRHP-Listed Sites and Native American Reservation Lands Under Whiteman AFB Training Airspace

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Ada East and West MOAs	18	None
Bison MOA	14	None
Eureka High/Low MOAs	19	None
Lindbergh A/B/C MOAs	33	None
Riley MOA	2	None

Table WH3-30. NRHP-Listed Sites and Native American Reservation Lands Under Whiteman AFB Training Airspace (Continued)

Airspace Designations	Number of NRHP Properties Under Airspace[a]	Native American Reservation Lands Under Airspace[a]
Salem MOA	14	None
Shirley A/B/C MOAs	227	None
Smoky MOA	7	None
Truman A/B/C MOAs	62	None
Lindbergh West ATCAA	7	None
Lindbergh D ATCAA	10	None

[a] Due to the sensitivity of the locations, archaeological sites are not included in this table or shown on any figures.

WH3.7.4 Airspace Environmental Consequences

Implementation of the proposed action would result in a 5.9 percent decrease in the total sortie-operations conducted annually in the airspace proposed for use. As described in Section WH3.2.4, L_{dnmr} under the training airspace would remain the same (0 dB increase) or slightly increase (1 to 2 dB), and the highest L_{dnmr} would remain at 53 dB. No supersonic flights would occur in the Whiteman AFB training airspace. No impacts on historic properties under the Whiteman AFB training airspace are expected. Scientific studies of the effects of noise and vibration on historic properties have considered potential impacts on historic buildings, prehistoric structures, water tanks, archaeological cave/shelter sites, and rock art. These studies have concluded that overpressures generated by supersonic overflight were well below established damage thresholds and that subsonic operations would be even less likely to cause damage (see Volume II, Appendix B, Section B.2.10).

WH3.7.4.1 Native American Concerns

During scoping, the USAF contacted 11 federally affiliated Native American tribes to invite them to attend the public meetings and express their concerns about the potential AFRC F-35A mission at Whiteman AFB. During the scoping process, including the public meetings, no comments regarding potential impacts on traditional cultural resources or traditional cultural properties were received.

In accordance with Section 106 of the NHPA and EO 13175, USAF also has contacted the 11 tribes to consult on a government-to-government basis regarding their concerns about potential impacts on traditional cultural resources and traditional cultural properties under airspace associated with Whiteman AFB. Four tribes have responded to the request for consultation. Three of the tribes indicated concurrence, approval, or no interest in the project. One tribe requested a copy of the Draft EIS. USAF coordination with interested tribes regarding airspace actions will continue throughout the EIS process.

WH3.7.5 Summary of Impacts to Cultural Resources

No archaeological sites are located in any of the proposed construction footprints at Whiteman AFB. In the case of unanticipated or inadvertent discoveries, the USAF would comply with Section 106 of the NHPA. All buildings within the APE have been evaluated for NRHP eligibility and determined non-eligible and the Missouri SHPO has concurred with this finding. Section 106 consultation is considered complete and Whiteman AFB will continue to coordinate with interested tribes throughout the EIS process. No impacts to historic properties under the airspace proposed for use are expected. Implementation of the AFRC F-35A mission is not anticipated to result in significant impacts to cultural resources.

WH3.8 LAND USE AND RECREATION

WH3.8.1 Base Affected Environment

WH3.8.1.1 Land Use

On-base construction would be consistent with established base land uses. Because potential land use consequences would primarily be noise-related, the discussion in this section focuses on noise-related land use regulations and compatibility constraints. The following paragraphs address federal, state, and local statures, regulations, programs, and plans that are relevant to the analysis of land use for Whiteman AFB and the surrounding areas.

Installation Development Plan (IDP). The Whiteman AFB IDP guides future development and land use decisions at Whiteman AFB (USAF 2015).

Joint Land Use Study (JLUS). The JLUS for Whiteman AFB was published in 2008 with the City of Knob Noster and Johnson County serving as participating communities. The JLUS was developed to encourage cooperative land use planning between the military and surrounding civilian land uses, to seek a cooperative means to anticipate and minimize the impacts of military operations on adjacent lands, and to protect and promote the future operational mission of Whiteman AFB.

The 2009 Military Airport Comprehensive Plan for the Unincorporated Area of Johnson County, Missouri. In 2009, after the JLUS was completed, the Johnson County Airport Zoning Commission published the comprehensive plan to focus on the necessary restrictions to allow for the safe and secure daily activities of both the public and the government (JCAZC 2009).

Local Regulations and Ordinances. Whiteman AFB and surrounding communities have been working on compatibility planning since the 2008 JLUS. The Johnson County Military Airport Zoning Commission was developed to provide encroachment protection for the base by limiting population density near the base and establishing reasonable limits for acreage minimums for residential development. The base actively participates in providing information to support ongoing community planning initiatives. Similarly, two surrounding communities have adopted regulatory overlays to address noise and air safety impacts. The Whiteman AFB compatibility menu identifies 39 strategies for land use planning.

On-Base Land Use. Whiteman AFB occupies approximately 5,419 acres (3,879 owned and 362 leased) with 1,178 acres of easements of federally owned or leased land at the eastern edge of Johnson County, Missouri. Land use on the base is generally divided into six planning districts. The Airfield District, which encompasses approximately 2,423 acres of the base, is the largest.

Surrounding Land Use. Whiteman AFB is located in west-central Missouri, directly south of Knob Noster and 7 miles east of Warrensburg. Land use surrounding the base is generally rural, agricultural land with wooded, flat, and rolling terrain.

As identified in Table WH3-31, under baseline conditions, land uses exposed to DNL of 65 dB or greater primarily consist of open areas, followed by residential, commercial and industrial areas. Approximately 98 acres of residential land is currently exposed to DNL of 65 dB or greater, resulting in incompatible use.

Table WH3-31. Off-Base Acres Currently Exposed to DNL of 65 dB or Greater at Whiteman AFB

Land Use Category[a]	DNL (dB)					
	65–69	70–74	75–79	80–84	≥ 85	Total
Commercial	17	12	0	0	0	29
Industrial	23	2	0	0	0	25
Open	1,381	504	52	0	0	1,937
Public/Quasi-Public	0	0	0	0	0	0
Recreational	0	0	0	0	0	0
Residential	79	19	0	0	0	98
Water	0	0	0	0	0	0
Total	**1,500**	**537**	**52**	**0**	**0**	**2,089**

[a] All numbers are in units of acres.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

Source: USAF 2015

WH3.8.1.2 Recreation

Whiteman AFB hosts an outdoor track, a 16-lane bowling center, an 18-hole golf course, two basketball courts, several baseball and soccer fields, tennis courts, and two swimming pools. The fitness center hosts state-of-the-art exercise machines and a gym with a basketball court. Although Whiteman AFB offers a variety of both indoor and outdoor recreational facilities, the IDP identified a need to pursue a consolidated recreation complex to leverage connections with the adjacent Knob Noster State Park (Whiteman AFB 2015b). Fishing, skeet, and archery are the only activities actively managed by the outdoor recreation office on base. Three ponds are open to recreational fishing on the base. The ponds are not regularly stocked but host a variety of species, including catfish, bluegill, and bass.

Knob Noster State Park is adjacent to the base and offers opportunities for camping, hiking, fishing, picnic areas, horseback riding, bicycle trails, and boating (Table WH3-32). Whiteman AFB is located in close proximity to multiple other recreational areas such as Truman Lake and Lake of the Ozarks. Multiple MDC Wildlife Areas offer hunting and fishing opportunities along with areas for hosting picnics and hiking.

Table WH3-32. Recreation Facilities near Whiteman AFB

ID	Recreational Facility	Activities	Current DNL (dB)	Compatibility (Y/N)
P01	Knob Noster State Park campground	Picnic areas, fishing, hiking, camping, bicycling, horseback riding	48	Y

WH3.8.2 Base Environmental Consequences

WH3.8.2.1 Land Use

WH3.8.2.1.1 Physical Development

The physical development associated with the proposed AFRC F-35A mission at Whiteman AFB would primarily occur in previously disturbed areas near the flightline where airfield and aircraft O&M support activities occur on a daily basis. None of the physical development associated with implementation of the proposed mission at Whiteman AFB would impact land use because the proposed construction and renovation would occur in land uses designated for the proposed use.

Subsequent O&M activities for the proposed mission would conform to current and future land uses on the base and traffic, noise, dust, and similar effects from construction equipment would be reduced through construction plans and practices agreed to by contractors. During scoping one commenter expressed concern about possible base expansion. No plans to expand the base or acquire land are part of the proposed AFRC F-35A mission. The physical changes and daily activities on the ground would be confined to the base. The proposed on-base development would have no impact to off-base areas. Impacts associated with physical development would be the same regardless of which afterburner scenario is selected.

WH3.8.2.1.2 Aircraft Operations

This analysis includes an evaluation of the potential noise impacts to on- and off-base land uses resulting from the proposed AFRC F-35A mission at Whiteman AFB. Volume II, Appendix B, Section B.2.2, presents the USAF noise compatibility guidelines for noise exposure to various land uses.

Scenario A

Implementation of Scenario A would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,421 acres (Table WH3-33 and Figure WH3-6). This would result in an increase of approximately 3,045 off-installation estimated residents and an additional 307 acres of residential land exposed to DNL of 65 dB or greater.

Table WH3-33. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario A

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	57	34	2	11	9	0	1	1	0	0	0	0	0	0	25	69	44
Open	1,381	2,925	1,544	504	844	340	52	198	146	0	0	0	0	0	0	1,937	3,967	2,030
Public/Quasi-Public	0	25	25	0	0	0	0	0	0	0	0	0	0	0	0	0	25	25
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	322	243	19	82	63	0	1	1	0	0	0	0	0	0	98	405	307
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,351**	**1,851**	**537**	**959**	**422**	**52**	**200**	**148**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,510**	**2,421**

[a] All numbers are in units of acres.
[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.
Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.
Source: USAF 2015

The JLUS identifies residential (except for mobile home parks), commercial, industrial, open, and public/quasi-public land uses as compatible, or generally compatible, with DNL from 65 to 75 dB when measures to achieve overall noise level reduction are included in facility design and construction.

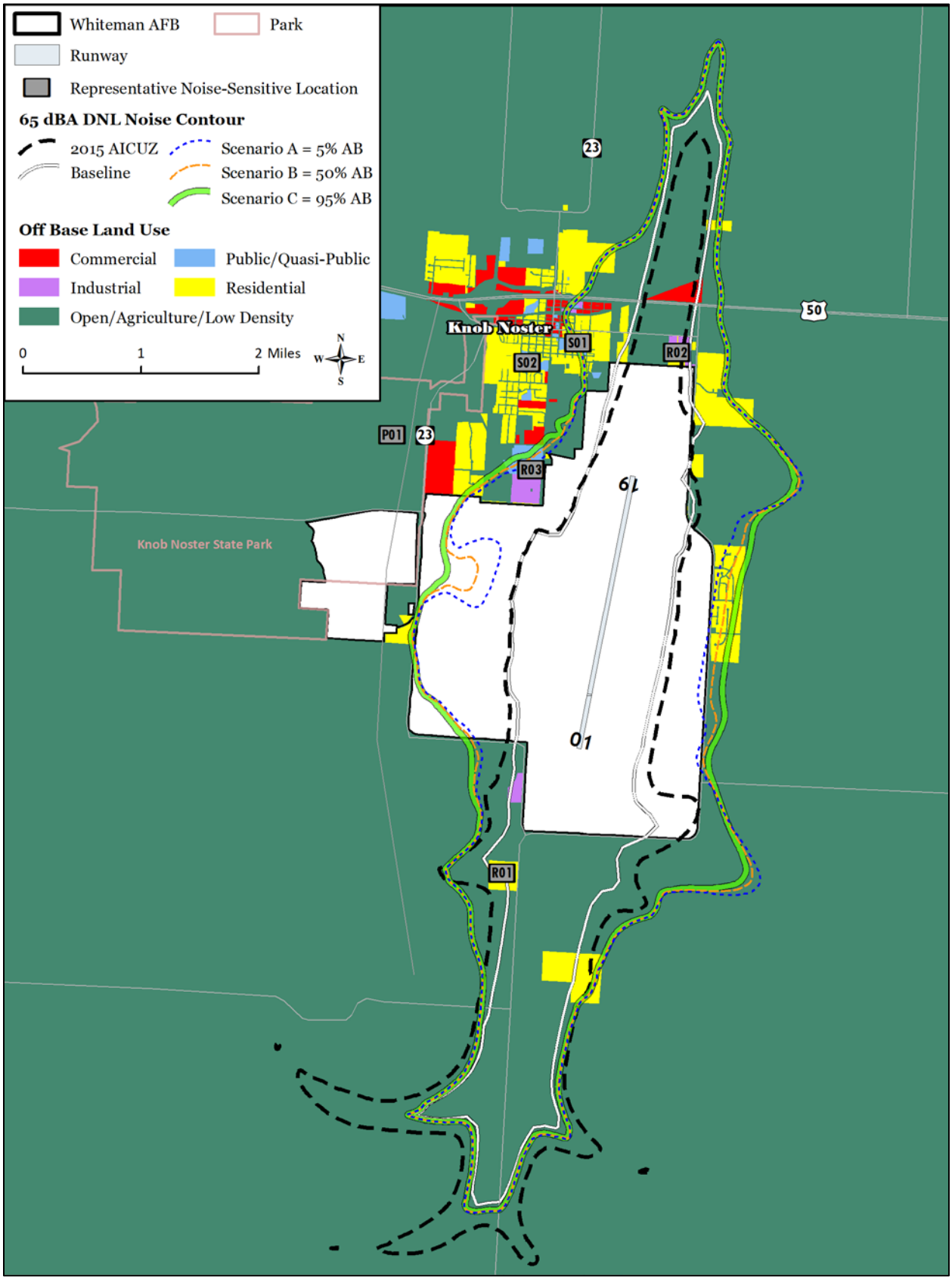

Figure WH3-6. Baseline, JLUS, and AFRC F-35A Mission DNL Contours Relative to Land Use at Whiteman AFB

Two mobile home parks would be impacted by increased noise from the AFRC F-35A mission. One park represented by point R02 is currently exposed to 68 dB DNL under baseline conditions. Implementation of Scenario A would result in a 5 dB DNL increase. A second mobile home park, represented by point R03, would be exposed to an increase of 9 dB DNL (66 dB DNL). The baseline and proposed action noise levels are and would be incompatible with this land use. As described in Section WH3.2.2, there would be significant noise-related impacts to residents in these areas. Land impacts are assessed in part on the change in the suitability of a location for its current or planned use (see Chapter 3, Section 3.8.3.1). The EIS identifies potential significant noise-related impacts to people in the vicinity of the base. However, from a land use perspective, the land use compatibility of the points represented by R02 and R03 would remain unchanged.

