Draft

Environmental Assessment

for B-21 Depot Maintenance Activation at Tinker Air Force Base, Oklahoma

October 2020

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
ABW	Air Base Wing
ACAM	Air Conformity Applicability Model
ACM	asbestos-containing materials
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational Safety and Health
AFPD	Air Force Policy Directive
AHRN	Automated Housing Referral Network
APE	Area of Potential Effects
APZ	Accident Potential Zone
BASH	Bird Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BMP	Best management practices
BNSF	Burlington Northern Santa Fe
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COC	Community of Comparison
CWA	Clean Water Act
CZ	Clear Zone
dB	decibel
dBA	A-weighted decibel
de minimis	of minimal importance
DLA	Defense Logistics Agency
DNL	day-night sound level
DoD	Department of Defense
DOPAA	Description of the Proposed Action and Alternatives
DOT	Department of Transportation
DSOR	Depot Source of Repair
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
ESA	Endangered Species Act

ESCP	Erosion and Sediment Control Plan
EO	Executive Order
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FY	fiscal year
GHG	greenhouse gases
GI	Green Infrastructure
gpd	gallons per day
HMA	Housing Market Area
(I-)	Interstate
IPaC	Information for Planning and Consultation
INRMP	Integrated Natural Resources Management Plan
kW	kilowatt
kWh	kilowatt hours
LBP	lead-based paint
L_{eq}	equivalent sound level
L_{max}	maximum sound level
LSZ	Lower Saturated Zone
MBTA	Migratory Bird Treaty Act
MMT	million metric tons
MOB	main operating base
MROTC	Maintenance Repair and Overhaul Technology Center
MSA	Metropolitan Statistical Area
MSL	mean sea level
mW	megawatt
mWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMAP	NOISEMAP
No.	Number
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
OC-ALC	Oklahoma City Air Logistics Complex
ODWC	Oklahoma Department of Wildlife Conservation
ODEQ	Oklahoma Department of Environmental Quality
OG&E	Oklahoma Gas and Electricity Company

OK	Oklahoma
OPDES	Oklahoma Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
P.L.	Public Law
Pb	lead
PCBs	Polychlorinated biphenyls
PCI	Pavement Condition Index
pCi/L	picocuries per liter
PM	particulate matter
PM 2.5	particulate matter less than 2.5 microns in diameter
PM 10	particulate matter less than 10 microns in diameter
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PZ	Producing Zone
RCRA	Resource Conservation and Recovery Act
ROAA	Record of Air Analysis
ROI	Region of Influence
SEL	sound exposure level
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Properties
tpy	tons per year
TSCA	Toxic Substances Control Act
$\mu g/m^3$	micrograms per cubic meter
U.S.C.	U.S. Code
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USZ	Upper Saturated Zone
VFR	visual flight rules
VOC	volatile organic compound
WWTP	wastewater treatment plant

Cover Sheet
Draft Environmental Assessment for
B-21 Maintenance Depot
Tinker Air Force Base, Oklahoma

Responsible Agencies: U.S. Air Force (USAF).

Affected Location: Tinker Air Force Base (AFB), Oklahoma

Report Designation: Draft Environmental Assessment (EA)

Abstract: This EA was prepared in compliance with the USAF's *Environmental Impact Analysis Process* (EIAP) for the proposed development of construction and activation of the B-21 Maintenance Depot at Tinker Air Force Base, Oklahoma. Under this proposal, USAF and the 72nd Air Base Wing (ABW) would establish the required facilities and logistic support for B-21 depot maintenance operations at Tinker AFB, Oklahoma, to support the maintenance requirements of the approximately 100 aircraft that will be established as the USAF B-21 fleet. Written comments and inquiries regarding this document should be directed by email to Mr. Tim Taylor at timothy.taylor.5@us.af.mil, or by postal mail at: Mr. Tim Taylor; 72 ABW/CEIEC; 7535 5th Street; Building 400; 2nd Floor, Tinker AFB OK; 73145.

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Comments on this document are requested. Letters or other written comments provided may be published in the Final EA. Any personal information provided will be used only to identify a desire to make a statement during the public review period or to fulfill requests for copies of the EA or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of the Final EA. However, only the names of the individuals making comments and specific comments will be disclosed; personal home addresses and telephone numbers will not be published in the Final EA.

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DRAFT ENVIRONMENTAL ASSESSMENT

FOR

B-21 DEPOT MAINTENANCE ACTIVATION

TINKER AIR FORCE BASE, OKLAHOMA

AIR FORCE MATERIEL COMMAND

72ND AIR BASE WING

4385 SOUTH AIR DEPOT BOULEVARD

TINKER AIR FORCE BASE, OKLAHOMA 73145

OCTOBER 2020

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1. Purpose of and Need for the Proposed Action

1.1 Introduction

The 72nd Air Base Wing (ABW) is the host organization at Tinker Air Force Base (AFB) and provides base installation and support services for the Oklahoma City Air Logistics Complex (OC-ALC) and more than 45 associate units assigned to six major commands. The OC-ALC performs programmed depot maintenance on the KC-46 A, KC-135, B-1B, B-2, B-52, and E-3 aircraft. Depot-level maintenance activities include major repair, overhaul, reclamation, and rebuild of these aircraft and their subcomponent parts, as well as technical assistance and functional check flights required for maintaining fleet operations. The OC-ALC also performs maintenance on the Navy E-6 aircraft, as well as maintenance, repair, and overhaul of select aircraft engines for the Air Force, Air Force Reserve, Air National Guard, Navy, and foreign military sales related aircraft. The mission of the OC-ALC is "Superior Maintenance for Global Aerospace Power." Tinker AFB also is home to the Air Force Sustainment Center headquarters, one of the six specialized centers assigned to the Air Force Materiel Command, whose mission is to sustain weapons system readiness to generate airpower for America.

This Environmental Assessment (EA) supports the U.S. Air Force (USAF) *Environmental Impact Analysis Process* (EIAP) for the activation of the B-21 Maintenance Depot at Tinker AFB. As part of the proposed depot activation, new facilities also would be constructed and existing facilities would be renovated on Tinker AFB for mission support. This EA analyzes the potential for significant environmental impacts associated with the Proposed Action and alternatives, including the No Action Alternative. The environmental documentation process associated with preparing this EA was conducted in compliance with the National Environmental Policy Act of 1969 ([NEPA], Title 42, United States Code, § 4321 et seq.); Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA* (Title 40 Code of Federal Regulations [CFR] §§ 1500–1508); and USAF's implementing regulation for NEPA, *Environmental Impact Analysis Process* (32 CFR § 989, as amended).

1.2 Background

The Department of Defense (DoD) is developing a new bomber aircraft, the B-21 Raiders (hereinafter "B-21"), which will eventually replace the B-1 and B-2 bomber fleets. The retirement schedule for the B-1 and B-2 bombers has not yet been determined.

In the mid-2000s, USAF believed its fleet of B-1, B-2, and B-52 bombers would suffice until the 2030s. However, in 2006, the Quadrennial Defense Review called for development of a next-generation bomber by 2018, accelerating USAF plans for a new bomber by almost 20 years. After considering multiple options, in 2011 the Secretary of Defense approved USAF's request to continue developing an optionally manned (i.e., capable of operation by an onboard crew or piloted remotely) bomber, which was authorized by Congress. On October 27, 2015, the DoD announced its intention to award a contract to build the new long-range strike bomber. Subsequently, the Secretary of the Air Force announced this bomber would be designated the B-21 Raider, in honor of the Doolittle Raiders of World War II.

Headquarters USAF Global Strike Command is the lead command for the B-21, which will be a long-range, highly survivable bomber aircraft capable of carrying a variety of mixed conventional munitions or nuclear ordnance. The B-21 will join the nuclear triad as a visible and flexible nuclear deterrent, assuring our allies and partners while also supporting national security objectives. The USAF plans to procure at least 100 B-21 Raiders, which is projected to enter service in the 2020s.

The Depot Source of Repair (DSOR) decision process is used to ensure effective use of commercial and organic (i.e., DoD owned) depot maintenance resources in order to prevent unnecessary duplication while meeting statutory requirements. Ultimately, the DSOR process optimizes the use of established depot capabilities while reducing overall program cost. Of the installations performing depot maintenance work, only one installation, OC-ALC at Tinker AFB, currently provides maintenance work for the B-1, B-2 and B-52 bomber fleets. In a memorandum dated September 30, 2013, USAF, through a strategic source of repair determination, identified Tinker AFB as the installation designated to support depot maintenance capability for the B-21 aircraft, which was then approved by the Air Force Materiel Commander through the issuance of a Joint Service DSOR determination memorandum. Tinker AFB also has been designated the Technology Repair Center for all bomber repair for USAF. Based on this, Tinker AFB is the only installation under review for the B-21 action; no other bases are considered.

Within the President's Budget Request released February 12, 2018, were details on the USAF plan to update the B-52 fleet and continue modifications to the B-1 and B-2 fleets while continuing to acquire the B-21. Once sufficient B-21 aircraft are operational, the B-1 and B-2 will be incrementally retired. However, delivery and retirement timelines are dependent upon the B-21 production and delivery schedules. Subject to change, B-1 and B-2 operations may continue into the 2030s.

Tinker AFB is located within Oklahoma City, Oklahoma (**Figure 1-1**). Located 10 miles southeast of downtown, Tinker AFB is bordered to the north by Interstate (I-) 40 and Southeast 29th Street; to the east by Douglas Boulevard; to the south by Southeast 74th Street; and to the west by Sooner Road. Incorporated areas immediately surrounding the installation include Midwest City to the north and Del City to the northwest. **Figure 1-1** shows the location of Tinker AFB and its geographic setting within Oklahoma County and Oklahoma City. Tinker AFB encompasses over 5,000 acres of federal land with 428 buildings, totaling 19.1 million square feet. The installation has a two-runway airfield capable of supporting the missions of Tinker AFB and the operations at the OC-ALC.

According to the Cost and Economic Division of Tinker AFB's Financial Management Directorate, Tinker AFB employs approximately 30,689 personnel, 37 percent of which are military and 63 percent are civilian. The total payroll for combined military and civilian personnel totals over $1.8 billion annually (Tinker AFB 2019b).

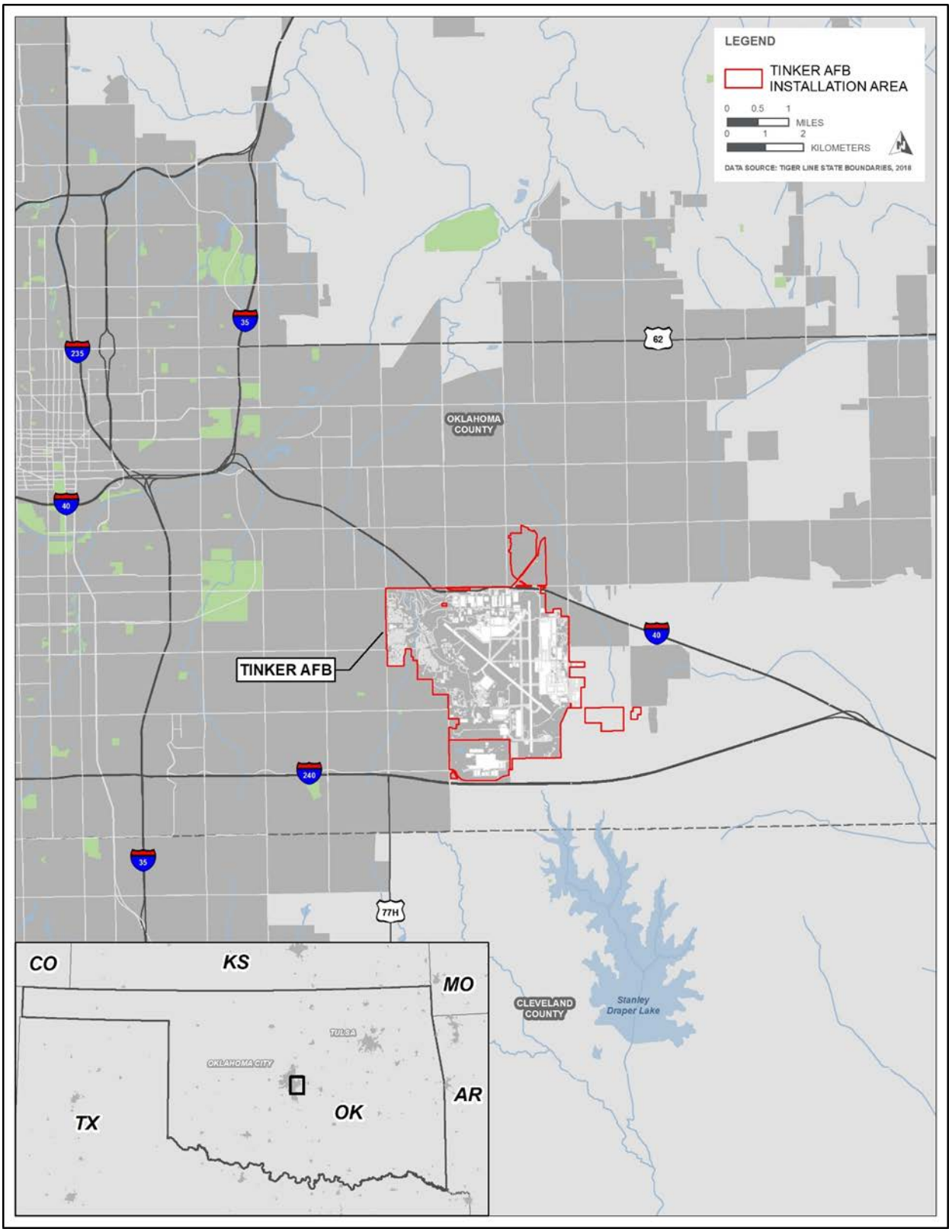

Figure 1-1 Tinker AFB, Oklahoma Location

1.3 Purpose of and Need for the Proposed Action

The purpose of the Proposed Action is to establish the specialized facilities and logistics support required to conduct B-21 depot maintenance operations for the approximately 100 aircraft that will be established as the USAF B-21 fleet. Depot-level maintenance is defined as material maintenance or repair requiring the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment as necessary (10 United States Code § 2460). The Proposed Action is needed because there are currently no facilities at Tinker AFB that support B-21 depot maintenance operations. Although Tinker AFB's mission includes a depot maintenance program for B-1, B-2, and B-52 aircraft, existing depot maintenance facilities are inadequate to meet the maintenance needs of the B-21. Further, these facilities are needed to continue B-1 and B-2 depot maintenance operations until B-21 aircraft are sufficiently operational and those airframes are retired.

1.4 Environmental Compliance Overview

1.4.1 National Environmental Policy Act (NEPA)

NEPA is a federal statute requiring the identification and analysis of potential environmental impacts associated with proposed federal actions before those actions are taken. The intent of NEPA is to help make well-informed decisions based on an understanding of the potential environmental consequences, and take actions to protect, restore, or enhance the environment. The CEQ process for implementing NEPA is codified in 40 CFR §§ 1500–1508. USAF's implementing regulation for NEPA is 32 CFR § 989 which provides a framework for how to implement CEQ regulations and achieve the goals of NEPA within the USAF.

In compliance with NEPA, the USAF determined an EA is the appropriate level of EIAP for the Proposed Action described in **Section 2.1.** This EA determines whether the Proposed Action might result in significant impacts. If significant impacts are identified, then the USAF would decide whether to mitigate the impacts to less than significant, undertake the preparation of an environmental impact statement, or abandon the Proposed Action. This EA will also be used to guide the USAF in implementing the Proposed Action in a manner consistent with USAF standards for environmental stewardship should the Proposed Action be approved for implementation.

1.4.2 Interagency/Intergovernmental Coordination

The CEQ regulations for implementing NEPA (40 CFR § 1501.7) state, "There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action. This process shall be termed scoping." In compliance with NEPA, USAF notifies relevant agencies, stakeholders, and federally recognized tribes about the Proposed Action and alternatives, and gives them the early opportunity to comment.

Like NEPA, the Intergovernmental Cooperation Act of 1968 and Executive Order (EO) 12372 (*Intergovernmental Review of Federal Programs*, as amended by EO 12416), require federal agencies to cooperate with and consider state and local views in implementing a federal

proposal. Through the interagency/intergovernmental coordination process, USAF notifies relevant federal, state, and local agencies and officials of the Proposed Action and alternatives and provides them with sufficient time to make known their environmental concerns specific to the action. The process also provides USAF the opportunity to cooperate with and consider state and local views in implementing the federal proposal.