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial, and other land uses. Implementation of the AFRC F-35A mission (Scenario A) would not result in significant impacts to land use.

Scenario B

Implementation of Scenario B would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,517 acres (Table WH3-34 and Figure WH3-6). This would result in an increase of an estimated 3,341 off-installation residents and an additional 354 acres of residential land exposed to DNL of 65 dB or greater. The same mobile home parks impacted by implementation of Scenario A would also be impacted by implementation of Scenario B.

Table WH3-34. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario B

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	55	32	2	12	10	0	1	1	0	0	0	0	0	0	25	68	43
Open	1,381	2,963	1,582	504	849	345	52	195	143	0	0	0	0	0	0	1,937	4,007	2,070
Public/Quasi-Public	0	35	35	0	0	0	0	0	0	0	0	0	0	0	0	0	35	35
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	370	291	19	81	62	0	1	1	0	0	0	0	0	0	98	452	354
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,445**	**1,945**	**537**	**964**	**427**	**52**	**197**	**145**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,606**	**2,517**

[a] All numbers are in units of acres.

[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

Source: USAF 2015

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial,

and other land uses. Implementation of the AFRC F-35A mission (Scenario B) would not result in significant impacts to land use.

Scenario C

Implementation of Scenario C would increase the area surrounding Whiteman AFB exposed to DNL of 65 dB or greater by approximately 2,620 acres (Table WH3-35 and Figure WH3-6). This would result in an increase of an estimated 3,699 off-installation residents and an additional 405 acres of residential land exposed to DNL of 65 dB or greater. The same mobile home parks impacted by implementation of Scenarios A or B would also be impacted by implementation of Scenario C.

Table WH3-35. Off-Base Acres Exposed to DNL of 65 dB or Greater at Whiteman AFB under Scenario C

Land Use Category[a]	DNL (dB)																	
	65–69			70–74			75–79			80–84			≥ 85			Total		
	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]	Baseline	AFRC F-35A Mission	Change[b]
Commercial	17	22	5	12	22	10	0	0	0	0	0	0	0	0	0	29	44	15
Industrial	23	54	31	2	13	11	0	1	1	0	0	0	0	0	0	25	68	43
Open	1,381	3,003	1,622	504	853	349	52	192	140	0	0	0	0	0	0	1,937	4,048	2,111
Public/Quasi-Public	0	46	46	0	0	0	0	0	0	0	0	0	0	0	0	0	46	46
Recreational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential	79	422	343	19	80	61	0	1	1	0	0	0	0	0	0	98	503	405
Water	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,500**	**3,547**	**2,047**	**537**	**968**	**431**	**52**	**194**	**142**	**0**	**0**	**0**	**0**	**0**	**0**	**2,089**	**4,709**	**2,620**

[a] All numbers are in units of acres.

[b] Change equals the difference between baseline acreage and acres exposed to noise resulting from the AFRC F-35A mission.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, acreage numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw number of acres. The resulting summations and change calculations are then rounded to whole numbers.

Source: USAF 2015

No recreational land would be exposed to DNL of 65 dB or greater. The largest increase in acreage exposed to additional noise would be open areas, followed by residential, commercial, industrial, and other land uses. Implementation of the AFRC F-35A mission (Scenario C) would not result in significant impacts to land use.

WH3.8.2.2 Recreation

Construction in support of the AFRC F-35A mission would occur in the existing cantonment area. Surrounding parks, schools, and recreational facilities are too far from the installation to be affected by construction noise. Increased truck traffic to the installation during the 2-year construction period could cause temporary effects to traffic flow on local roads, but this is not anticipated to interfere with access to recreational areas near Whiteman AFB. New facilities would not alter any sensitive views that have important recreational value.

Implementation of the AFRC F-35A mission at Whiteman AFB would result in a net increase of 11 personnel with dependents as a result of the drawdown of the AFRC A-10 mission as the F-35A

aircraft arrive. This change in the number of people would have no discernable effect on recreational resources.

Implementation of Scenario A would result in a DNL increase of 6 dB at the Knob Noster State Park campground. Implementation of Scenarios B or C would result in the same DNL at recreational facilities as implementation of Scenario A, except at Knob Noster State Park, where DNL would be 55 dB rather than 54 dB for both Scenarios B and C. Noise modeling results summarized in Table WH3-36 indicate that implementation of the AFRC F-35A mission at Whiteman AFB would not result in DNL greater than 65 dB at the Knob Noster State Park campground. However, a DNL increase of 6 dB above baseline conditions would be noticeable.

Table WH3-36. Noise Effects on Recreation Facilities Around Whiteman AFB Resulting from Scenario A

Recreational Facility	DNL (dB)	
	Baseline Conditions	AFRC F-35A Mission
Knob Noster State Park campground	48	54

The use of some outdoor recreational facilities such as outdoor sports fields and ball courts is compatible with DNL below 75 dB, with the installation of special sound buffering, although noise increases could reduce the quality and enjoyment of outdoor activities for some persons. One measure of annoyance is the potential for speech interference. As described in Section WH3.2.2.2, 50 dB L_{max} is the metric used to determine potential speech interference. As shown in Table WH3-15, recreational users at the Knob Noster State Park campground would experience one additional outdoor noise event (an increase from three to four) per hour at L_{max} greater than 50 dB.

Another noise metric that can be used to evaluate potential impacts to recreational uses is SEL. The SEL of the loudest overflight event experienced regularly at the Knob Noster State Park campground would increase by 5 dB (Table WH3-10). Recreational users at the Knob Noster State Park campground would experience an increase in the number of these loudest overflight events from less than 1 per day to up to nearly 10 per day at the highest SEL.

WH3.8.3 Airspace Affected Environment

WH3.8.3.1 Land Use

This section summarizes land ownership and identifies affected Special Use Land Management Areas (SULMAs) under the airspace currently used by pilots from Whiteman AFB. SULMAs include selected areas managed by federal and state agencies that provide recreational and scenic opportunities (e.g., parks, monuments, and scenic river corridors), solitude or wilderness experiences (e.g., forests and wilderness areas), conservation of natural or cultural resources (e.g., wildlife refuge areas and national monuments), and other special management functions (e.g., Native American reservation lands). SULMAs often provide a combination of these attributes. Some SULMAs could include recreation-oriented sites such as campgrounds, canoeing opportunities, trails, and visitor centers; recreation is addressed separately in Section WH3.8.3.2.

Pilots from Whiteman AFB use airspace in Missouri, Arkansas, and Kansas with most areas being in Missouri (see Figure WH3-7). The SULMAs under the airspace used by pilots stationed at Whiteman AFB include wilderness areas, National Forests, National Wildlife Refuges, state Wildlife Management Areas and parks, and Native American reservation lands. The majority of federal land under the airspace used is administered by the U.S. Forest Service (USFS), followed by the USFWS. Figure WH3-7 identifies the airspace currently used along with the SULMAs aggregated by ownership (i.e., USFS, USFWS, state land, etc.).

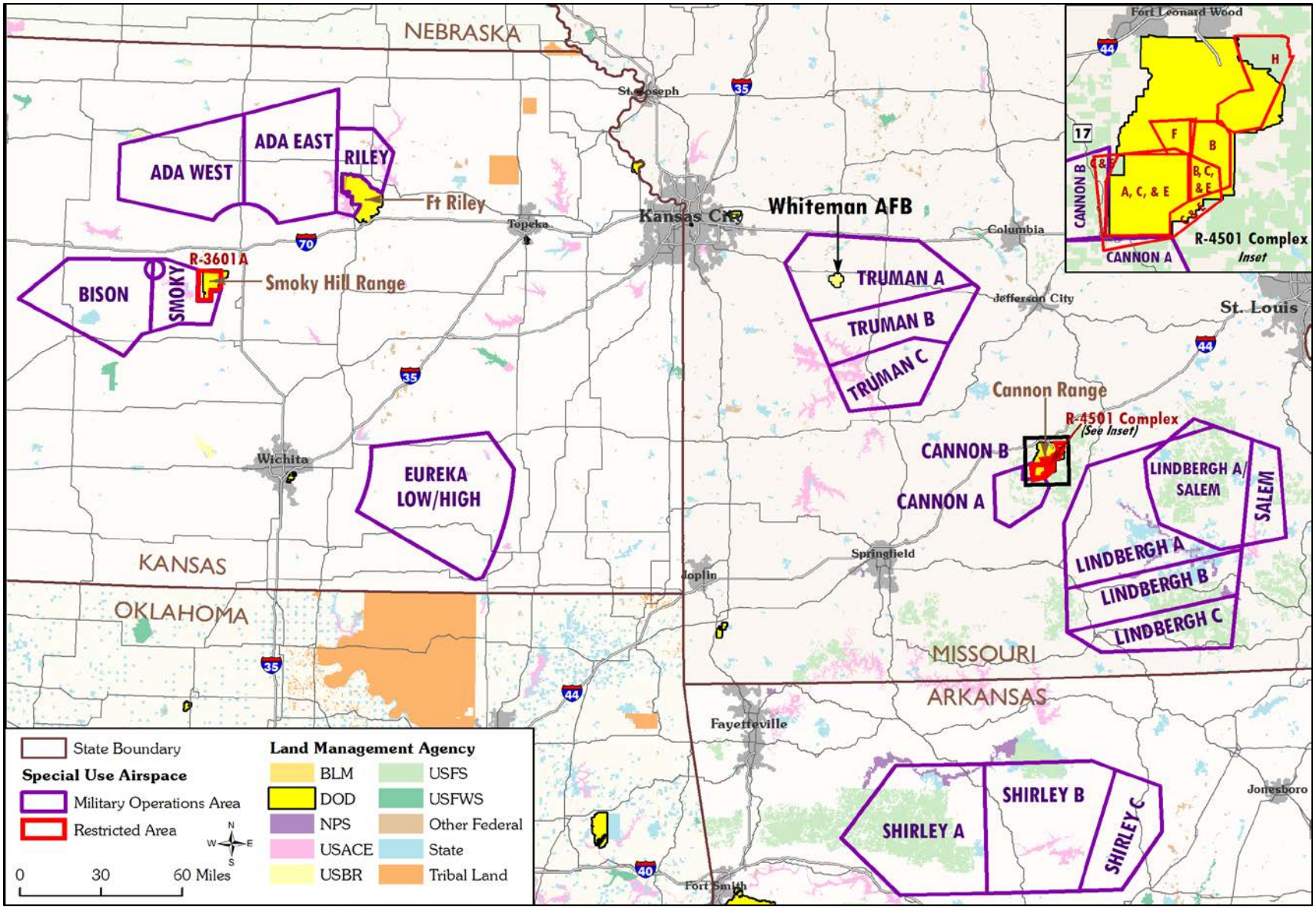

Figure WH3-7. SULMAs Beneath Whiteman AFB Airspace

WH3.8.3.2 Recreation

Recreational opportunities under the airspace currently used are similar to those described in Section WH3.8.1.2. The underlying land reflects the same mosaic of federal, state, and private ownership, with a similar range of outdoor recreational activities. The public lands support a variety of recreational opportunities and activities, with some areas having particular qualities or recreational purposes.

Examples of these include one National Forest, one National Wildlife Refuge and numerous state parks, lakes and conservation areas. Southern Missouri and Northern Arkansas host habitats that support a wide variety of species, particularly throughout the oak-hickory woodlands that dominate this area. These areas are popular for recreational bird watching. In addition, many of the national forests and state lands offer opportunities for hunting and fishing and a variety of different outdoor recreational opportunities. Eastern and central Kansas also offers numerous recreational opportunities and habitats for a wide variety of both game and non-game species. Public access is permitted to limited portions of both Fort Leonard Wood and Fort Riley for recreation. The Sikes Act stipulates that access for wildlife-oriented recreation shall be provided to the extent possible with military use, while maintaining the priority of the military purpose and safety of public users. Recreational activities within the designated areas of Fort Leonard Wood and Fort Riley include camping, driving, fishing, hunting, off-highway vehicle uses in designated areas, and viewing natural resources of interest.

WH3.8.4 Airspace Environmental Consequences

WH3.8.4.1 Land Use

Table WH3-37 identifies the SULMAs that occur under the airspace proposed for use by AFRC F-35A pilots operating from Whiteman AFB that would be exposed to subsonic noise that would increase L_{dnmr} up to 2 dB above baseline conditions. In all cases, SULMAs under the airspace proposed for use would not experience subsonic L_{dnmr} greater than 47 dB.

Table WH3-37. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Whiteman AFB

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	Change
Cannon A MOA					
Allen (Wilbur) Memorial Conservation Area	383	100	<45	47	2
Mark Twain National Forest	1,505,503	3	<45	47	2
Cannon B MOA					
Mark Twain National Forest	1,505,503	<1	<45	46	1
R-4501					
Mark Twain National Forest	1,505,503	<1	<45	46	1
Salem MOA					
Anderson Mountain Rare II Study Area	2,741	7	<45	47	2
Bell Mountain Wilderness	9,183	100	<45	47	2
Bismarck Conservation Area	1,159	94	<45	47	2
Buford Mountain Conservation Area	3,919	100	<45	47	2
Cedar Mountain Conservation Area	117	100	<45	47	2
Champion Springs Conservation Area	173	100	<45	47	2
Clearwater Recreation Area	1,8714	39	<45	47	2
Current River Conservation Area	29,734	19	<45	47	2

Table WH3-37. Special Use Areas Land Management Areas Exposed to Subsonic Noise Increases of 1 dB or Greater from the AFRC F-35A Mission at Whiteman AFB (Continued)

SULMA Name	SULMA Acreage	Percentage of SULMA Under Airspace	Baseline Conditions	AFRC F-35A Mission	
			L_{dnmr}	L_{dnmr}	L_{dnmr}
Salem MOA					
Dillard Mill State Historic Site	131	100	<45	47	2
Elephant Rocks State Park	128	100	<45	47	2
Fort Davidson State Historic Site	68	100	<45	47	2
Funk Memorial State Forest And Wildlife Area	182	100	<45	47	2
Graves Mountain Conservation Area	3,236	34	<45	47	2
Indian Trail Conservation Area	12,863	100	<45	47	2
Johnson's Shut-Ins State Park	8,304	100	<45	47	2
Ketcherside Mountain Conservation Area	3,451	100	<45	47	2
Logan Creek Conservation Area	11,985	94	<45	47	2
Lower Taum Sauk Lake	1,347	100	<45	47	2
Mark Twain National Forest	1,505,503	23	<45	47	2
Pilot Knob National Wildlife Refuge	118	100	<45	47	2
Riverside Conservation Area	2,696	100	<45	47	2
Rocky Creek Conservation Area	37,652	3	<45	47	2
Sunklands Conservation Area	3,2407	6	<45	47	2
Taum Sauk Mountain State Park	2,125	100	<45	47	2

AFRC F-35A operations would result in minor subsonic L_{dnmr} increases of 2 dB above baseline. Subsonic L_{dnmr} would remain below 65 dB under all of the airspace proposed for use. None of the airspace proposed for use is approved for supersonic aircraft operations.