Interagency/intergovernmental coordination materials related to the Proposed Action described in this EA are included in **Appendix A**.

1.4.3 Consultation

U.S Fish and Wildlife Service (USFWS)/Oklahoma Department of Wildlife Conservation (ODWC) Coordination

Six federally listed threatened and endangered species could potentially occur on the installation. Only one, the piping plover (*Charadrius melodus*), has been documented on the installation. This individual was found dead on Runway 36/18 on May 11, 2009, the result of a bird-aircraft strike. Proposed Action airfield operations would be covered under a separate, ongoing programmatic consultation USAF is conducting with USFWS under Section 7 of the Endangered Species Act (ESA). USAF is currently conducting informal ESA Section 7 consultation with USFWS that would cover the construction portion of the Proposed Action. This section will be updated as the consultation process progresses.

Tinker AFB has no state threatened or endangered species. However, many state species of concern and species at risk do occur on the installation. Therefore, although not required by law, in 2018 Tinker AFB natural resources officials coordinated with ODWC on potential actions to protect and conserve state species of concern and species at risk. Tinker AFB/ODWC-coordinated prescriptive and mitigative actions to achieve this goal will be described in **Section 3.2** of the EA, and ODWC will be afforded the opportunity to review and comment on the Draft EA.

State Historic Preservation Officer (SHPO) and Tribal Consultation

Cultural resources are structures, buildings, archeological sites, districts (a collection of related structures, buildings, and/or archeological sites), cemeteries, and objects. Section 106 of the National Historic Preservation Act (NHPA) of 1966 requires consultation with the Oklahoma Historical Society/Oklahoma SHPO and federally recognized tribes to determine and/or resolve the undertaking's effects on historic properties. Review and coordination of this project followed approved procedures for compliance with federal laws. Tribal consultation letters were mailed by Tinker AFB on May 20, 2020. The letters are contained in Appendix D. The SHPO consultation letter was delivered on April 20, 2020 that included an Assessment of Effects to Historic Properties, and is also contained in **Appendix D**. The SHPO concurred with the Assessment of Effects that no historic properties would be affected by the undertaking, successfully concluding Section 106 consultation (see **Appendix D**).

1.4.4 Compliance with Executive Orders

EO 11988, *Floodplain Management*, was issued in 1977 and requires federal agencies to evaluate the potential effects of actions it may take in a floodplain to avoid adversely impacting

floodplains wherever possible. EO 11988 also ensures that federal agency planning programs and budget requests reflect consideration of flood hazards and floodplain management, including the restoration and preservation of such land areas as natural undeveloped floodplains, and that agencies prescribe procedures to implement the policies and procedures of the EO. EO 11988 requires public notice when there is potential for floodplain development and impacts, and prescribes a process for deciding whether floodplain development is the only practicable alternative for implementing a proposed action. Through this EA process, the USAF issued an early notice of potential floodplain impacts in *The Oklahoman* on March 21, 2020. The notice requested comments on the proposed action with respect to potential floodplain concerns. No comments have been received in response to the floodplain notice. USAF will consider the potential for floodplain impacts in a process for determining whether floodplain locations are the only practicable alternative to implement the Proposed Action.

EO 11990, *Protection of Wetlands*, also issued in 1977, requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction and to preserve the values of wetlands, and to prescribe procedures to implement the policies and procedures of this EO. It is USAF policy to seek to preserve the natural values of wetlands while carrying out its mission on both USAF lands and non-USAF lands. To the maximum extent practicable, USAF avoids actions that would either destroy or adversely modify wetlands.

Similar to EO 11988 for floodplain management, EO 11990 also requires public notice when there is potential for wetland development and impacts, and prescribes a process for deciding whether wetland development is the only practicable alternative for implementing a proposed action. Through this EA process, USAF issued an early notice of potential wetland impacts in *The Oklahoman* on March 21, 2020. The notice requested comments on the proposed action with respect to potential wetland concerns. No comments have been received in response to the wetland notice.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued in 1994. Its purpose is to focus federal attention on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities. The EO directs federal agencies to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law. This EA presents an analysis in **Section 3.8** to determine if the Preferred Alternative would result in adverse and/or disproportionate effects on low-income or minority populations.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks (Protection of Children)* was issued in 1997. The EO directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children and to ensure these policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks. This EA presents an analysis in **Section 3.8** of the potential environmental health and safety risk that may disproportionately affect children through implementation of the Proposed Action.

1.4.5 Permits and other Compliance Requirements

Applicable permits and additional compliance requirements from local, state, and federal agencies will be identified and obtained or followed prior to construction or demolition associated with the Preferred Alternative. The construction contractor would identify and obtain appropriate permits for construction and demolition activities. All underground utility locations would need to be identified prior to any construction activities. All identified applicable or potential permits and additional **Table 1-1** compliance requirements are presented in **Section 2.1** and are discussed in more detail in the appropriate subsections of the EA.

Table 1-1. Potential Permits/Additional Compliance Requirements

Name	Description	New Permit/Renewal/Modification
Clean Air Act (CAA) - Title V	Requires all major sources and some minor sources of air pollution to obtain an operating permit. A Title V permit grants a source permission to operate.	Tinker has an existing Title V permit (2015-0383-TVR2), which would require modification for the new maintenance depot.
Prevention of Significant Deterioration	Applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is in attainment or unclassifiable with the National Ambient Air Quality Standards.	Tinker's CAA Prevention of Significant Deterioration permit is incorporated into the existing Title V permit.
Multi-Sector General Industrial Permit OKR05	Authorizes discharge of stormwater from industrial facilities, consistent with the terms of the permit.	Modification may be required.
Section 438 of the Energy Independence and Security Act	Required to establish stormwater design requirements for construction projects that disturb a footprint greater than 5,000 square feet of land in order to maintain or restore the property to its pre-development hydrology state.	Tinker AFB would integrate appropriate stormwater design criteria into the project design for either alternative.
General Permit OKR10 for Stormwater Discharges from Construction Activities within the State of Oklahoma	Required for construction activities disturbing one or more acres of land.	Required prior to commencement of construction activities.
General Permit OKR04, Phase II Small municipal storm sewer System discharge	The permit authorizes discharges of stormwater and certain non-stormwater discharges from Small Municipal Separate Storm Sewer Systems.	Modification may be required.
Pollution Discharge Elimination System (OK0000809 and OK0035203)	Permitting in accordance with National Pollution Discharge Elimination System (NPDES) requirements.	Tinker currently has two permits (OK0000809 and OK0035203). Modifications would be required for additional discharges.

Name	Description	New Permit/Renewal/Modification
Clean Water Act (CWA) Section 404 Permit	Required for dredge or fill work in waters of the U.S.	A Section 404 permit would be required if the action impacts Waters of the U.S.
Migratory Bird Relocation Permit	Required by USFWS to authorize the removal and relocation of migratory birds, including their nests, eggs, and individual birds.	A permit would be required if clearing activities are conducted during the breeding season and if active nesting migratory birds present a conflict to construction activities. Permit processing would be approximately 30 days.
Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit	Required to ensure the safe treatment, storage, and disposal of hazardous wastes by establishing specific requirements that must be followed when managing those wastes.	Would need to be amended to include new processes.
OKC Industrial Wastewater discharge permits	Required for discharge of industrial and sanitary waste.	Tinker currently has two permits, Number (No.) 0029-TAC and No. 0029-FC. Modifications would be required if discharge would exceed 1.5 million gallons per day (gpd).

1.4.6 Public Involvement

In addition to government agency involvement, NEPA documents are made available to the public for comment. Any comments received are then disclosed to the federal decision maker prior to the action being taken. The premise of NEPA is that the quality of federal decisions will be enhanced if proponents provide information to the public and involve the public in the planning process.

USAF is required to manage floodplains and wetlands in accordance with Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*, which includes the USAF guidance for compliance with EO 11988, Floodplain Management and EO 11990, Protection of Wetlands. USAF has identified both alternatives are located in floodplain areas as described in **Section 2.1**. In addition, one alternative contains a wetland that could potentially be impacted by the Proposed Action. Therefore, a Notice for Early Public Review was published in *The Oklahoman* newspaper on March 21, 2020 in order to inform the public of the potential for floodplain or wetland impacts. No comments were received from the public or other stakeholders. A copy of the notice is provided in **Appendix A**.

A Notice of Availability was published in *The Oklahoman* on [INSERT DATE] to notify the public and other stakeholders of the availability of the Draft EA and Draft Finding of No Significant Impact (FONSI) for review. The draft documents were made available for review at the Midwest City Library and were [add text re: where the documents may have been posted online]. The Notice of Availability was issued to solicit comments on the Proposed Action and involve local communities in the decision-making process. Public and agency comments on the Draft EA and

Draft FONSI will be considered prior to a decision being made on whether or not to sign the FONSI.

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2. Description of the Proposed Action and Alternatives

This chapter presents information on the Proposed Action and alternatives to establish the required facilities and logistic support needed to perform depot maintenance operations for the B-21 aircraft at Tinker AFB. **Section 2.1** provides a description of the Proposed Action. **Section 2.3** describes the process used to identify and evaluate potential alternatives to the Proposed Action and describes alternatives considered but dismissed from detailed review. **Sections 2.4 and 2.5** describe the alternatives selected for detailed review in this EA. Lastly, **Section 2.6** discusses the No Action Alternative.

2.1 Proposed Action

Under the Proposed Action, OC-ALC and 72nd ABW propose to establish facilities and logistics support for the B-21 Maintenance Depot activation at Tinker AFB.

2.1.1 Elements of the Proposed Action

The Proposed Action includes construction/demolition/renovation of facilities, additional personnel, aircraft operations, and aircraft maintenance operations at Tinker AFB.

Construction – Proposed for construction to support the B-21 depot maintenance operations are approximately 600,000 square feet of hangars, associated facilities, and laydown areas.

Demolition – The Proposed Action includes the demolition of existing facilities to make space for the newly proposed B-21 maintenance depot support facilities. Demolition could include existing pavements, hangars, storage, and other buildings.

Renovation – The Proposed Action includes the renovation of part of an existing building to create administrative office space. An additional building would also be renovated for use as a parts warehouse specific to the needs of the B-21 depot maintenance program.

Personnel – The Proposed Action includes an estimated increase of 800 personnel to support B-21 depot maintenance operations at full end state. It is assumed that there would be an increase of up to 1,200 personnel during any overlap in the B-1 and B-21 missions. These numbers represent a mix of USAF civilian and active duty personnel. It also is assumed that each personnel would include 1.5 dependents who would live off-installation in existing available housing. Approximately 175 construction workers would be needed for the maintenance depot campus construction.

Aircraft Operations – An estimated 12 B-21 aircraft would be serviced at Tinker AFB per year based on fleet size. The Proposed Action would include up to five takeoffs and landings (i.e., ten operations) per month during the daytime hours of 7 a.m. to 10 p.m. In addition, engine test run-ups would occur at a newly constructed engine test area for approximately 11 hours per month based on the expected monthly throughput of B-21 aircraft.

The B-21 fleet would operate within Military Training Routes and other existing airspace areas already designated for military flight operations conducted into and out of Tinker AFB. No changes to airspace configurations (i.e., size, shape, or location) are proposed or would be required to support the implementation of the Proposed Action.

Aircraft Maintenance Operations – Aircraft maintenance operations would include the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment as necessary.

Utilities – Because a majority of the Proposed Action elements would be implemented in areas of Tinker AFB that are already built up and used for similar purposes, all required utility connections already exist. Minor trenching and/or rerouting of existing utilities may be required based on site-specific layouts. However, such trenching and rerouting would occur in areas already disturbed with pavements, maintained open space (i.e., grassy medians or other open areas), or existing buildings. A 750-kilowatt (kW) generator would be installed to supply backup power in case of power outage.

2.2 Selection Standards for Alternatives

As stated in Section 1.2, Tinker AFB has been designated the technology repair center for all USAF bomber repair and will be the installation assigned to support B-21 depot maintenance activities. USAF initially considered four main areas at Tinker AFB as alternatives for hosting the proposed B-21 maintenance depot facilities (**Figure 2-1**). Considering alternatives helps to avoid unnecessary impacts and allows for an analysis of reasonable ways to achieve the stated purpose. CEQ defines reasonable alternatives as those that are economically and technically feasible, and show evidence of common sense.

Certain requirements must be present or reasonably attainable for an alternative to meet the purpose of and need for the Proposed Action. For the proposed B-21 Maintenance Depot facility, alternatives selected for analysis in this EA must allow B-21 operational units to maintain the ability to operate and train without affecting their mission. Therefore, selection standards for alternatives are those standards that stem from B-21 mission operational requirements.

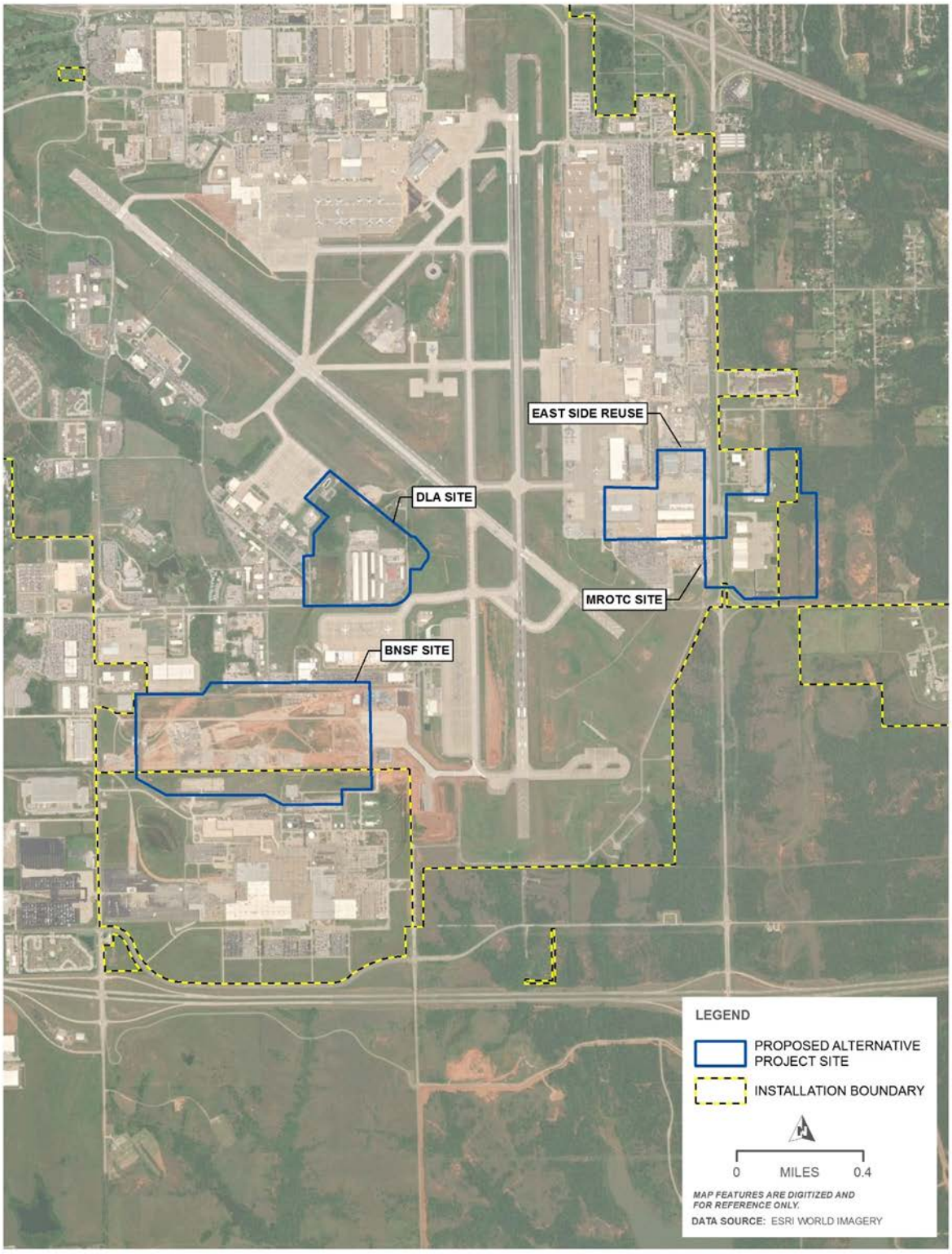


Figure 2-1. Alternatives Sites Initially Considered for the B-21 Maintenance Depot