WH3.8.4.2 Recreation

A synopsis of issues and methodology for addressing potential impacts from military training on recreational resources under training airspace are provided in Chapter 3, Section 3.8.2. In general, a diverse range of active and passive recreational activities occurring throughout the region already coexists within a context of some exposure to military overflight. Increased number of sorties in some airspaces would continue exposure of recreational participants to subsonic noise and potential startle effects from overflights. This could cause some degradation in enjoyment for those affected and loss of opportunity for quiet recreational environments in the region. Subsonic noise could diminish opportunities for visitors to experience natural soundscapes in national forests, and could affect the qualities of natural quiet that are intrinsic to recreational opportunities in wilderness areas, national wild and scenic rivers, and other remote locations.

Average subsonic noise levels under the airspace proposed for use would remain the same, except for areas under the Canon and Salem MOAs, where L_{dnmr} increases of 1 to 2 dB would occur. These increases would be barely discernable and would not result in substantial effects on the noise environment or recreation in underlying areas.

Federal agencies are generally mandated to manage wilderness areas for their wilderness qualities. This includes maintaining the natural setting and allowing minimal human disturbance and development. Although the noise increases are small, wilderness management goals could be negatively affected by increased noise and visual effects associated with military overflights. Increased noise in wilderness areas, recreation areas, and other specially managed lands could also be perceived by some recreational users as affecting their recreation experience.

WH3.8.5 Summary of Impacts to Land Use and Recreation

Land use and recreational resources would not be impacted by any of the construction because all of the construction would be conducted on the base in compatible land use areas. Implementation of Scenarios A, B, or C would expose an additional 2,421, 2,517, or 2,620 acres, respectively, of off-installation land to DNL of 65 dB or greater. The JLUS identifies the residential areas (expect for the mobile home parks) within this area as compatible, or generally compatible, with DNL from 65 to 75 dB when measures to achieve overall noise level reductions are included in the facility design and construction. Impacts to land use would not be considered significant under any of the afterburner scenarios.

None of the recreational areas identified for study around the base would be exposed to DNL greater than 65 dB. However, under Scenario A, DNL would increase at Knob Noster State Park campground by 6 dB (from 48 dB to 54 dB), which would be noticeable. Under Scenarios B or C, the DNL would increase to 55 dB. Regarding impacts to land use and recreation under the airspace proposed for use, DNL would remain below 47 dB beneath all of the airspace proposed for use and the increase in aircraft operations would be minor. In addition, none of the airspace proposed for use is approved for supersonic aircraft operations and therefore no sonic booms would occur.

WH3.9 SOCIOECONOMICS

Socioeconomics refers to features or characteristics of the social and economic environment. The factors affecting socioeconomic resources are the change in personnel, construction of new facilities, renovations and modifications to existing facilities, and noise from F-35A aircraft at Whiteman AFB. These factors are evaluated relative to population, employment, earnings, housing, education, and public and base services. Whiteman AFB is located approximately 2 miles south of Knob Noster in Johnson County, Missouri. Impacts to socioeconomic resources would extend beyond the base boundaries. Therefore, for the purposes of this socioeconomics analysis, the ROI for the proposed action and No Action Alternative is Johnson County, with an emphasis on Whiteman AFB.

WH3.9.1 Base Affected Environment

WH3.9.1.1 Population

Population estimates for Johnson County totaled 53,897 persons in 2017 (USCB 2018). Between 2010 and 2017, the county population increased at an average annual rate of 0.3 percent, with a total increase of approximately 1,302 persons over the 7-year period (USCB 2018). The State of Missouri has an estimated population of 6.1 million (USCB 2018). Average annual population growth in the county has been the same as the state (Table WH3-38).

Table WH3-38. Population in the ROI for Whiteman AFB

Location	2010 Census	2017 Estimates	Annual Percent Change (2010–2017)
Johnson County	52,595	53,897	0.3
Missouri	5,988,927	6,113,532	0.3

Source: USCB 2018

As shown in Table WH2-3, the total current authorized personnel at the base is 12,642 persons. Of the total authorized base personnel, 7.98 percent (1,009 persons) are associated with AFRC.

WH3.9.1.2 Economic Activity (Employment and Earnings)

In 2016, employment in Johnson County totaled 27,086 jobs (BEA 2017a). The largest employment sector in Johnson County was government and government enterprises (40.6 percent), followed by retail trade (8.4 percent), and accommodation and food services (7.3 percent) (BEA 2017a). Construction accounted for 4.1 percent of total employment. Over the last several years, the average annual unemployment rate in the county has steadily declined from 7.2 percent in 2013 to 4.4 percent in 2017 (BLS 2018a). During this same time, the state average annual unemployment rate also declined annually but remained lower than the county. Per capita personal income in Johnson County is estimated at $33,236, which is less than the estimated $42,926 per capita personal income in the state (BEA 2017b).

Whiteman AFB is an important economic contributor to the region through employment of military and civilian personnel, and expenditures for goods and services. The total economic impact of the base on the surrounding communities (defined within a 50-mile radius) in fiscal year 2016 was more than $668 million (Whiteman AFB 2016). Of the total economic impact estimated, approximately 19 percent was for annual expenditures. These included construction; services; and materials, equipment, and supplies procurement (Whiteman AFB 2016). The total payroll for military, DoD civilians, and other base personnel exceeded $346 million (Whiteman AFB 2016). Based on the Impact Analysis for Planning (IMPLAN) economic model, the on-base authorized employment of 12,642 personnel supports an estimated additional 3,448 secondary jobs in the community.

WH3.9.1.3 Housing

Table WH3-39 presents census-derived housing data for Johnson County. The county has an estimated 21,803 total housing units (houses), of which 9 percent (1,869 units) were vacant in 2016 (USCB 2016a). Less than half (40.6 percent) of the occupied houses in the county are renter-occupied and the remaining 59.4 percent are owner-occupied. The median value of owner-occupied houses in Johnson County is estimated at $142,800. The median monthly gross rent was $744 in 2016 (USCB 2016a). As described in Section WH3.2.1.1, an estimated 580 residents and approximately 174 houses are currently exposed to DNL of 65 dB or greater from aircraft operations at Whiteman AFB.

Table WH3-39. Housing Data in the ROI for Whiteman AFB

Location	Houses	Occupied	Vacant
Johnson County	21,803	19,934	1,869

Source: USCB 2016a

As of April 2018, the median listing price of a home in Knob Noster, Missouri, was $165,000. This is more than the nearby city of Odessa, which has a median list price of $160,000, and less than the nearby city of Warrensburg, which has a median list price of $175,000 (Realtor.com 2018). Data collected in 2015 and 2018 show that housing sale prices increased by approximately 16 percent during this timeframe. This is consistent with the state growth in housing sale prices following the preceding economic recession. Recent upward price trends in the local real estate market are expected to continue into the near future.

Accompanied and unaccompanied housing is available on base at Whiteman AFB. Military family housing is privatized and owned by Balfour Beatty Communities. Eight neighborhoods on base are for service members. Estimated waiting times for family housing varies depending on the size of the unit and the rank (Balfour Beatty Communities 2018).

WH3.9.1.4 Education

One elementary school, Whiteman Elementary, is located on base and is part of the Knob Noster Public School District. The Knob Noster Public School District serves more than 1,800 students. Children of school age that reside on base most likely attend one of the off-base schools in the Knob Noster Public School District, the Warrensburg School District, or Sedalia School District 200. Whiteman AFB contains one child development center with a capacity of 169 children ages 6 weeks to 5 years (MyBaseGuide 2018). No schools on or off base are known to be currently exposed to DNL of 65 dB or greater.

WH3.9.1.5 Public Services

Fire and emergency services, law enforcement and protection, and medical services are available throughout Johnson County. The Johnson County Fire Protection District provides rescue and fire suppression to the eastern two-thirds of Johnson County not including the Cities of Knob Noster and Warrensburg, which each have their own fire departments. The Johnson County Fire District has 11 fire departments/fire stations and 130 volunteers (JCFPD 2018). Sheriff and police departments throughout the county provide law enforcement and public safety to the residents of Johnson County. The Western Missouri Medical Center is located in Johnson County and has 75 licensed beds available (Health 2018).

WH3.9.1.6 Base Services

Base services at Whiteman AFB include shopping and dining facilities, airman and family services, a community activity center, an exchange shop, a family support building, education and training facilities, and outdoor and indoor recreational facilities (MyBaseGuide 2018).

WH3.9.2 Base Environmental Consequences

WH3.9.2.1 Population

The current personnel at Whiteman AFB and the projected change anticipated to support the AFRC F-35A mission are provided in Table WH2-3. Implementation of the AFRC F-35A mission would potentially add up to 11 full-time mission personnel. This increase in personnel would increase the existing base population by approximately 0.1 percent and increase the existing county population by less than 0.1 percent. No increase in population would result from the estimated three secondary jobs associated with the increase in base personnel. Implementation of the AFRC F-35A mission would have no discernible effect on population.

WH3.9.2.2 Economic Activity (Employment and Earnings)

As shown in Table WH2-3, implementation of the AFRC F-35A mission at Whiteman AFB would increase the full-time work force assigned to Whiteman AFB by 11 total personnel. Using the IMPLAN model, the direct effect of 11 full-time personnel at Whiteman AFB would have an estimated indirect and induced effect of up to three jobs. During scoping, one commenter asked if the USAF would actively recruit local citizens for employment during and after construction. It is anticipated that the local labor force would be sufficient to fill these new secondary jobs.

Construction activities provide economic benefits to the surrounding areas through the employment of construction workers and the purchase of materials and equipment. Construction activities would be temporary and provide a limited amount of economic benefit. Noise associated with construction activities would be limited to within the base boundaries and would not impact economic activity.

The USAF estimates that a total of $32.5 million in MILCON expenditures during 2021-2023 would be associated with implementation of the AFRC F-35A mission at Whiteman AFB. The total expenditures could generate up to 120 jobs, primarily in the construction industry or related industries, and to a lesser extent in wholesale trade, retail stores (i.e., non-store retailers, miscellaneous store, general merchandise, and gasoline stations), hospitals, and limited-service and full-service restaurants. Construction activities would occur during a 2-year period. With a labor force of 23,157 and an unemployment rate of 4.4 percent, it is expected that the local labor force in the ROI and in the surrounding areas would be sufficient to fill these new jobs. Implementation of the AFRC F-35A mission and projected total MILCON expenditures of $32.5 million at Whiteman AFB would generate an estimated $8.0 million in direct, indirect and induced income in the ROI. The jobs and related income generated would be temporary (i.e., during the construction activity).

WH3.9.2.3 Housing

Assuming all incoming full-time personnel would require off-base housing, there would be a potential need for 11 off-base houses. Based on the number of vacant houses in the ROI, it is anticipated that the housing market in the ROI and surrounding communities and counties would support this need. These impacts would be the same regardless of which afterburner scenario is selected.

During scoping, people raised concerns about the potential impact of noise on surrounding property values. As discussed in more detail in Chapter 3, Section 3.9.3, studies have shown a relation between noise and property values. A study conducted by Trojanek et al. (2017) summarized the results from 79 studies; the majority of those studies found that housing values decreased from 0.26 to 1 percent for every decibel increase in DNL above 65 dB. Some of the studies had values that decreased less than this range and others decreased more. It is a reasonable assumption, based on these studies, that increases in noise could cause some reduction in the rate of increase in housing prices. The percent of effect is dependent upon a number of factors, including the noise indicators used, thresholds, types of properties evaluated, and other factors. The general impact on home pricing would be the same regardless of which afterburner scenario is selected.

Table WH3-40 shows the total estimated number of houses that would be exposed to DNL of 65 dB or greater compared to the existing conditions. The estimated number of residents exposed to this level of noise is from each afterburner scenario is identified in Tables WH3-11, WH3-13, and WH3-14. The JLUS identifies residential land use (except for mobile home parks) to be generally compatible with DNL between 65 and 70 dB with noise attenuation. Residential land exposed to DNL of 70 to 75 dB can be compatible uses, although the JLUS notes that measures to achieve an overall noise level reduction do not solve all noise annoyance issues. Residential land use is incompatible with DNL greater than 75 dB.

Table WH3-40. Estimated Houses Exposed to DNL of 65 dB or Greater from Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

DNL (dB)	Estimated Houses						
	Baseline	**Scenario A**	**Change**	**Scenario B**	**Change**	**Scenario C**	**Change**
65 – 69	163	864	701	960	797	1,060	897
70 – 74	40	164	124	161	121	160	120
75 – 79	0	2	2	2	2	2	2
80 – 84	0	0	0	0	0	0	0
≥85	0	0	0	0	0	0	0
Total	**203**	1,030	**827**	1,123	**920**	1,222	**1,019**

WH3.9.2.4 Education

As described in Chapter 3, Section 3.9.3, the total number of dependents, including spouse and children, was estimated at 2.5 times 65 percent of full-time active associate, active reserve, dual status technician, and non-dual status technician. The total number of children was estimated at 1.5 times 65 percent of full-time personnel, because it was assumed each military member would be accompanied by a spouse. Thus, it is estimated that 11 dependents would be of school age and would enter any of the schools in the three surrounding school districts. The projected number of incoming students would represent a 0.61 percent increase of the current total enrollment in the Knob-Noster Public School District. Based on the size of the school district in the ROI, schools in Johnson County would not be noticeably affected by the increase of 11 students.