Selection standards used to screen site alternatives are described as follows:

1. A site alternative cannot affect existing or future planned mission depot maintenance operations KC-46A, KC-135, B-1B, B-2, B-52, E-3 and the Navy E-6. All existing missions must continue without interruption or risk of mission failure.
2. A site alternative should be located so that all maintenance facilities can be physically connected to the runway.
3. A site alternative should be adjacent to or within close proximity (within five minutes) to taxiway and ramp areas. Additional ramp space will be required but should be limited and co-located with existing ramp space, when possible. Existing taxiways should be utilized to the maximum extent possible.
4. A site alternative should be large enough to house a 600,000-square foot area of primary facilities needed for the B-21 depot maintenance in a contiguous campus setting with sufficient space for expansion. A viable candidate site should include approximately 75 acres of useable land to accommodate the proposed facilities and operations.
5. A site alternative should ensure utility access to support all required activities. All utilities should be accessible and provide sufficient capacity to support the proposed operations.
6. A site alternative should allow efficient application of force protection measures and comply with anti-terrorism/force protection requirements. Any land acquisition must include sufficient buffer space around the entire perimeter of property adjacent to public property and all new construction planned near installation boundaries must include appropriate setbacks under anti-terrorism/force protection rules.

The four sites initially considered for the proposed location of the B-21 depot maintenance facility as shown on **Figure 2-1** include: Defense Logistics Agency (DLA) site; Maintenance, Repair, and Overhaul Technology Center (MROTC) site; Burlington Northern Santa Fe (BNSF) Railyard site; and East Side Reuse site. **Table 2-1** compares the four-site selection standards to show why the alternatives were either carried forward for further analysis or eliminated from analysis.

Table 2-1. Site Alternative Screening using Selection Standards

Site Alternative	1	2	3	4	5	6
DLA Site	Y	Y	Y	Y	Y	Y
MROTC Site	Y	Y	Y	Y	Y	Y
BNSF Site	N	Y	Y	N	Y	Y
East Side Reuse	N	Y	Y	N	Y	Y

Green Y = meets selection standard; Red N = does not meet selection standard.

2.3 Alternatives Eliminated from Further Consideration

2.3.1 Former Burlington Northern Santa Fe (BNSF) Railyard site

Tinker AFB acquired the former BNSF Railyard site in 2015. This site is included as a part of Tinker AFB property and is the site of the KC-46 Pegasus campus currently under development. The KC-46 campus construction started in 2014 and is a series of construction projects that will overlap until approximately 2030. The west side of the KC-46 campus is reserved for the future growth of the KC-46 mission. If the space were utilized for the B-21, there would be a high likelihood that any growth in either mission would result in a displaced second campus, causing inefficiencies through the lost synergy of a consolidated campus.

2.3.2 East Side Reuse Site

This site is an existing maintenance operations area for B-1 and other aircraft immediately to the east of the airfield that includes the ramp area surrounding buildings 2122 and 2121. The existing maintenance operations in this area include aircraft disassembly, cleaning, depainting, painting, electrical, and other heavy maintenance work. This site was eliminated from further consideration because this area currently conducts maintenance on the B-1 aircraft. Although the B-21 would eventually replace the B-1 fleet, there would be operational overlap for the foreseeable future. Therefore, this space would still be required for B-1 maintenance and could not be repurposed for the proposed B-21 mission.

2.4 Alternative 1 – DLA Site

The DLA alternative site is located west of runway 13/31 as shown in **Figure 2-1** and **Figure 2-2**. The DLA site would contain the majority of the B-21 program including aircraft bays, taxiways, taxi lanes, aircraft parking apron space, aircraft fuel/defuel parking positions, aircraft run-up parking positions, and personal vehicle access/parking. Two supporting facilities, a parts warehouse and administrative office space, would be developed within two separate existing buildings separated from the main DLA site.

Under this alternative, the existing DLA warehouse campus would need to be removed and relocated. In addition, a portion of the 507th parking area would be relocated, and miscellaneous utility lines and small structures would be removed.

The DLA site alternative would require construction of paved area over an existing closed landfill. Landfill Number 5 occupies approximately 5 acres of surface area and contains approximately 75,000 cubic yards of industrial and general waste. Landfill Number 5 is located on the proposed DLA site and is bound by Tower Road on the west, Taxiway E to the south, and Crutcho Creek to the north and east. No occupied structures are proposed to be constructed over the closed landfill area.

The DLA site falls extensively in a floodplain area. Construction on the site to support the proposed B-21 campus would require the modification or removal of jurisdictional wetland area, modification and/or removal of a stormwater detention basin, and removal or modification of a portion of an existing perennial stream. To support construction at the DLA site, mature tree stands and vegetation that cover portions of the proposed site would need to be cleared. The

current topography of the DLA site would require several areas to be graded, cut, and filled to provide land capable of supporting construction. Up to 300,000 cubic yards of fill material would be required to create an even grade. Due to the proposed site development affecting existing floodplains, wetlands, and other resources, mitigation would be required to prevent significant impacts from occurring. Additional details regarding these impacts and required mitigations are presented in **Section 3**.

Construction – Under Alternative 1, the site shown in **Figure 2-2** (currently used as a DLA storage area) would be redeveloped to accommodate new facilities in support of the proposed B-21 depot maintenance mission. New construction would consist of aircraft environmental shelters, new pavements for aircraft apron, vehicle parking, taxiway connection, and engine test run-up pad, in addition to other supporting infrastructure as needed. Because a specific site layout has not yet been developed, it is assumed that the entire area noted as DLA site (Alternative 1) on **Figure 2-2** would be redeveloped into 100 percent impervious surface. The proposed construction at the DLA site would result in a total of 74 acres of developed and impervious surface, which is a net increase of 30 acres of impervious developed surface over current site conditions.

Figure 2-2. Alternative 1 – DLA site at Tinker AFB

A new DLA warehouse storage displaced by the Proposed Action at the DLA site under Alternative 1 would need to be constructed in a new location on Tinker AFB. A 200,000-square foot warehouse storage building would be constructed on a current vacant grassy area as indicated in **Figure 2-2** and **Figure 2-3**. The site selected for relocation of the DLA warehouse was chosen for its proximity to a planned future truck gate, which is not part of this Proposed Action. Other existing "gray" space was considered for the replacement DLA warehouse site, but there is no available gray space on Tinker AFB large enough to host the replacement warehouses.

Figure 2-3. DLA Storage Replacement Site Existing Conditions

Construction of the B-21 maintenance depot campus would occur in fiscal year (FY) 2025 and would last through FY 2040. Construction for the DLA warehouse replacement would begin in FY 2024 and last through FY 2025.

Demolition – In order to implement the Proposed Action at the DLA site (Alternative 1), existing buildings would need to be demolished to make room for the proposed development. The buildings to be demolished consist primarily of old DLA open storage buildings known as "pole barns." These storage buildings are metal-sided, pole-supported storage buildings that are open on one side as depicted in **Figure 2-4**.

Figure 2-4. Example Pole Barn Building

Table 2-2 summarizes the demolition that would take place to support construction at the DLA site alternative. Although some of the buildings listed in **Table 2-2** are older than 50 years, none are considered eligible for listing on the National Register of Historic Places (NHRP).

Table 2-2. Building Demolition Associated with the DLA Site (Alternative 1)

Structure Name	Year Built	Square Feet
Reserve Forces Operational Training	1991	825
Supply Shed	1955	66,177
Supply Shed	1955	71,860
Supply Shed	1992	12,000
Supply Shed	1987	17,193
Supply Shed	1987	14,399
Administrative Office	1990	2,824
Supply Shed	1987	18,490
Hazardous Materials Storage	1990	27,944
Warehouse Supply	1990	9,998
Total Square Feet of Building		**242,710**

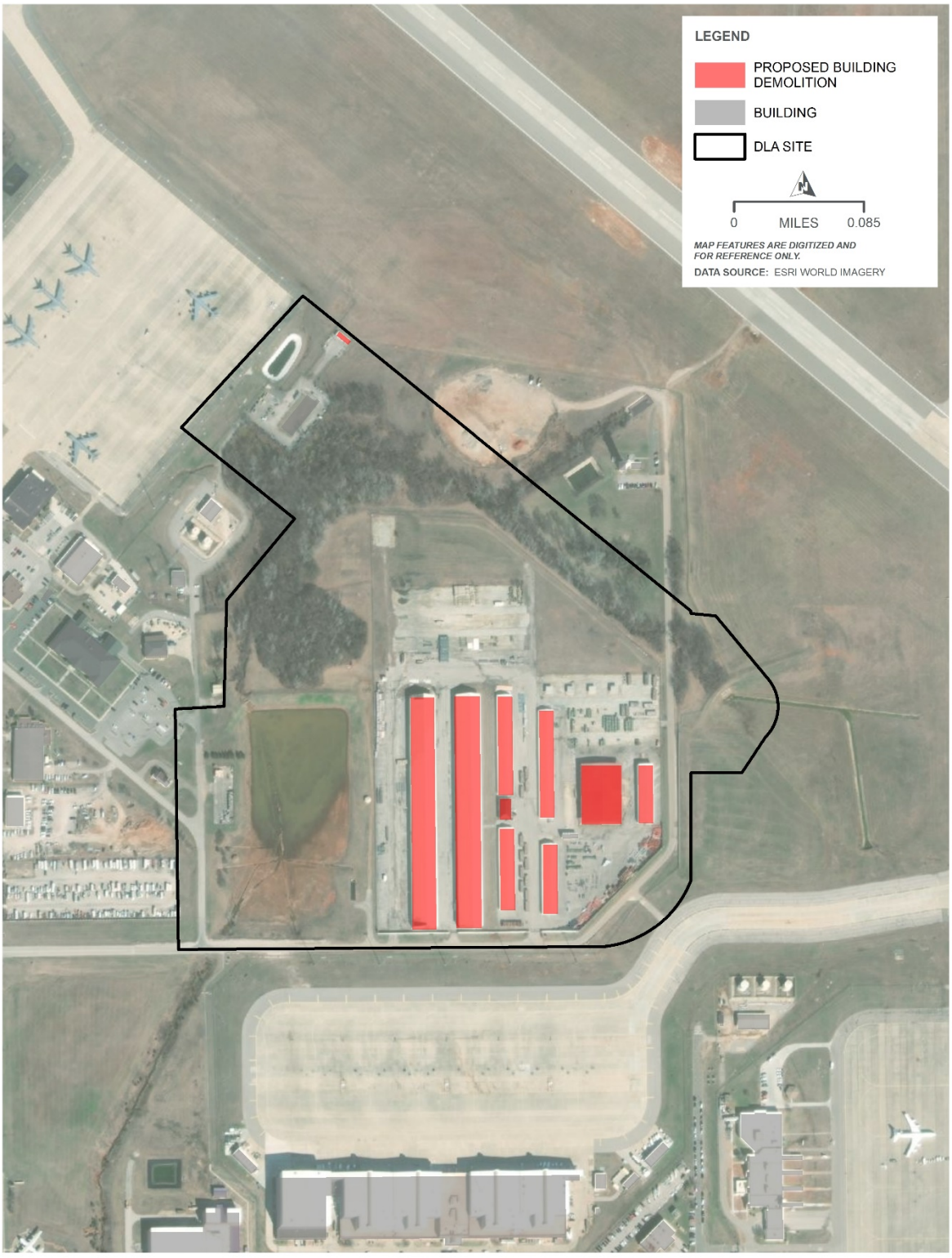


Figure 2-5. Proposed Building Demolition at the DLA Site Alternative

Renovation – The Proposed Action includes partial renovation of an existing building on the south side of the installation to create administrative office space. An additional existing building on the north side of Tinker AFB also would be renovated for use as a parts warehouse specific to the needs of the B-21 depot maintenance program. Renovation of these two buildings to support the B-21 maintenance depot Proposed Action would maximize the use of existing space that does not need to be located contiguous to the proposed B-21 maintenance facilities. Renovation of the two facilities would result in reuse of 40,000 square feet of parts storage space and 300,000 square feet of administrative space. Neither existing building is considered eligible for listing on the NRHP.

Personnel – Alternative 1 includes an increase of 800 personnel to support B-21 depot maintenance operations. It is assumed that this number is a mix of civilian and military personnel. It also is assumed that each employee would include 1.5 dependents who would live off-installation in existing available housing. The average commute distance to Tinker AFB is 50 miles, and it is assumed that each new employee would commute to Tinker AFB in a privately owned vehicle. A temporary increase in on-installation construction personnel also would occur. During the years of construction 2025–2040, it is assumed that 175 construction personnel would commute daily to Tinker AFB from off-installation. It also is assumed that construction personnel already live and commute to and from worksites in the Oklahoma City region.

Aircraft Operations – An estimated 12 B-21 aircraft would be serviced at Tinker AFB per year based on fleet size. The Proposed Action would include up to five takeoffs and landings (i.e., 10 operations) per month during the daytime hours of 7 a.m. to 10 p.m. In addition, engine test run-ups would occur at a newly constructed engine test area for 11 hours per month based on the expected monthly throughput of B-21 aircraft.

The B-21 fleet would operate within Military Training Routes and other existing airspace areas already designated for military flight operations conducted into and out of Tinker AFB. No changes to airspace configurations (i.e., size, shape, or location) are proposed or would be required to support the implementation of the Proposed Action.

Aircraft Maintenance Operations – Aircraft maintenance operations would include the overhaul, upgrading, or rebuilding of parts, assemblies, or subassemblies, and the testing and reclamation of equipment as necessary.

Utilities – Because a majority of the Proposed Action elements would be implemented in areas of Tinker AFB that are already built up and used for similar purposes, all required utility connections already exist. Minor trenching and/or rerouting of existing utilities may be required based on site-specific layouts. However, such trenching and rerouting would occur in areas already disturbed with pavements, maintained open space (i.e., grassy medians or other open areas), or existing buildings. A 750-kW generator would be installed to supply backup power in case of power outage.

2.5 Alternative Site 2 – MROTC Site

The MROTC is located east of Tinker AFB as seen in **Figure 2-5**. The site is bordered by Douglas Boulevard and Tinker AFB to the west, SE 59th Street to the south, Landfill Number 6

to the southeast, and an Army Reserve Center to the north. A small cemetery is located immediately east of the MROTC site on SE 59th Street.

The MROTC site is approximately 133 acres and is owned by Oklahoma Industries Authority, who granted a long-term lease to MROTC Development Partner, which expires in 2055. MROTC Development Partner subleased this parcel to Boeing for a period of 17 years with the term expiring in 2023. Boeing, in turn, has subleased facility space to the USAF for current and future depot maintenance activities. Of the 133 acres, approximately 48 acres are currently developed, including 156,254 square feet of hangar space and administrative area (three hangars and one common space building) and a 283,000-square foot aircraft operations ramp. This real estate lease is currently ongoing as part of general support at Tinker AFB and is not connected to this proposed action. As with the DLA site, the MROTC site also contains some floodplain areas.