During scoping, people submitted comments regarding the potential noise impacts on children and education facilities. One off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) would be newly exposed to DNL of 65 to 69 dB (Section WH3.2.2.1). Educational services are identified in the JLUS as a generally compatible use with sound attenuation measures within the 65 to 70 dB DNL contour. Results of recent reviews on how chronic aircraft noise exposure at school or at homes has been associated with children having poorer reading and memory skills (Basner et al. 2018). Studies also suggest that "children exposed to chronic aircraft noise at school have poorer performance on standardized achievement tests compared to children who are not exposed to aircraft noise" (Basner et al. 2018). Implementation of Scenarios A, B, or C would expose students at Knob Noster Elementary School and Knob Noster High School to an increase in overflight events per hour (see Section WH3.2.2.3), which would disrupt classroom learning.

WH3.9.2.5 Public Services

The estimated addition of 11 USAF-related personnel and dependents would represent less than a 0.1 percent increase of the existing Johnson County population. This would be an indiscernible increase in the county population and would have no measurable effect on county services.

During scoping, people submitted comments regarding the potential impact that noise from the F-35A aircraft would have on the quality of life and health of residents. Aircraft noise has the potential to cause a variety of effects such as annoyance, speech interference, sleep interference, hearing loss, and non-auditory health effects (Section WH3.2.2). Potential non-auditory health impacts due to aircraft noise are discussed in more detail in Section WH3.2.2.7 and Volume II, Appendix B. The USAF continually works with local governments and communities to assess and manage aircraft noise in the environment and attempts to reduce, where possible, the potential impacts of noise to people. When possible, the AFRC F-35A pilots would intentionally avoid overflying identified noise-sensitive locations.

WH3.9.2.6 Base Services

Base services would have adequate capacity to support 11 additional personnel on base associated with the AFRC F-35A mission.

WH3.9.3 Summary of Impacts to Socioeconomics

The personnel increase (11 full-time mission personnel) and community service requirements of the AFRC F-35A mission (Scenario A, B, or C) at Whiteman AFB would not result in significant impacts to population, economic activity, housing availability, or public services. Implementation of Scenario A, B, or C would result in an estimated 827, 920, or 1,019 houses exposed to DNL greater than 65 dB from AFRC F-35A aircraft operations. One school would be exposed to DNL greater

than 65 dB from AFRC F-35A aircraft operations under Scenarios A, B, or C. Implementation of the AFRC F-35A mission would not result in significant socioeconomic impacts.

WH3.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

The environmental justice analysis considers affected populations that meet certain characteristics based on income and age. Analysis of environmental justice and other sensitive receptors is conducted pursuant to EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* and EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks.* Environmental justice addresses impacts to minority and low-income populations. This analysis focuses on increased noise resulting from the proposed action as the primary impact to these populations. The USAF guidelines for environmental justice analysis use census data (i.e., percentages of populations identifying themselves as minority, low-income, etc.) to determine potential impacts to these populations. The guidelines also address children (under 18) and elderly (65 and older) as additional sensitive populations. (Minority, low-income, children, and elderly populations are henceforth referred to as environmental justice populations.) Tables WH3-11, WH3-13, and WH3-14 list the number of people exposed to DNL of 65 dB or greater from baseline and the three afterburner scenario conditions at Whiteman AFB.

This analysis is completed to determine if there are existing disproportionate noise impacts to environmental justice populations (i.e., baseline DNL of 65 dB or greater) and if implementation of the proposed action would result in disproportionate noise impacts to environmental justice populations (i.e., AFRC F-35A mission DNL of 65 dB or greater).

Environmental justice analysis overlays the 65 dB DNL contour on the census data polygons. The smallest census data which has the information necessary for analysis of potential impacts to environmental justice populations is used to determine potential impacts. The smallest group of census data which contain the needed information for this analysis is the Census BG. Each BG that is partially or wholly encompassed by the 65 dB DNL contour is defined as an ROI. There could be few or many ROIs for a specific environmental justice analysis, depending on the extent of the noise contour and the size of the BGs. The next higher level of census data is the Census Tract (CT). Each CT contains a number of BGs (ROIs).

In order to identify disproportionate impacts from baseline or proposed action noise levels, a Community of Comparison (COC) is needed. The COC is defined by summing the population in all the CTs which contain any part of an ROI affected by the 65 dB DNL contour. The percentages of minority and low-income persons are calculated for each ROI (i.e., BG). The ROI and COC percentages are then compared. If the percentage of minorities or low-income persons in an ROI is equal to or greater than the percentage of minorities or low-income persons in the COC, there is a disproportionate impact to the environmental justice population in that ROI (USAF 2014). Chapter 3, Section 3.10.3, provides a description of the method applied to calculate the proportion of the population in the ROIs.

> Census blocks are the smallest unit for which the USCB collects census information. **Block Groups (BGs)** are comprised of a combination of census blocks and are a subdivision of **census tracts (CTs)**. Census tracts are a small, relatively permanent statistical subdivision of a county delineated by a local committee of census data users for the purpose of presenting census data. This EIS uses **BGs** and **CTs** in the environmental justice analysis. The **BGs** also comprise the **Region of Influence (ROI)** analyzed in the EIS.

For Whiteman AFB, there are three CTs containing the five ROIs (BGs) which are partially or wholly affected by DNL of 65 dB or greater from the AFRC F-35A mission. Figure WH3-8 presents an overlay of the baseline and AFRC F-35A mission 65 dB DNL contour on the ROIs and the COC.

WH3.10.1 Base Affected Environment

Table WH-41 provides baseline demographic conditions in Johnson County, where Whiteman AFB is located. Table WH3-41 includes minority, low-income, children, and elderly population numbers and percentages for county, state, and nation census categories to show context and to help determine the intensity of impacts. The three CTs are the COC for the environmental justice analysis. The COC has a higher proportion of minority and children populations than Johnson County, but lower than the State of Missouri or the nation. The COC has a lower low-income and elderly population than the county, state, or the nation.

Table WH3-41 shows that under baseline conditions three ROIs (BGs) have higher percentages of low-income populations and two ROIs (BGs) have higher percentages of minority populations than the percentage of those populations living in the COC. This means that there are existing disproportionate impacts to low-income and minority populations living in these ROIs.

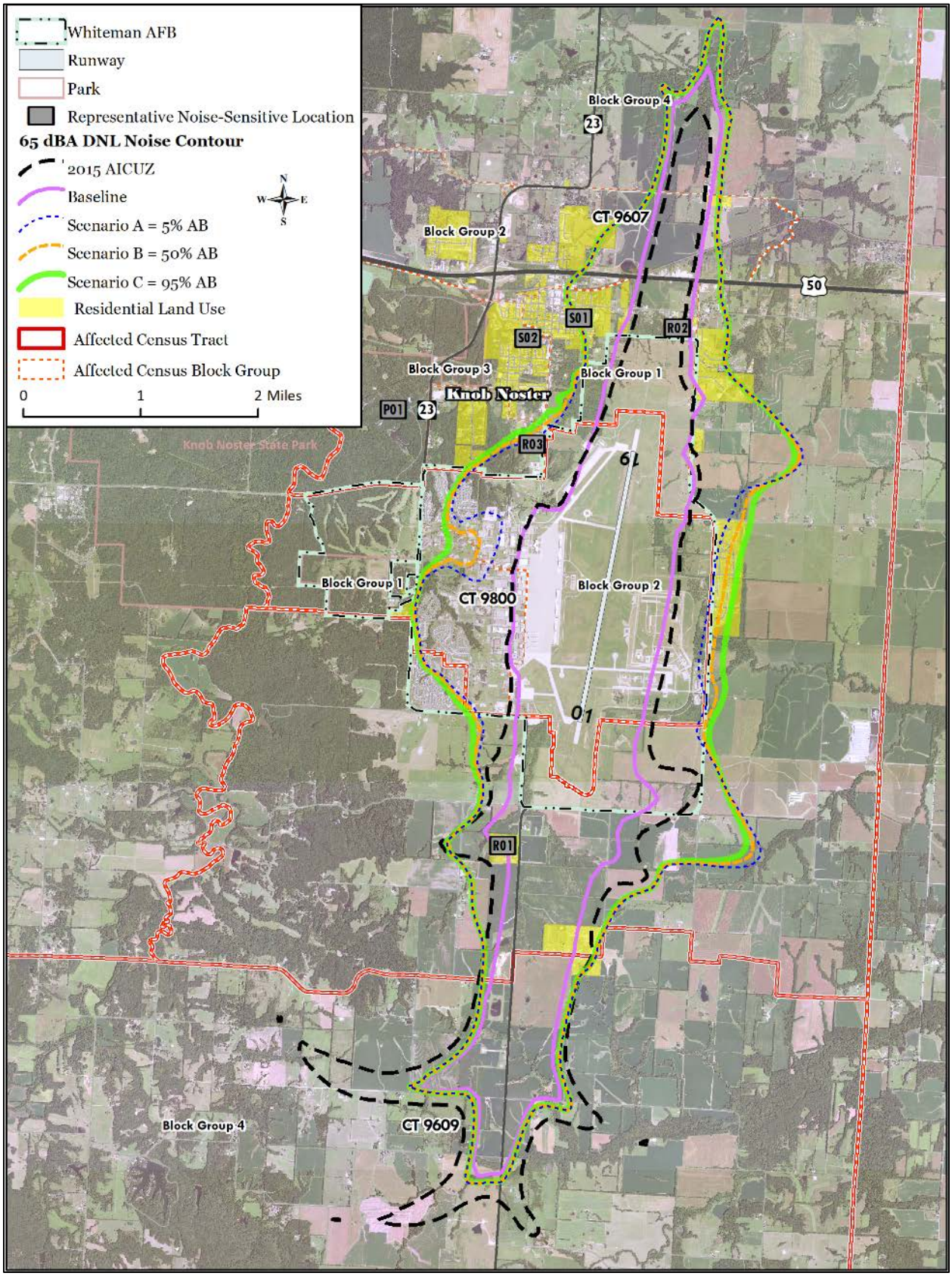

Figure WH3-8. Whiteman AFB Census Tracts and Block Groups Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions

Table WH3-41. Environmental Justice Populations and Demographics for Whiteman AFB

Geographic Unit	Total Population	Population for Whom Poverty is Determined[a]	Minority		Low-Income		Children		Elderly	
			Number	Percent	Number	Percent	Number	Percent	Number	Percent
CT 9607.00	5,621	5,603	1,115	19.8	512	9.1	1,627	28.9	359	6.4
CT 9609.00	4,826	4,812	222	4.6	650	13.5	1,184	24.5	742	15.4
COC	**10,447**	**10,415**	**1,337**	**12.8**	**1,162**	**11.2**	**2,811**	**26.3**	**1,101**	**10.5**
Johnson County	53,941	49,182	7,467	13.8	7,953	16.2	11,696	21.7	6,348	11.8
State of Missouri	6,075,300	5,891,760	1,226,232	20.2	861,679	14.6	1,389,409	22.9	956,032	15.7
United States	321,004,407	313,048,563	38.5	123,726,618	14.6	45,650,345	22.9	73,601,279	14.9	47,732,389

[a] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years of age.

Note: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Source: USCB 2017a-e

WH3.10.2 Base Environmental Consequences

WH3.10.2.1 Scenario A

The analysis of environmental justice populations at Whiteman AFB identified three ROIs with disproportionally high minority populations and one ROI with disproportionally high low-income populations. These populations are currently exposed to DNL of 65 dB or greater and would continue to be exposed to DNL of 65 dB or greater after implementation of the proposed action. Therefore, implementation of the AFRC F-35A mission would not result in disproportionate impacts to minority or low-income populations. The areas where these populations are located are shown on Figure WH3-9.

The other sensitive populations evaluated in this analysis are children and elderly. As shown in Table WH3-43, an additional estimated 669 children and an additional estimated 196 elderly persons who reside in the ROIs would be exposed to DNL of 65 dB or greater with implementation Scenario A. The areas where these populations are located are shown on Figure WH3-10. Implementation of Scenario A would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB.

Sections WH3.2.2.2 and WH3.2.2.3 describe speech interference and classroom learning disruption associated with increased overflight and noise levels, which would adversely impact children and elderly populations.

Implementation of the Scenario A would not expose any hospitals (on-base or off-base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. Noise-sensitive locations such as libraries are included in education services and are identified in the JLUS as a compatible use, with sound attenuation, in areas exposed to DNL of 65 to 70 dB. For more information about potential noise impacts to schools, refer to Section WH3.2.2.3.

Table WH3-42. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario A)

Geographic Unit		Baseline					Proposed (newly affected)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	97	18.7	Yes	22.1	Yes	363	18.7	Yes	22.1	Yes
2[a]	939	5	29.7	Yes	9.3	No	69	29.7	Yes	9.3	No
4[a]	2,596	474	13.7	Yes	2.3	No	1,191	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	603	0.3	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,226**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

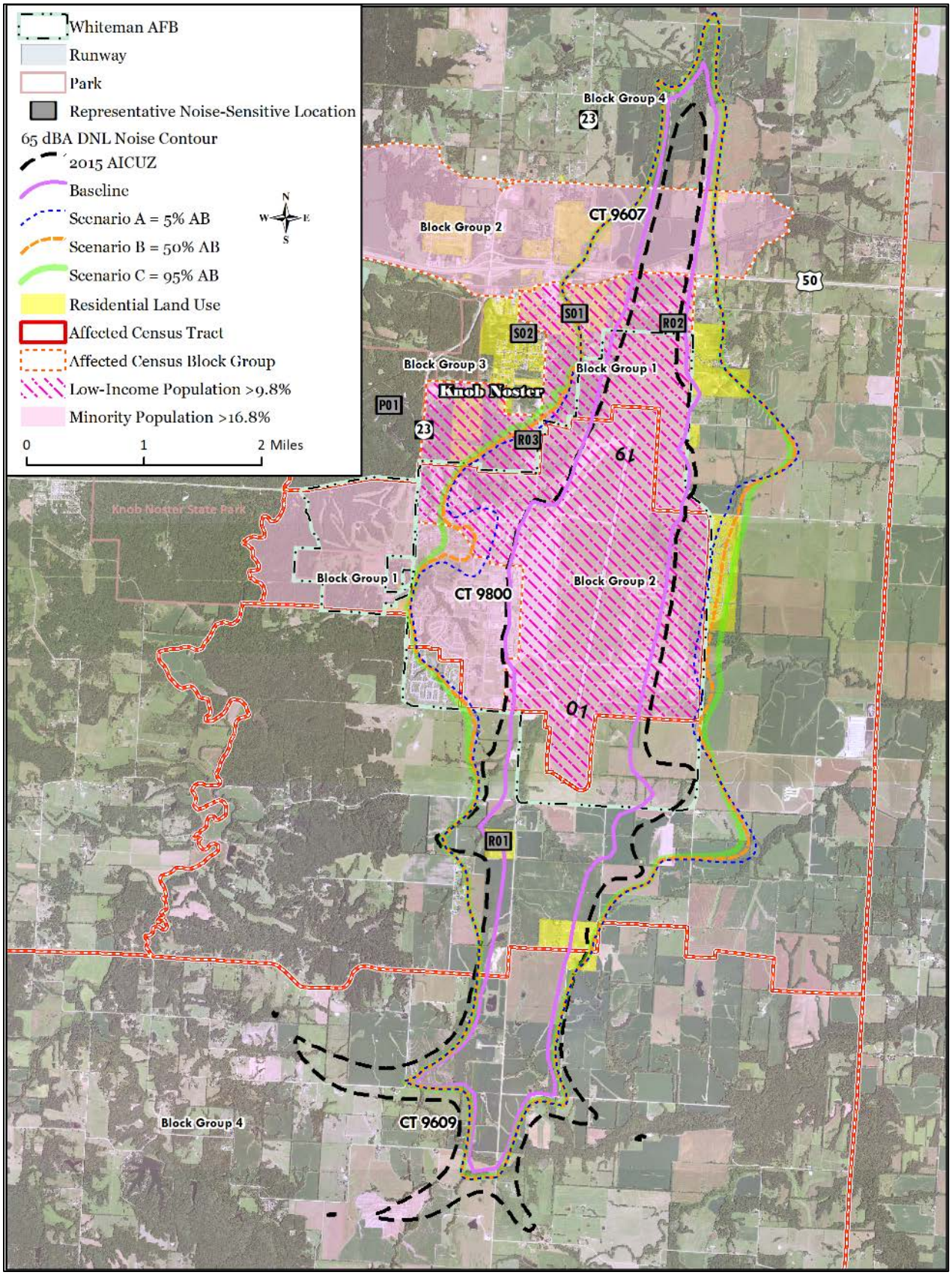

Figure WH3-9. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

Table WH3-43. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario A)

Geographic Units	Population in the Census Area	Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	373	25.1	91	6.3	24
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	9
4	2,596	474	33.2	157	5.0	24	1,482	33.2	395	5.0	61
CT 96090.00											
4	984	4	26.7	1	15.0	1	585	26.7	161	14.8	90
Total	**5,655**	**580**	**NA**	**144**	**NA**	**32**	**2,226**	**NA**	**669**	**NA**	**196**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

WH3.10.2.2 Scenario B

Implementation of Scenario B would not result in disproportionate noise impacts to minority or low-income populations (Table WH3-44 and Figure WH3-9). This scenario would expose an additional estimated 764 children and 194 elderly persons to DNL of 65 dB or greater (Table WH3-45 and Figure WH3-10).

Implementation of Scenario B would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. For more information about potential noise impacts to schools and a description of speech interference and classroom learning disruption, refer to Sections WH3.2.1.3, WH3.2.2.2 and WH3.2.2.3.

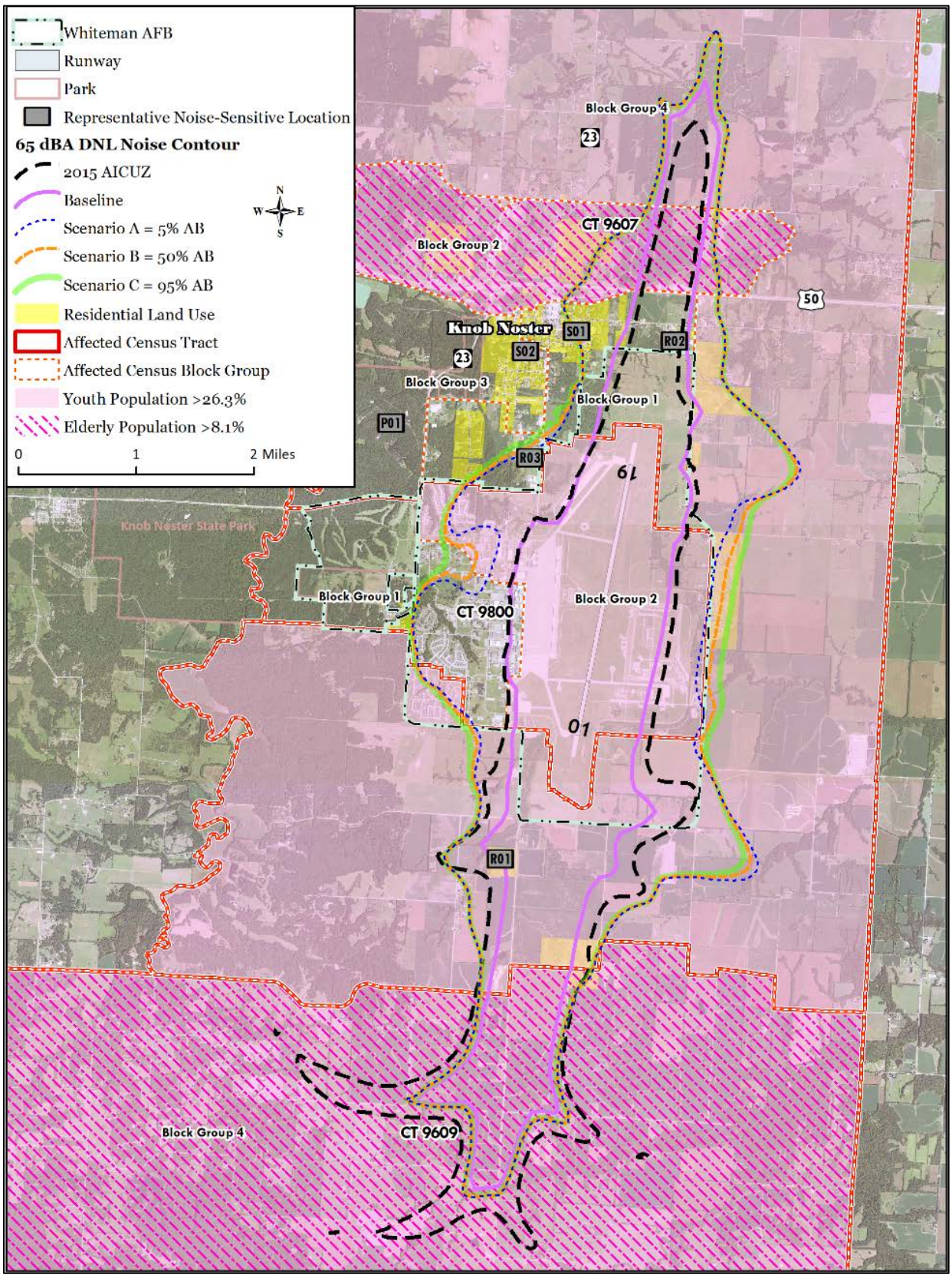

Figure WH3-10. Youth and Elderly Populations and Noise-Sensitive Receptors Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB

Table WH3-44. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario B)

Geographic Unit		Baseline					Proposed (newly affected)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	98	18.7	Yes	22.1	Yes	373	18.7	Yes	22.1	Yes
2[a]	939	6	29.7	Yes	9.3	No	67	29.7	Yes	9.3	No
4[a]	2,596	368	13.7	Yes	2.3	No	1,482	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	585	0.8	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,507**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table WH3-45. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario B)

Geographic Units	Population in the Census Area	Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC		Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	373	25.1	94	6.3	24
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	8
4	2,596	474	33.2	157	5.0	24	1,482	33.2	492	5.0	74
CT 96090.00											
4	984	4	26.7	1	15.0	1	585	26.7	156	14.8	88
Total	**5,655**	**580**	**NA**	**184**	**NA**	**32**	**2,507**	**NA**	**764**	**NA**	**194**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

WH3.10.2.3 Scenario C

Implementation of Scenario C would not result in disproportionate noise impacts to minority or low-income populations (Table WH3-46 and Figure WH3-9). All of the ROIs currently exposed to DNL of 65 dB or greater would continue to be exposed to this noise level under Scenario C. This scenario would expose an additional estimated 863 children and 207 elderly persons to DNL of 65 dB or greater (Table WH3-47 and Figure WH3-10).

Implementation of Scenario C would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB. For more information about potential noise impacts to schools and a description of speech interference and classroom learning disruption, refer to Sections WH3.2.1.3, WH3.2.2.2 and WH3.2.2.3.

Table WH3-46. Minority and Low-Income Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario C)

Geographic Unit		Baseline					Proposed (newly affected)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate	Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Minority (%)	Disproportionate	Low-Income (%)	Disproportionate
CT 96070.00											
1[a]	1,136	97	18.7	Yes	22.1	Yes	386	18.7	Yes	22.1	Yes
2[a]	939	5	29.7	Yes	9.3	No	67	29.7	Yes	9.3	No
4[a]	2,596	474	13.7	Yes	2.3	No	1,793	13.7	Yes	2.3	No
CT 96090.00											
4[a]	984	4	0.8	No	8.2	No	558	0.3	No	8.2	No
ROI Totals	**5,655**	**580**	**NA**	**NA**	**NA**	**NA**	**2,804**	**NA**	**NA**	**NA**	**NA**
COC	10,447	NA	12.8	NA	11.2	NA	NA	12.8	NA	11.2	NA

[a] Indicates this ROI (BG) is currently encompassed by the baseline 65 dB or greater DNL contour.

Notes: Shading indicates that implementation of the AFRC F-35A mission and or baseline conditions result in disproportionate noise impacts to the BG (ROI). Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.

Key: NA = Not applicable, does not apply

Source: USCB 2017a-e

Table WH3-47. Children and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and AFRC F-35A Mission Conditions at Whiteman AFB (Scenario C)

Geographic Units		Baseline					Proposed (Newly Affected)				
Census BG (ROI)/COC	Population in the Census Area	Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)		Additional Population in the Area Encompassed by DNL of 65 dB or Greater	Children (<18 years)		Elderly (65 years or >)	
			Percent	Number	Percent	Number		Percent	Number	Percent	Number
CT 96070.00											
1	1,136	97	25.1	24	6.3	6	386	25.1	97	6.3	25
2	939	5	32.4	2	12.4	1	67	32.4	22	12.4	8
4	2,596	474	33.2	157	5.0	24	1,793	33.2	595	5.0	90
CT 96090.00											
4	984	4	26.7	1	15.0	1	588	26.7	149	14.8	84
Total	**5,655**	**580**	**NA**	**144**	**NA**	**32**	**2,804**	**NA**	**863**	**NA**	**207**
COC	10,447	NA	26.9	2,811	10.5	1,101	NA	26.9	3,349	10.5	1,281

Notes: Numbers may not sum due to rounding. To best represent the level of accuracy achieved, population group numbers are displayed as whole numbers in the text and tables, whereas calculations are based on the raw population group numbers containing multiple decimal points. The resulting summations and change calculations are then rounded to whole numbers.
Key: NA = Not applicable, does not apply
Source: USCB 2017a-e

WH3.10.3 Summary of Impacts to Environmental Justice and Protection of Children

Implementation of the AFRC F-35A mission would not result in disproportionate noise impacts to minority or low-income populations. The estimated number of children and elderly people exposed to DNL of 65 dB or greater from each afterburner scenario are listed in Table WH3-48.

Implementation of any of the three afterburner scenarios would expose one off-base childcare facility (Rau's Day Care) and one off-base school (Knob Noster Elementary) to DNL of 65 to 69 dB. This scenario would not expose any hospitals (on base or off base) or parks to DNL of 65 dB or greater. The Trails Regional Library Knob Noster Branch would be exposed to DNL of 65 to 69 dB.

Table WH3-48. Summary of the Minority, Low-Income, Children, and Elderly Populations Exposed to DNL of 65 dB or Greater Under Baseline and the Three Afterburner Scenarios for the AFRC F-35A Mission at Whiteman AFB

Scenarios and Baseline/No Action	Disproportionate Impact		Newly Exposed Individuals	
	Minority Populations - Census BGs (ROIs)	Low-Income Populations - Census BGs (ROIs)	Children	Elderly Persons
Baseline/No Action[a]	3 of 4[a]	1 of 4[a]	144[a]	32[a]
Scenario A	3 of 4	1 of 4	669	196
Scenario B	3 of 4	1 of 4	764	194
Scenario C	3 of 4	1 of 4	863	207

[a] Baseline/No Action is the existing conditions and does not include the values for any of the other scenarios.

WH3.11 INFRASTRUCTURE

WH3.11.1 Base Affected Environment

WH3.11.1.1 Potable Water System

Whiteman AFB obtains potable water from 10 active water supply wells installed within the Gasconade and Roubideaux Formations. The base has a permit through MDNR to dispense drinking water. The supply capacity of the aquifer poses no limits to the amount of drinking water that could be supplied to the base. Whiteman AFB has adequate water supply and supporting infrastructure. The water system at Whiteman AFB consists of 331,227 linear feet of distribution pipes, 29,297 linear feet of supply mains, 1,250,000 gallons of storage, and a 26,000-gallon treatment facility (Whiteman AFB 2015b).

According to the 2009 Natural Infrastructure Assessment (NIA), the water distribution system is capable of supporting the mission. The water meets the primary and secondary drinking water standards (Whiteman AFB 2009a).

WH3.11.1.2 Wastewater

One government-owned Wastewater Treatment Plant (WWTP) is located on the installation. According to the 2009 NIA for Whiteman AFB, the WWTP capacity is fully capable of supporting the mission. This plant handles all industrial and domestic wastewater. It operates under a USEPA NPDES permit, administered by the MDNR. The treatment plant is monitored on a daily, weekly, or periodic basis for different point source discharges (Whiteman AFB 2015b).

The sanitary sewer system collects sewage and sends it to the treatment plant through a series of lift stations. The treatment plant is located west of Missouri Route 23, adjacent to the golf course. The capacity of the treatment plant is approximately 2.2 million gallons per day (MGD), and it currently treats an average of 0.58 MGD, which is approximately 26 percent of its capacity (Whiteman AFB 2015b).

The wastewater infrastructure is well maintained and in operable condition. Wastewater is discharged into a receiving body that is not degraded (Whiteman AFB 2015b).

Requirements to improve the system include replacing original aging equipment in the WWTP. Original pumps, valves, and piping require replacing in the following processes: trickling filter, grit removal, sludge transfer, and anaerobic digester (Whiteman AFB 2015b).