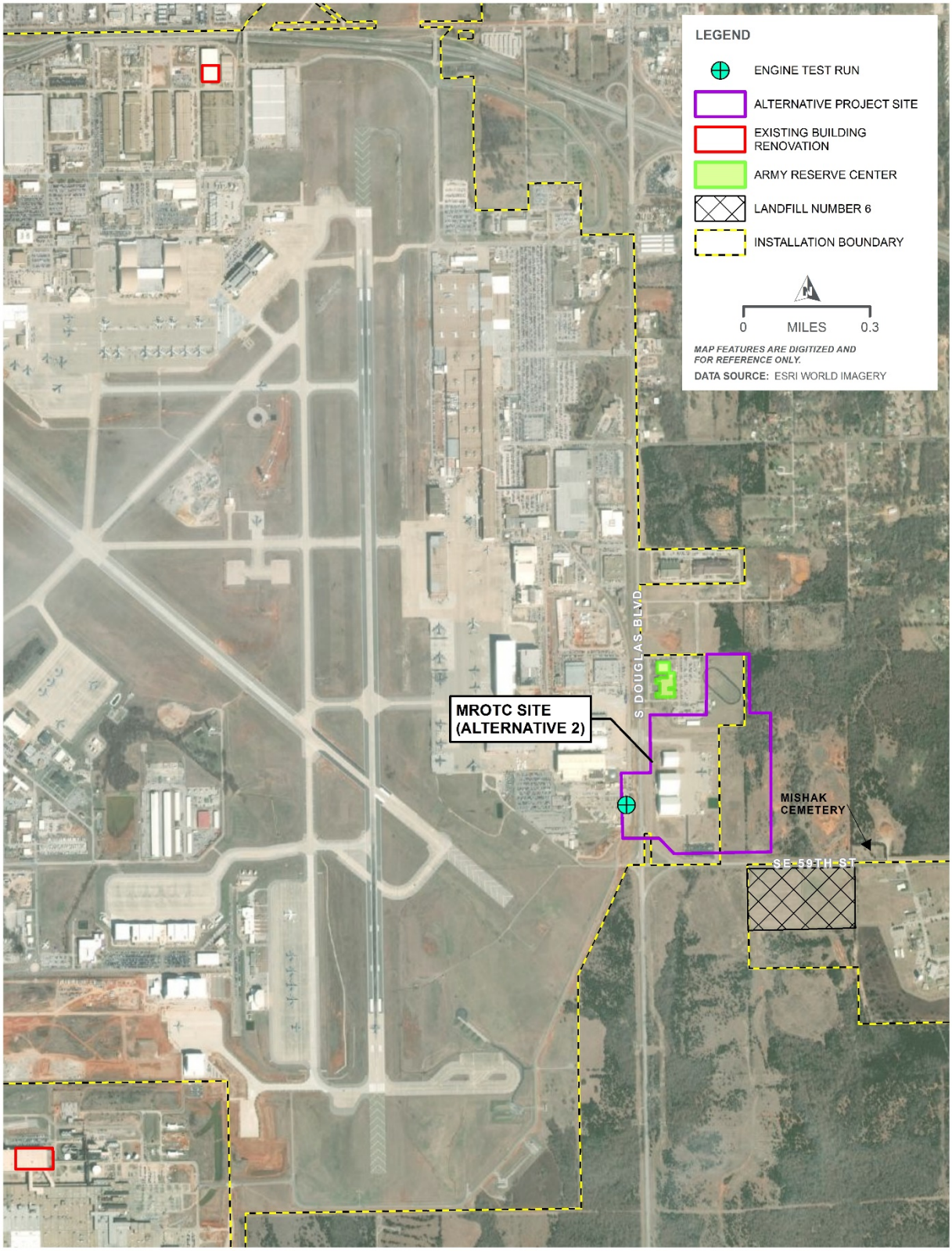


Figure 2-6. Alternative 2 – MROTC site at Tinker AFB

The B-21 mission would require acquisition of the parcel currently leased by USAF and acquisition of an additional 80 acres as security buffer to the east. Oklahoma City is proposing a permanent closure of Douglas Boulevard and a portion of SE 59th St, both adjacent to the MROTC site, in a separate action. While the city's road closure proposal is not part of Alternative 2, the closure of these roads would create synergy between the MROTC site and the main facilities located along the flight line of Tinker AFB. Analysis of the potential cumulative effects between the city's road closure proposal and Alternative 2 are accounted for in **Section 4.2**. Specific elements of Alternative 2 are presented as follows.

Construction – Under Alternative 2, existing hangars and other facilities would be reused to the extent possible. Aircraft parking ramp space would be expanded and new space connected to the MROTC site would be constructed for an engine test run-up area that would be located on what is now Douglas Boulevard. The exact site layout is not currently available. However, up to approximately 28 acres of new impervious surface would be developed at the MROTC site under Alternative 2, resulting in up to approximately 76 developed acres of impervious surface.

Demolition – No demolition would be required other than the incidental demolition of existing pavements that might be needed to accommodate site reconfiguration.

Renovation – Renovation would be the same as described under Alternative 1.

Personnel – Personnel increases or changes would be the same as described under Alternative 1.

Aircraft Operations – Aircraft operations would be the same as described under Alternative 1.

Aircraft Maintenance Operations – Aircraft maintenance operations would be the same as described under Alternative 1.

Utilities – Utilities would be the same as described under Alternative 1.

2.6 No Action Alternative

CEQ and USAF NEPA regulations require the alternatives analyzed include the "No Action" alternative even if, by law, USAF must implement the Proposed Action. In the case of the B-21 depot maintenance activation, the No Action Alternative provides a baseline of the environmental conditions existing at Tinker AFB and provides a benchmark, enabling the USAF decision maker to compare the magnitude of environmental effects between all the alternatives. Under the No Action Alternative, the B-21 aircraft would not be brought to Tinker AFB for depot-level maintenance operations. USAF would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any property acquisitions occur at Tinker AFB to accommodate the new mission requirement for the B-21 maintenance operations.

3. Affected Environment and Environmental Consequences

All potentially relevant resources were initially considered for analysis in this EA. **Sections 3.1** through **3.11** present the existing environmental conditions and potential environmental impacts for the following resource categories: air quality, biological resources, geology and soils, hazardous materials and wastes, health and safety, infrastructure and utilities, noise, socioeconomics, cultural resources, water resources, and land use.

In compliance with NEPA, CEQ, and EIAP 32 CFR § 989 guidelines, **Section 3** of this document focuses only on the resources considered potentially subject to impacts from the alternatives to the Proposed Action, including the No Action Alternative. Resource categories that have been eliminated from further detailed study in this document and the rationale for eliminating them are presented below.

Airspace Management. Though the Proposed Action entails transit of a new aircraft to and from the installation, the projected annual number of flights would not appreciably add to air traffic or affect airspace management in the region, and the required transit flights would not change the type and conduct of flight operations normally conducted out of the installation. It is estimated that B-21 depot activities would only include five takeoffs and landings (i.e., 10 operations) per month, which would not result in a significant increase in total flying hours. Additionally, the Proposed Action would not reconfigure or affect use of the existing airspace. Therefore, further consideration and analysis of impacts on airspace are not included in this EA.

3.1 Air Quality

3.1.1 Definition of the Resource

Air pollution is the presence in the atmosphere of one or more contaminants (e.g., dust, fumes, gas, mist, odor, smoke, and vapor) such as to be injurious to human, plant, or animal life. Air quality as a resource incorporates several components that describe the levels of overall air pollution within a region, sources of air emissions, and regulations governing air emissions. The following sections include a discussion of the existing conditions, a regulatory overview, and a summary of climate change and greenhouse gases (GHG).

The United States Environmental Protection Agency (USEPA) Region 6 and Oklahoma Department of Environmental Quality (ODEQ) regulate air quality in Oklahoma. The CAA (42 U.S. Code [U.S.C.] 7401-7671q), as amended, assigns the USEPA responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (PM) (measured as both particulate matter less than 10 microns in diameter [PM10] and particulate matter less than 2.5 microns in diameter [PM2.5]), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb) (see **Table 3-1**). Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to

chronic health effects. While each state has the authority to adopt standards stricter than those established under the federal program, Oklahoma accepts the federal standards.

Table 3-1. National Ambient Air Quality Standards

Pollutant	Air Quality Standard	
	Level	**Averaging Period**
CO		
1-hour (ppm)	35	Not to be exceeded more than once per year
8-hour (ppm)	9	
NO_2		
1-hour (ppb)	100	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
O_3		
8-hour (ppm)	0.070	3-year average of the fourth highest daily maximum
SO_2		
1-hour (ppb)	75	99th percentile, averaged over 3 years
3-hour (ppb)	0.5	Not to be exceeded more than once per year
$PM_{2.5}$		
24-hour ($\mu g/m^3$)	35	98th percentile, averaged over 3 years
Annual mean ($\mu g/m^3$)	12	Averaged over 3 years
PM_{10}		
24-hour ($\mu g/m^3$)	150	Not to be exceeded more than once per year over 3 years
Pb		
Rolling 3-month average ($\mu g/m^3$)	0.15	Not to be exceeded

Source: USEPA 2020a
ppm = parts per million; ppb = parts per billion; $\mu g/m^3$ = micrograms per cubic meter

3.1.2 Existing Conditions

Federal regulations designate areas in violation of the NAAQS as nonattainment and areas with levels below the NAAQS as attainment. Oklahoma County is within Air Quality Control Region 184, which USEPA has designated as an attainment area for all criteria pollutants (USAF 2018a). Because the Proposed Action is within an area that is in full attainment for the NAAQS, the general conformity rule does not apply.