WH3.11.1.3 Stormwater System

Whiteman AFB is in the Clear Fork of the Blackwater River and Long Branch watersheds. Stormwater from Whiteman AFB flows to the Missouri River Drainage Basin in the Gasconade-Osage Rivers subregion. The 2010 SWPPP states that surface drainage flows through drainage basins and 47 associated outfalls that collect and drain stormwater from Whiteman AFB. The SWPPP was updated in 2016 and new drainage basins and outfalls were catalogued at that time (Whiteman AFB 2015b).

The southeastern corner of Whiteman AFB is within the 100-year floodplain of Long Branch Creek. Annual storms cause localized flooding and ponding on several parts of the installation, though no significant flooding has been reported in recent years. Frequent flooding from Long Branch Creek affects certain uses of low-lying areas of the base, including the Weapons Storage Area. Forecasted increases in the intensity and/or frequency of severe weather events could escalate the flooding challenge (Whiteman AFB 2015b).

Stormwater is monitored on Whiteman AFB through a USEPA NPDES permit administered by MDNR. The SWPPP requires a monthly inspection of stormwater discharge. Noncompliance has not been an issue under this permit (Whiteman AFB 2015b).

According to the 2009 NIA, the stormwater discharge system is fully capable of supporting the mission with no system failures occurring in the 36-month evaluation period. The stormwater system meets the demands of normal rainfall (Whiteman AFB 2015b).

WH3.11.1.4 Electrical System

The West Central Electric Cooperative (Touchstone) supplies electrical power to Whiteman AFB. Two 30-megawatt (MW) substations provide electricity to Whiteman AFB with excess capacity. There are two separate feeds for the substations. One is from Sedalia, the other from Warrensburg. The electrical distribution system has a maximum capacity of 525,600,000 kilowatt hours (kWh) per year. Whiteman AFB purchased 86.6 million kWh in 2013, approximately 16.5 percent of capacity. Whiteman AFB's mission necessitates a redundant power supply for mission-critical loads. Several areas on the base have been identified for adding redundancy. The electrical system condition is adequate. All installation electrical lines are underground (Whiteman AFB 2015b).

WH3.11.1.5 Natural Gas System

There are approximately 174,000 linear feet of natural gas distribution lines installed on the base. The system has two regulatory stations. The natural gas system on Whiteman AFB is adequate. The system is capable of providing 26,702 million British thermal units (MMBTUs)/day. Current usage is 1,075 MMBTU/day, 4 percent of system capacity. Missouri Gas Company provides natural gas to Whiteman AFB. During times of peak demand, Whiteman AFB uses alternative systems for industrial purposes. Variations in the supply and cost of natural gas could necessitate further consideration of alternative forms of heating in the future (Whiteman AFB 2015b).

WH3.11.1.6 Solid Waste Management

Solid waste at Whiteman AFB is managed in accordance with AFI 32-7042, *Waste Management.* In general, AFI 32-7042 establishes the requirements for installations to have a solid waste management program to incorporate a solid waste management plan; procedures for handling, storage, collection and disposal of solid waste; record-keeping and reporting; and pollution prevention. Whiteman AFB's Integrated Solid Waste Management Plan (ISWMP) provides guidance for managing municipal solid waste, compostable materials, C&D debris, and industrial solid waste to ensure compliance with applicable requirements for solid waste disposal, waste minimization, recycling, and reuse (Whiteman AFB 2013).

In accordance with the AFI 32-7042, Whiteman AFB strives to divert as much of their solid waste stream in the most cost-effective manner possible, keeping in mind the cost savings and cost avoidance that result from diverting solid waste from landfill disposal. The installation's nonhazardous solid waste and C&D debris diversion rates in 2012 were 45.11 and 99.4 percent, respectively (Whiteman AFB 2013).

Municipal solid waste generated at Whiteman AFB is collected by a contractor. Solid waste that is not reused or recycled is removed by the contractor and landfilled at the Show-Me Landfill located South off DD highway, east of Warrensburg, Missouri. No operating sanitary or C&D debris landfills are located on the installation. C&D contracts include requirements that C&D debris be recycled at off-site facilities (Whiteman AFB 2013).

WH3.11.1.7 Transportation

The transportation network is adequately handling the current level of traffic on base. Whiteman AFB has 45.7 miles of paved roads. Missouri Route 23 provides access to Whiteman AFB and connects the installation to U.S. Highway 50 to the north (Whiteman AFB 2015b).

Some of the high-traffic streets such as Arnold Avenue are showing alligator cracking and rutting from loading stresses. There are local ponding areas where storm runoff does not flow to the stormwater runoff system along Flightline Road, resulting in pavement deterioration from standing water. However, the transportation systems on Whiteman AFB are capable of supporting the mission (Whiteman AFB 2015b).

WH3.11.1.7.1 Gate Access

Three entry control facilities provide access to Whiteman AFB. An arterial street network connects the installation gates: Spirit Gate on the west, Arnold Gate on the north, and LeMay Gate on the south (Whiteman AFB 2015b).

WH3.11.1.7.2 On-Base Traffic Circulation

Missouri Route 23 divides the base to the west and provides access through Spirit Gate. The presence of Missouri Route 23 and its division of the base property remains a security concern. Secondary access to the base is provided through Arnold Gate, located on the north side of the base on Highway J. Arnold Gate is used for access to and from Knob Noster. Secondary access is also provided on a limited basis via LeMay Gate, located on the south side of the base on Highway D. LeMay Gate is also the contractor and commercial delivery gate (Whiteman AFB 2015b).

During peak access hours and under heightened security, traffic at Spirit Gate causes delays on Missouri Route 23 and Spirit Boulevard. Apart from this interference, the gates adequately accommodate the current volume of base traffic (Whiteman AFB 2015b).

WH3.11.2 Base Environmental Consequences

The projected change in population that would result from implementation of the proposed AFRC F-35A mission at Whiteman AFB is an increase of 11 base personnel or approximately 0.1 percent of the base population. This projected change in population and development was used to determine the impact on infrastructure. The maximum demand or impact on capacity was calculated for the potable water, wastewater, electric, and natural gas systems based on the projected change in population. To identify maximum demand or impact on these systems, any change in population was assumed to reside on base. The impact of the proposed AFRC F-35A mission on the transportation infrastructure, was considered negligible based on the potential minor increase of base personnel and on-base traffic.

WH3.11.2.1 Potable Water System

Based on the average usage rate of 94 gallons per day (GPD) (USGS 2018) per person in Johnson County, Missouri, it is anticipated that the increase in population associated with the proposed AFRC F-35A mission (i.e., 11 persons) would create an additional water use demand of 0.001 MGD. This increase, combined with the existing peak usage at Whiteman AFB, would not exceed the water system capacity and impacts would not be significant.

WH3.11.2.2 Wastewater

The USEPA estimates that the average person generates approximately 120 GPD of wastewater between showering, toilet use, and general water use (USEPA 2014). Based on this rate, the proposed increase in population (i.e., 11 persons) would increase wastewater discharge from Whiteman AFB by 0.001 MGD. The capacity of the treatment plant is approximately 2.2 MGD, and it currently treats an average of 0.58 MGD. Therefore, the increase in wastewater discharge would be well below the treatment plant's maximum capacity and the impacts would not be significant.

WH3.11.2.3 Stormwater System

The proposed AFRC F-35A mission would require demolition of facilities and construction of new facilities near the existing developed flightline and cantonment areas. The total disturbed area associated with these projects would not exceed 5 acres (approximately 2.9 acres) and impacts would not be significant.

During the short-term construction period, all contractors would be required to comply with applicable statutes, standards, regulations, and procedures regarding stormwater management. During the design phase, a variety of stormwater controls could be incorporated into construction plans. These could include planting vegetation in disturbed areas as soon as possible after construction; constructing retention facilities; and implementing structural controls (e.g., interceptor dikes, swales [excavated depressions], silt fences, straw bales, and other storm drain inlet protection), as necessary, to prevent sediment from entering inlet structures.

WH3.11.2.4 Electrical System

The West Central Electric Cooperative (Touchstone) reports the average household used 17.1 MWh per year (1.425 MWh per month). Converting this rate to an hourly rate and assuming 11 new households (i.e., one new household for each new authorized personnel on base), the proposed increase in population would increase electrical use at Whiteman AFB by 188.1 MWh per year. The electrical distribution system has a maximum capacity of 525,600 MWh per year. The increase due to implementing the proposed action would not exceed the West Central Electric Cooperative energy supply limit or the capacity of the base distribution system and impacts would not be significant.

WH3.11.2.5 Natural Gas System

The U.S. Energy Information Administration (USEIA) estimates that the average person in Missouri uses 6.4 MCF of natural gas per year (USEIA 2016). Based on this rate, the proposed increase in population (11) would increase natural gas use at Whiteman AFB by approximately 70.4 MCF per year. The current system is operating at approximately 4 percent of maximum capacity; therefore, implementation of the proposed AFRC F-35A mission would result in a very minor increase in usage and the impacts would not be significant.

WH3.11.2.6 Solid Waste Management

Solid waste would continue to be managed in accordance with AFI 32-7042 and the ISWMP with the implementation of the proposed AFRC F-35A mission at Whiteman AFB. Using methodology developed by the USEPA (USEPA 2009), it is estimated that implementation of the proposed AFRC F-35A mission would generate approximately 2,504 tons of C&D debris for recycling or removal to landfills. Application of the 60 percent DoD target diversion rate (DoD 2012) for C&D debris would result in approximately 1,503 tons being reused or recycled, and approximately 1,002 tons being placed in the Show-Me Landfill or other landfills in the region. However, Whiteman AFB's current

C&D debris diversion rate is greater than 99 percent, with the installation requiring their C&D contractors to recycle C&D debris at off-site facilities (Whiteman AFB 2015b). Regardless, the Show-Me Landfill has an estimated life span of 42 years, has more than 3,500,000 tons of remaining capacity, and would be able to accommodate the material resulting from the proposed AFRC F-35A mission (Stevens 2018). Additionally, solid waste generated from the proposed renovation and repair of the airfield pavement, apron, and ramp projects (Table WH2-1), would be recycled and reused as aggregate for the concrete and asphalt used in those projects.

The addition of 11 personnel and their associated dependents would generate additional municipal solid waste but have little effect on the municipal solid program (collection, disposal, etc.). The overall impacts would not be significant.

Contractors would be required to comply with federal, state, and local regulations for the collection and disposal of municipal solid waste from the base. C&D debris, including debris contaminated with hazardous waste, ACM, lead-based paint (LBP), or other hazardous components, would be managed in accordance with AFI 32-7042 and the installation's ISWMP.

WH3.11.2.7 Transportation

The addition of 11 personnel to the base as a result of implementing the proposed AFRC F-35A mission would have an almost imperceptible change in the traffic on the base. Therefore, no significant impacts to infrastructure are anticipated to result as a result from implementation of the proposed AFRC F-35A mission at Whiteman AFB.

WH3.11.3 Summary of Impacts to Infrastructure

Implementation of the AFRC F-35A mission would not result in changes to any of the utility infrastructure (i.e., potable water, wastewater, stormwater, electricity, natural gas, and solid waste) on Whiteman AFB. In addition, the new mission would also not require any changes to transportation resources including any of the base gates. Therefore, implementation of the new mission would result in negligible impacts to infrastructure.

WH3.12 HAZARDOUS MATERIALS AND WASTE

WH3.12.1 Base Affected Environment

WH3.12.1.1 Hazardous Materials

Hazardous materials used by USAF and contractor personnel at Whiteman AFB are managed in accordance with the Hazardous Materials Management Plan (Whiteman AFB 2003). This plan is written in accordance with AFI 32-7086, *Hazardous Materials Management.* Hazardous materials are controlled through the base Hazardous Materials Storage Facility. The purpose of the Hazardous Materials Storage Facility is to minimize and track the ordering, storage, distribution, use, reuse, recycling, and disposal of hazardous materials through the use of single point control.

WH3.12.1.1.1 Aboveground and Underground Storage Tanks

Bulk Jet-A+ at Whiteman AFB is stored in eight aboveground storage tanks (ASTs) at the Bulk Fuel Storage Area and Type IV Hydrant Tank Area. These eight ASTs have a combined storage capacity of approximately 4,440,160 gallons. Various other ASTs at Whiteman AFB are used to store Jet-A+, gasoline, diesel, oil, and used oil. Whiteman AFB also manages eight underground storage tanks (USTs) (Whiteman AFB 2015c). Whiteman AFB used approximately 17,500,000 gallons of Jet-A+ in 2017 with approximately annual capacity of 36,000,000 gallons. Whiteman AFB receives all

liquid fuels via commercial tank trucks. Jet-A+ is delivered from the Bulk Fuel Storage Area to the A-10 aircraft parking ramp via six R-11 6,000-gallon refueling trucks (Whiteman AFB 2015b).

All tanks at Whiteman AFB are managed in accordance with the base Spill, Prevention, Control, and Countermeasure (SPCC) Plan and Facility Response Plan (FRP) (Whiteman AFB 2015a). This plan addresses storage locations and proper handling procedures for all hazardous materials to minimize the potential for spills and releases. This plan also describes the response procedures for spills or discharges of petroleum products and other hazardous materials at Whiteman AFB. Implementation of the SPCC Plan and FRP provide measures to prevent petroleum product discharges from occurring, and prepare the base to respond in a safe, effective, and timely manner to mitigate the impacts of an uncontrolled discharge. The SPCC Plan and FRP also address roles, responsibilities, and response actions for all major spills (Whiteman AFB 2015c).

WH3.12.1.1.2 Toxic Substances

The Asbestos Management and Operating Plan outlines management roles and responsibilities and establishes procedures to protect personnel who live and work on Whiteman AFB from exposure to excessive levels of airborne asbestos fibers. The plan also describes how the base will carry out ACM-related work and ensures compliance with all USAF, federal, state, and local regulation dealing with ACM (Whiteman AFB 1997). The Civil Engineering Squadron maintains an electronic asbestos database documenting asbestos-related activities. Based on the plan, all proposed facility construction, demolition, and renovation or self-help projects must be reviewed, to the extent possible, to identify the presence of ACM prior to work beginning. Work on ACM projects would only be performed by a Missouri-registered asbestos abatement contractor trained in accordance with OSHA and USEPA standards. For any project on base, ACM wastes are removed by the contractor performing the work and handled and disposed of in accordance with federal, state, and local regulations at a waste disposal site authorized to accept such waste.

The Whiteman AFB Lead-Based Paint Management Plan (Whiteman AFB 2009b) was designed to bring the base into compliance with USEPA and MDNR policies and laws governing LBP management. The plan also provides guidance and establishes procedures for the management of LBP and the implementation of the LBP program. The Lead-Based Paint Management Plan also defines management and organizational responsibilities and procedures for ensuring that personnel at Whiteman AFB are not exposed to lead poisoning. The Civil Engineering Squadron maintains permanent LBP records to document the location of LBP. These records are updated after each abatement project. The design of building alteration projects, demolitions, and requests for self-help projects are reviewed to determine if lead-containing materials are present in the proposed work area. For every project on Whiteman AFB, LBP wastes are removed by the contractor and disposed of in accordance with the Whiteman AFB Hazardous Waste Management Plan and state and federal regulations at a permitted off-base landfill (Whiteman AFB 2017b).Whiteman AFB is reportedly free of polychlorinated biphenyls (PCBs) (Golson 2018).

WH3.12.1.2 Hazardous Waste Management

Whiteman AFB is classified as a Large-Quantity Generator. Typical hazardous wastes generated during O&M activities include flammable solvents, contaminated fuels and lubricants, paint/coating, stripping chemicals, waste oils, blast media, waste paint-related materials, and other miscellaneous wastes.

Hazardous waste generated, used, treated, stored, transported, or disposed of by Whiteman AFB is regulated by the State of Missouri under authority granted to the state by the USEPA. The base is registered as a hazardous waste generator with the MDNR.

Hazardous wastes at Whiteman AFB are managed in accordance with the U.S. Air Force Hazardous Waste Management Plan (Whiteman AFB 2017b). This plan describes the handling and management of hazardous wastes from the point the material becomes a hazardous waste to the point of ultimate disposal, as required by federal and state laws and regulations. In 2017, the base generated approximately 20,100 pounds of hazardous waste, which was disposed of at off-base permitted disposal facilities.

WH3.12.1.3 Environmental Restoration Program

There are 44 Environmental Restoration Program (ERP) sites at Whiteman AFB. Thirty-three (33) of these sites are closed with no further action or with additional actions that have been completed. The remaining 11 ERP sites have been closed with long-term management activities and institutional controls under the authority of both the state and USEPA (Whiteman AFB 2010a, Whiteman AFB 2015b). Environmental response actions at Whiteman AFB are planned and executed under the ERP in a manner consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and other applicable laws. Whiteman AFB is not listed on the USEPA's National Priorities List.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are members of a family of emerging contaminants known as per- and polyfluoroalkyl substances (PFAS) that are directly related to the former use of Aqueous Film Forming Foam (AFFF), a fire suppressing agent that was used by the DoD. The USEPA has not issued regulatory limits on PFAS. However, the USEPA has issued a 70 parts per trillion Lifetime Health Advisory level for PFOS/PFOA in drinking water. In October 2018, consistent with CERCLA, Whiteman AFB completed the on-base portion of a site inspection of AFFF release areas (Whiteman AFB 2018). The site inspection identified four AFFF areas. If the CERCLA risk assessment process ultimately determines there is a need for cleanup action, federal and state cleanup standards will be evaluated under the CERCLA process to see if there are Applicable or Relevant and Appropriate Requirements (ARARs) at any of the four on-base sites. The off-base portion of the AFFF site inspection has not been completed.

Whiteman AFB has transitioned to firefighting foam that meets the Military Specification (MILSPEC) standard for PFAS concentrations. The new foam meets both the MILSPEC requirements for firefighting and the goals of the USEPA 2010/2015 PFOA Stewardship Program (Whiteman AFB 2018).

WH3.12.2 Base Environmental Consequences

WH3.12.2.1 Hazardous Materials Management

Implementation of the proposed AFRC F-35A mission at Whiteman AFB would not add any new hazardous materials that would exceed the base's current hazardous waste processes. Existing procedures for the centralized management of the ordering, storage, distribution, use, reuse, recycling, and disposal of hazardous materials through the base Hazardous Materials Storage Facility are adequate to accommodate the changes anticipated with the replacement of the A-10 mission with the AFRC F-35A mission.

The F-35A was designed to reduce the quantities and types of hazardous materials needed for maintenance of the aircraft. Unlike the A-10 aircraft, the F-35A aircraft does not use cadmium fasteners, chrome plating, copper-beryllium bushings, or primers containing cadmium and hexavalent chromium. No adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB. Long-term environmental benefits from the reduced use of hazardous materials are anticipated.

The F-35A aircraft is composed of composite materials (e.g., carbon fiber) and stealth coatings (e.g., low observable material), which could pose a health risk under specific circumstances (e.g., during maintenance or when burned as a result of an aircraft crash). The only maintenance of the stealth coating that would occur at the base would be done using a brush or roller to apply coatings, bonding materials, or applying tape. Depot-level maintenance of the low observable material (including spray capability) for the F-35A would be conducted off-site; therefore, the composite material for major repairs to the low observable material would not be stored on base. Section WH3.4.2.4.2 discusses composite materials and emergency crash response.

WH3.12.2.1.1 Aboveground and Underground Storage Tanks

New and remodeled facilities would require the addition of new ASTs to support generators, as well as new hazardous material and waste containers. The new and remodeled facilities would be constructed with berms and drains leading to oil-water separators (OWSs), if required, to contain potential uncontrolled releases of petroleum products. The Whiteman AFB SPCC Plan and FRP would subsequently need to be revised to incorporate any changes in facility design, construction operation, or maintenance that materially affects the potential for an uncontrolled release of petroleum products (Whiteman AFB 2015c).

WH3.12.2.1.2 Toxic Substances

Several demolition and renovation projects are planned as part of the proposed AFRC F-35A mission. Any construction, demolition, or renovation project proposed at Whiteman AFB would be reviewed to determine if ACM is present. As shown in Table WH3-49, Building 706 is proposed for demolition and could potentially contain ACM. All handling and disposal of ACM wastes would be performed in accordance with the Whiteman AFB *Asbestos Management and Operating Plan* (Whiteman AFB 1997) and in compliance with federal, state, and local regulations. Before initiating any demolition or ACM work, required notifications to the MDNR, Air Pollution Control Program, would be completed. This notification (MO 780-1923, if applicable) will be submitted 20 working days before beginning work. MDNR requires a 10-working-day notification, but the Asbestos Management and Operating Plan requires a 20-working-day notification. Work on ACM projects would only be conducted by a Missouri registered asbestos abatement contractor with current certificates of training in accordance with standards established by OSHA and the USEPA. All ACM wastes would be disposed of at an approved landfill (Whiteman AFB 1997).

Table WH3-49. Toxic Substances Associated with Projects for the AFRC F-35A Mission at Whiteman AFB

Project	Year Constructed	ACM	LBP	PCBs
Demolition				
Building 706	1980	[a]	[b]	[c]
Renovation				
Building 41 renovation for squadron operations	2009	[d]	[d]	[c]
Building 91 renovation for engine repair	1991	[d]	[d]	[c]
Building 1117 electrical and ventilation upgrades	1995	[d]	[d]	[c]
Building 1118 electrical upgrade	1995	[d]	[d]	[c]
Building 1119 egress shop – relocation from building 1117	1995	[d]	[d]	[c]

[a] Buildings constructed before 1980 are assumed to potentially contain ACM (AFI 32-1052, *Facility Asbestos Management*).
[b] Buildings constructed before 1980 are presumed to potentially contain LBP (Whiteman AFB 2009b).
[c] Whiteman AFB is reportedly PCB-free (Golson 2018).
[d] Buildings constructed after 1980 are presumed to not contain ACM or LBP.

All construction, demolition, and renovation projects proposed at Whiteman AFB would be reviewed to determine if LBP or lead-containing materials are present, and whether such materials would be disturbed. To the extent possible, the presence of lead within the work area would be identified prior to work beginning. As shown in Table WH3-49, Building 706 is proposed for demolition and could potentially contain LBP or lead-containing material. If the presence of lead-containing material in the project work area is unknown, the shop and real property records would be reviewed to determine the presence of lead. If the presence of lead-containing material in the work area is still unknown, sampling and analysis for lead would be conducted. The handling and disposal of lead wastes would be conducted in accordance with the Whiteman AFB Hazardous Waste Management Plan (Whiteman AFB 2017b), and in compliance with federal, state, and local requirements and regulations.

Although minor increases in the management requirements for ACM and LBP removal are anticipated, no adverse impacts are anticipated to result from implementation of the AFRC F-35A mission at Whiteman AFB. Long-term environmental benefits from removal of toxic substances are anticipated.

WH3.12.2.2 Hazardous Waste Management

Whiteman AFB would continue to operate as a Large-Quantity Generator and would generate hazardous wastes during various O&M activities associated with the proposed AFRC F-35A mission. Waste-associated maintenance materials include adhesives, sealants, conversion coatings, corrosion prevention compounds, hydraulic fluids, lubricants, oils, paints, polishes, thinners, cleaners, strippers, tapes, and wipes. No new hazardous materials would be added that exceed the base's current hazardous waste processes. The U.S. Air Force Hazardous Waste Management Plan (Whiteman AFB 2017b) would be updated to reflect any change in disposal procedures or hazardous waste generators and waste accumulation points. Implementation of the AFRC F-35A operational beddown and mission at Whiteman AFB would potentially have a beneficial impact on hazardous waste management. Transition from the A-10 to the F-35A would decrease the volume and types of hazardous waste and waste streams because O&M involving cadmium and hexavalent chromium primer, and various heavy metals have been eliminated or greatly reduced. All hazardous wastes would be handled and managed in accordance with federal, state, and local regulations.

WH3.12.2.3 Environmental Restoration Program

There are 44 ERP sites at Whiteman AFB that are closed with no further action or closed with long-term management activities and institutional controls under the authority of both the state and USEPA (Whiteman AFB 2010a, Whiteman AFB 2015b). None of the proposed construction, demolition, or renovation projects associated with the proposed AFRC F-35A mission at Whiteman AFB are on or directly adjacent to the ERP sites. However, there is the possibility that undocumented contaminated soils and/or groundwater from historical fuel spills could be present. If encountered during C&D-related excavations, storage/transport/disposal of contaminated groundwater/soils would be conducted in accordance with applicable federal, state, and local regulations; AFIs; and base policies. Should soil or groundwater contaminants be encountered during C&D activities, health and safety precautions, including worker awareness training, would be required.

Whiteman AFB identified four AFFF (PFAS) release areas for site inspection on base. These sites are currently being evaluated in accordance with the CERCLA process. Whiteman AFB will comply with Air Force Guidance Memorandum (AFGM) 2019-32-01, *AFFF-Related Waste*

Management Guidance, to manage waste streams containing PFAS. The AFGM will be updated as needed to address changes in regulatory requirements, DoD determinations of risk, or development of new technologies. If PFOS/PFOA attributable to DoD actions is found in drinking water at levels that exceed USEPA's Lifetime Health Advisory, the DoD takes immediate action to stop human exposure by providing alternate drinking water sources.

In addition to groundwater contamination as it relates to drinking water, other PFAS contamination considerations relative to the proposed AFRC F-35A mission include worker safety during implementation of the projects and proper management of any PFAS-impacted environmental media that is identified in the project footprint. As part of implementation of the new mission, excavations for new buildings would occur. Based on review of known historical releases of AFFF at Whiteman AFB, none of the projects associated with the AFRC F-35A mission would potentially impact or be impacted by the known AFFF areas (Whiteman AFB 2018). The next step in the CERCLA process is the remedial investigation. During the remedial investigation, the USAF will collect detailed information to characterize site conditions, determine the nature and extent of the contamination, and evaluate risks to human health and the environment posed by the site conditions by conducting a baseline ecological and human health risk assessment. The CERCLA process will continue regardless of any construction activities. Construction activities, to include the handling, mitigation, and disposal or other disposition of contamination discovered before or during the construction activity, will proceed in accordance with all applicable legal requirements. The ERP manager would be consulted during the CERCLA process and prior to implementation of this project to ensure worker safety.

WH3.12.3 Summary of Impacts to Hazardous Materials and Waste

Implementation of the new mission would not add any new hazardous materials that would exceed the base's current processes. No ASTs, USTs or OWSs would be removed. The building proposed for demolition is assumed to be free of ACM and LBP. However, prior to any demolition or renovation, plans are reviewed and if ACM or LBP are identified, Whiteman AFB would complete the appropriate notifications and complete the abatement work in accordance with applicable plans and per all local, state and federal requirements. None of the construction would affect ERP sites. Should contaminated media be encountered during construction, storage/transport/disposal of contaminated media would be conducted in accordance with base plans and applicable regulations. Implementation of the new mission would not result in significant impacts to hazardous materials and wastes.

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WH4.0 CUMULATIVE EFFECTS AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis 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 (federal or non-federal) undertakes such other actions" (40 *CFR* 1508.7). In this section, an effort has been made to identify past and present actions in the Whiteman AFB region and those reasonably foreseeable actions that are in the planning phase or unfolding at this time. Actions that have a potential to interact with the AFRC F-35A mission at Whiteman AFB are included in this cumulative analysis. This approach enables decision makers to have the most current information available so that they can evaluate the environmental consequences of the AFRC F-35A mission at Whiteman AFB and in associated airspace.

Whiteman AFB is an active military installation that undergoes changes in mission and training requirements in response to defense policies, current threats, and tactical and technological advances. As a result, the installation requires new construction, facility improvements, infrastructure upgrades, and other maintenance/repairs on a nearly continual basis. Although known construction and upgrades are a part of the analysis contained in this document, some future requirements cannot be predicted. As those requirements surface, future NEPA analyses will be conducted, as necessary.

WH4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

Whiteman AFB was activated in 1942 as Sedalia Army Airfield during the mobilization efforts following the Japanese attack on Pearl Harbor. The base closed in 1947 as part of the post-World War II demobilization. In 1951, the base returned to serve as Sedalia AFB under the Strategic Air Command, beginning with two years of reconstruction. The first aircraft arrived at Whiteman AFB in 1953. These included the B-47 Stratojet and the KC-97 tankers in 1954. In 1955 the base was redesignated as Whiteman AFB in honor of Lieutenant George A. Whiteman, a Sedalia native killed at Pearl Harbor. Construction continued through the 1950s. The period of 1960-1970 was stable for Whiteman AFB, but construction began again in the late 1980s when the base was identified as the future home of the B-2 Stealth Bomber. The AFRC operating the A-10 moved to the base in 1994 from Richards-Gebaur AFB near Kansas City. The primary mission at Whiteman AFB is to maintain pilot proficiency and combat readiness for the 509 BW flying the B-2 bomber and the AFRC 442 Fighter Wing operating the A-10. The 1-135 ARB is an ANG unit that provides ground forces with air support and direct close combat attack.

Table WH4-1 summarizes past, present, and reasonably foreseeable actions within the region that could interact with the AFRC F-35A mission at Whiteman AFB. The table briefly describes each identified action, presents the proponent or jurisdiction of the action and the timeframe (e.g., past, present/ongoing, future), and indicates which resources potentially interact with the AFRC F-35A mission at Whiteman AFB. Recent past and ongoing military actions in the region were considered as part of the baseline or existing conditions in the region surrounding Whiteman AFB and training airspace.

Table WH4–1. Past, Present, and Reasonably Foreseeable Actions at Whiteman AFB and Associated Region

Action	Proponent/Location	Timeframe	Description	Resource Interaction
Military Actions				
Whiteman AFB IDP	509 BW	Present and Future	The IDP includes 17 short-range projects, 12 medium-range projects, and 3 long-range projects. The short-range projects range in size from as large as the construction of a new Joint Mobility Center to an addition on the Fitness Center. Medium-range development projects include large projects such as the construction of a consolidated sports complex. Long range development project include a consolidated base exchange/commissary complex, fuels hydrant system extensions and a depot-level maintenance facility. The top MILCON project for the facility is the construction of a Stealth Operations Facility to replace the current squadron operations and mission planning facilities.	Noise, Air Quality, Safety, Soil and Water Resources, Transportation, Infrastructure
B-21 Bomber Mission	USAF	Future	Whiteman AFB along with three other bases has been selected by the USAF as a reasonable alternative for the B-21 bomber mission. The B-21 mission could replace the current B-2 mission at Whiteman AFB. Delivery of the first B-21 Bombers is anticipated to begin in the mid-2020s.	Noise, Air Quality, Safety, Soil and Water Resources, Biological Resources, Cultural Resources, Land Use and Recreation
Non-Military (Federal) Actions				
None				
Non-Military (Private Actions)				
Cahill Residential Development	Private Developer/City of Warrensburg	Present and Future	This project includes the construction of 231 single-family, two-story homes on 130 acres.	Noise, Air Quality, Land Use and Recreation
Timber Glen at Hawthorne Estates Development	Private Developer/City of Warrensburg	Present and Future	This project includes the development of 48 single-family homes.	Noise, Air Quality, Land Use and Recreation
Construction of a $42 million mixed use facility	University of Central Missouri	Past	This facility will feature apartments, a Starbucks, a restaurant, the university store, and a convenience store.	Noise, Air Quality, Land Use and Recreation
Construction of a steel rebar manufacturing plant	Nucor Steel	Present and Future	Approximately 250 acres of land on the northeast side of Sedalia has been annexed by the City for Nucor to construct a new steel plant to be fully functional in 2019.	Noise, Air Quality, Land Use and Recreation, Socioeconomics
State and Local				
Warrensburg Capital Projects	City of Warrensburg	Present and Future	These projects will include street, curb, and sidewalk repair, maintenance, and improvement projects, as well as Veterans Road extension, traffic signal upgrades, Hawthorne & Maguire Round-About, and ongoing Downtown Revitalization.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics
Warrensburg Capital Projects	City of Warrensburg	Future	This project includes the development of a new Industrial-Business Park.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics
Warrensburg Capital Projects	City of Warrensburg	Future	This project includes the installation of a new fiber optic communication system.	Noise, Air Quality, Land Use, Infrastructure, Socioeconomics

WH4.2 CUMULATIVE IMPACTS

The following analysis considers how the impacts of the actions in Table WH4-1 might affect or be affected by the AFRC F-35A mission at Whiteman AFB. The analysis considers whether such a relationship would result in potentially significant impacts not identified when the AFRC F-35A mission at Whiteman AFB is considered alone.

Table WH4-2 provides a summary of the cumulative effects. As shown in Table WH4-2, safety, cultural resources, infrastructure, and hazardous materials and waste are not anticipated to contribute to cumulative effects. Cumulative effects are described for airspace, noise, air quality, soil and water resources, biological resources, land use and recreation, socioeconomics, and environmental justice and protection of children. Climate change is also described in this section because changes in climate have the potential to cumulatively impact other resource areas.

Table WH4-2. Summary of Cumulative Effects for Whiteman AFB

Resource Area	AFRC F-35A Mission	Past, Present, and Reasonably Foreseeable Actions[a]	Cumulative Effects
Airspace	◘	◘	◘
Noise	●	◘	◘
Air Quality	○	◘	○
Safety	○	○	○
Soil and Water Resources	◘	◘	◘
Biological Resources	◘	◘	◘
Cultural Resources	○	○	○
Land Use and Recreation	◘	◘	◘
Socioeconomics	◘	◘	◘
Environmental Justice and Protection of Children	◘	◘	◘
Infrastructure	○	○	○
Hazardous Materials and Waste	○	○	○

[a] When determining the potential for significance, past and ongoing actions in the region were considered as part of the baseline or existing conditions in the region surrounding Whiteman AFB and the airspace (e.g., the cumulative noise impact of past and present missions at Whiteman AFB were modeled under baseline conditions).

Key: ○ = not affected or beneficial impacts
◘ = affected but not significant, short to medium term, impacts that range from low to high intensity
● = significant impacts, that are high in intensity or are long-term

WH4.2.1 Airspace

WH4.2.1.1 Airfield Operations

As noted in Section WH2.3, implementation of the AFRC F-35A mission at Whiteman AFB would increase overall airfield operations by approximately 17.4 percent. Should Whiteman AFB be selected for the B-21 Bomber mission, additional impacts to airfield operations would be anticipated. The number of operations could increase or decrease based on the new mission requirements. Based on the best available information at this time, no known present and/or reasonable foreseeable future actions, when combined with the increased AFRC F-35A operations, would result in any significant cumulative impacts to airfield operations or the management and configuration of the airspace currently surrounding this airfield environment.

Military actions with major changes in aircraft types or operations would undergo additional environmental analysis to determine the exact number of operations and the potential for additional impacts within the airspace.

WH4.2.1.2 Training Airspace

Several of the SUA areas proposed for use by the AFRC F-35A mission at Whiteman AFB would see increased use should the mission be located at Whiteman AFB. The increased use is not anticipated to have significant impacts to military training or civilian aircraft in these areas.

Of the projects described in Table WH4-1, only the potential beddown of the B-21 Bomber mission at Whiteman AFB would have a potential to increase airspace usage. The number of sorties for this unit is not known at this time and additional NEPA analysis would occur prior to a change in mission at Whiteman AFB. Because the mission would be a replacement mission, it is not anticipated that there would be a significant change in airspace use. Any potential conflicts in the use of airspace would be deconflicted by the scheduling agency. Any changes to SUA or charting of new SUA would require separate environmental analysis.

No present and/or known reasonable foreseeable future actions, when combined with the increase in airspace sorties that would result from the AFRC F-35A mission at Whiteman AFB, would result in any cumulative impacts to airspace management in the SUAs proposed for use.

WH4.2.2 Noise

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) occurring during the same time periods. C&D projects are a regular occurrence on and near active USAF installations such as Whiteman AFB. C&D noise would be localized and temporary. Construction work is generally limited to normal working hours (i.e., 7:00 A.M. to 5:00 P.M.). Furthermore, the projects are or would be located in an acoustic environment that includes elevated aircraft operations noise levels. In the instance that multiple C&D projects affect a single area at the same time, construction noise would be a slightly more noticeable component of the acoustic environment.

As described in Section WH3.2.2, the AFRC F-35A mission at Whiteman AFB would result in increased noise from the proposed aircraft operations. It was determined that the increase in noise would be a significant impact to the environment surrounding Whiteman AFB. The hypothetical future beddown of a B-21 bomber mission (Table WH4-1) would also affect noise levels near the installation. However, the B-21 bomber has not yet been designed, and noise levels that would be generated by the aircraft during flight are not known.

Private and state/local government-funded land development projects have the potential to increase noise impacts by increasing the noise-sensitivity of areas exposed to elevated aircraft noise levels. However, major development projects listed in in Table WH4-1 are located in Warrensburg, which is more than 5 miles from Whiteman AFB, and would not be exposed to DNL of 65 dB or greater from the AFRC F-35A mission. Implementation of the AFRC F-35A mission, combined with past, present, and reasonably foreseeable projects, would not result in significant cumulative noise impacts.

WH4.2.3 Air Quality

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. These

projects would generate the same types of construction related air quality impacts as described for the proposed AFRC F-35A mission (e.g. fugitive dust emissions, increases in construction related criteria pollutant emissions). Although implementation of the AFRC F-35A mission would result in minor increases in emissions of NO_x, SO_x, $PM_{2.5}$ and CO_{2e}, these increases, combined with air emission increases from past, present, and reasonably foreseeable future actions, would not prevent this area from maintaining NAAQS or result in significant cumulative impacts to the air quality.

The implementation of the proposed AFRC F-35A mission at Whiteman AFB would not result in significant impacts to air quality. No known projects, when added to the emissions from the AFRC F-35A mission, would result in significant impacts to air quality.

WH4.2.4 Soil and Water Resources

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. These construction projects would increase the amount of soil disturbed and have the potential to increase erosion and sedimentation into surface water features. Impacts to soil and water resources resulting from implementing the AFRC F-35A projects at Whiteman AFB, combined with impacts to soil and water resources from past, present, and reasonably foreseeable future actions, would not result in significant cumulative impacts to the soil and water resources.

WH4.2.5 Biological Resources

The additional C&D projects described in Table WH4-1 would be anticipated to have similar types of impacts to vegetation, wildlife, and special status species as those impacts described for the construction impacts for the proposed AFRC F-35A mission. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on biological resources at Whiteman AFB would not be significant.

The aircraft operations associated with implementation of the AFRC F-35A mission at Whiteman AFB would not result in significant impacts to wildlife, including threatened and endangered species and migratory birds. Projects such as the B-21 Bomber mission could result in similar impacts to wildlife as those described in this EIS. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on the biological resources at Whiteman AFB would not be significant.

WH4.2.6 Land Use and Recreation

C&D projects associated with the proposed AFRC F-35A mission would occur near other ongoing and future C&D projects (e.g., IDP projects, construction from private and state and local development) during the same time periods. C&D projects have been and will continue to be a regular occurrence on and near installations such as Whiteman AFB. Construction projects would continue to comply with existing zoning ordinance. Cumulative impacts resulting from implementation of the proposed AFRC F-35A mission in conjunction with past, present, and reasonably foreseeable future actions on land use and recreation at Whiteman AFB would not be significant.

Aircraft operations associated with implementation of the AFRC F-35A mission at Whiteman AFB would not result in significant impacts to land use and recreation. Increased noise would impact

some recreational facilities and could reduce the enjoyment of those facilities for some persons. Projects such as the B-21 Bomber mission could increase noise in the region surrounding Whiteman AFB and add to the impacts from the AFRC F-35A mission. Additional NEPA analysis would be conducted for future beddown missions to quantify any additional impacts.

WH4.2.7 Socioeconomics

The C&D projects associated with the AFRC F-35A mission would provide short-term, economic benefits to surrounding areas through employment of construction workers and through the purchase of materials and equipment. The short-term impact of implementing the proposed mission combined with any or all of the projects listed in Table WH4-1 would result in negligible cumulative impacts to socioeconomics in the area. The addition of 11 personnel associated with the proposed mission is also not anticipated to result in cumulative impacts to housing, schools, or other socioeconomic resources in this area.

WH4.2.8 Environmental Justice and the Protection of Children

The proposed C&D projects on and near Whiteman AFB would not result in any cumulative impacts to environmental justice populations. Noise resulting from the operation of F-35A aircraft would affect people living near the installation. As discussed in Section WH3.10.2, implementation of the AFRC F-35A mission at Whiteman AFB would not result in disproportionate impacts to minority or low-income populations. Projects such as the B-21 Bomber mission could increase noise in the region surrounding Whiteman AFB and add to the impacts from the AFRC F-35A mission. Additional NEPA analysis would be conducted for future beddown missions to quantify any additional impacts.

WH4.2.9 Climate Change

Missouri and the surrounding region could experience a continuing of recent upward trends in average temperatures and below average occurrence of extremely cold days, an increase in heavy rain events and winter precipitation, and an increase in the intensity of naturally occurring droughts (USGCRP 2017).

Increases in temperature, heavy precipitation events, and drought intensity could interact with resource areas such as air quality, water resources, and socioeconomics. Increasing temperatures have been shown to increase ground level ozone and particulates (Orru et al. 2017). Increases in heavy precipitation events lead to increased risk of flooding and spring planting delays. Increases in drought intensity could impact water availability. Potential socioeconomic impacts could include increased costs associated with poor air quality, flooding damage, and decreased harvests.

While the recent impacts of climate change have been minor in the Missouri region and operations at Whiteman AFB have remained relatively unchanged, exacerbation of climate conditions in the future could increase the cost of proposed operations and could impede operations during extreme events. Additional measures could be needed to mitigate such impacts over the operational life expectancy of the F-35A.

WH4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals)

that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

For the beddown of F-35A aircraft at Whiteman AFB, most resource commitments are neither irreversible nor irretrievable. Most impacts are short-term (e.g., air emissions from construction) or longer lasting but negligible (e.g., public service increases). Those limited resources that could involve a possible irreversible or irretrievable commitment are discussed below.

Should the AFRC F-35A mission be located at Whiteman AFB, some land in the cantonment would be disturbed. However, much of this land has been previously disturbed and is heavily influenced by airfield development. Construction and renovation of base facilities would require the consumption of limited amounts of material typically associated with interior renovations (e.g., wiring, insulation, windows, and drywall) and exterior construction (e.g., concrete, steel, sand, and brick). An undetermined amount of energy to conduct renovation, construction, and operation of these facilities would be expended and irreversibly lost.

Training operations would continue and involve consumption of nonrenewable resources (e.g., gasoline used in vehicles and jet fuel used in aircraft). None of these activities are expected to significantly decrease the availability of minerals or petroleum resources. Privately owned vehicle use by the personnel continuing to support the existing missions would consume fuel, oil, and lubricants. The amount of these materials used would increase; however, this additional use is not expected to significantly affect the availability of the resources.

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