Tinker AFB is a major source of air emissions and currently operates under Title V Permit No. 2009-394-TVR2, which expires on September 1, 2021. Emissions on base are primarily from the maintenance of aircraft, including the use of solvents, paint stripping, surface coating, jet engine testing, fuel tanks, boilers, and emergency generators. **Table 3-2** lists Tinkers AFB's facility-wide air emissions from all significant stationary sources.

Table 3-2. 2018 Emissions for Significant Stationary Sources at Tinker AFB

Pollutant	Emissions (tpy)
CO	105.3
NO_x	121.7
Volatile organic compounds (VOCs)	467.3
PM_{10}	12.9
$PM_{2.5}$	9.4
SO_x	11.1

Source: USAF 2018a
tpy = tons per year

Climate and Greenhouse Gasses. Tinker AFB's average high temperature is 93.1 degrees Fahrenheit (°F) in the hottest month of July and the average low temperature is 26.2°F in the coldest month of January. Tinker AFB has average annual precipitation of 35.9 inches per year. The wettest month of the year is May with an average rainfall of 5.4 inches (IDcide 2020).

GHGs are components of the atmosphere that trap heat relatively near the surface of the earth, and therefore, contribute to the greenhouse effect and climate change. Most GHGs occur naturally in the atmosphere, but increases in their concentration result from human activities such as the burning of fossil fuels. Global temperatures are expected to continue to rise as human activities continue to add CO_2, methane, nitrous oxide, and other greenhouse (or heat-trapping) gases to the atmosphere. Whether or not rainfall will increase or decrease remains difficult to project for specific regions (USEPA 2016) and (IPCC 2014).

EO 13834, *Efficient Federal Operations,* outlines policies intended to ensure that federal agencies meet such statutory requirements in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment. The EO specifically requires agencies within the DoD to measure, report, and reduce their GHG emissions from both their direct and indirect activities.

3.1.3 Environmental Consequences

This section discusses the effects of the proposed action on air quality and climate change. Effects on air quality would be considered significant if the action would create emissions greater than the significance indicator values presented in the tables below, or it would contribute to a violation of any federal, state, or local air regulation. Effects on climate change would be significant if the action meaningfully contributed to the potential effects of global climate change.

3.1.3.1 ALTERNATIVE 1 – DLA SITE

Alternative 1 would have short- and long-term, minor, adverse effects on air quality. Short-term effects would be due to fugitive dust and equipment exhaust generated by heavy equipment during construction and demolition. Long-term effects would be due to increases in aircraft operations, ground support equipment, aircraft maintenance, new personnel, and heating of proposed buildings at Tinker AFB.

Because all components of Alternative 1 are within an area that is in full attainment for the NAAQS, the general conformity rules do not apply. A Record of Air Analysis (ROAA) is in

Appendix B. The threshold indicators for significance under existing USAF policy are the thresholds of 250 TPY. Alternative 1 would not create emissions greater than the threshold values or lead to a violation of any federal, state, or local air regulation. Consistent with Air Force policy, the ROAA uses 250 TPY as a significance indicator for NEPA Air Quality Analysis since Tinker is located in an area that is attainment for all criteria pollutants.

The Air Force's Air Conformity Applicability Model (ACAM) was used to estimate emissions from Alternative 1. **Table 3-3** lists total direct and indirect emissions resulting from Alternative 1. These emission estimates include construction and demolition, aircraft operations, ground support equipment, aircraft maintenance, additional vehicles driven by new personnel, heating of proposed buildings, back-up generators and a paint booth. Emissions from Alternative 1 would be below the *de minimis* thresholds for all criteria pollutants, and effects would be minor. ACAM output files containing detailed emissions calculations are included in **Appendix B**.

Table 3-3. Annual Emissions Compared to *De Minimis* Thresholds – DLA Alternative

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Significance Indicator [tpy]	Exceeds Significance Indicator? [Yes/No]
Construction/Demolition	15.2	20.0	6.5	<0.1	34.4	0.8	250	No
Operations	31.0	34.4	6.4	1.7	4.3	3.0	250	No

Source: USAF 2018b
Notes: NO_x and VOCs are precursors to O_3.
Lead is not a pollutant of concern for the proposed action.

For purposes of this analysis, it was assumed that all construction and demolition activities would be compressed into a single 12-month period. Therefore, regardless of the ultimate implementation schedule (currently slated to span a 15-year period), annual emissions would be less than those specified herein. In addition, operational emissions would increase over time as the complex was developed. Small changes in facilities site and ultimate design, and moderate changes in quantity and types of equipment used would not substantially change these emission estimates and would not change the determination under the general conformity rule or level of effects under NEPA. Notably, the emissions for all criteria pollutants would be below the *de minimis* thresholds; therefore, the general conformity rule would not apply regardless of any changes in the attainment status of the region for any criteria pollutant.

Regulatory Review. The proposed facilities would include a 750-kW generator, and may include additional stationary sources of air emissions such as boilers, degreasers, and a paint booth. The exact make, model, and size of these emission sources are unknown at this time; however, they would be reviewed on a case-by-case basis, and would be added to the installation-wide Title V air permit as necessary. It is possible that other minor new stationary sources may become necessary. Any new stationary sources of air emissions would fully comply with ODEQ permitting requirements. Permitting scenarios would vary based on the final design and the timing of the projects. During the permitting process, however, either (1) the actual equipment, controls, or operating limitations of new sources of air emissions would be selected to reduce emissions below the major modification threshold, or (2) the permitting process would ensure that the NAAQS are not exceeded. This would ensure the projects (both

individually and collectively) would not interfere with the ability of the state to maintain air quality in accordance with the NAAQS. This permitting approach is inherent to federal and state air regulations and leads to a forced preservation of clean air in attainment regions. Therefore, regardless of the ultimate permitting scenario, effects would be less than significant.

In addition, the Oklahoma Administrative Code outlines other non-permitting requirements, such as controlling fugitive dust and open burning. All persons responsible for any operation, process, handling, transportation, or storage facility that could result in fugitive dust would take reasonable precautions to prevent such dust from becoming airborne. Reasonable precautions might include using water to control dust from road grading or land clearing. Alternative 1 would proceed in full compliance with current ODEQ requirements with compliant practices and products.

Greenhouse Gases and Climate Change. This EA examines GHGs as a category of air emissions. It also looks at issues of temperature and precipitation trends to determine if the Proposed Action would be affected by climate change. This EA does not attempt to measure the actual incremental effects of GHG emissions from the Proposed Action. There is a lack of consensus on how to measure such effects. Existing models have substantial variation in output, and do not have the ability to measure the actual incremental effects of a project on the environment. There are also no established criteria identifying monetized values that are to be considered significant for NEPA purposes.

Small increases in GHG emissions from Alternative 1 would primarily come from the fuel used during B-21 run-up activities but would not meaningfully contribute to the potential effects of global climate change. **Table 3-4** compares the estimated annual GHG emissions from Alternative 1 to the annual global, nationwide, statewide, and installation wide GHG emissions. The estimated operational GHG emissions from Alternative 1 would be relatively small in comparison to global, national, state, and installation GHG emissions, so the effects would be negligible. Alternative 1 would have 32 percent more GHG emissions than Alternative 2 because of the increased level of construction and demolition.

Table 3-4. GHG Emissions - Proposed Action

Scale	CO_2e Emissions (MMT)	Change from Alternative 1
Global	43,125	0.000032%
United States	6,870	0.0002%
Oklahoma	101.4	0.01%
Tinker AFB Wide	0.081	0.17%
Alternative 2	0.010	(32%)
Alternative 1	**0.014**	**-**

Sources: USEIA 2018, USEPA 2020b
Note: MMT = million metric tons CO_2e = carbon dioxide equivalent)

Climate Change Adaptation and Resilience. **Table 3-5** outlines potential climate stressors and their effects on the Proposed Action. The B-21 maintenance activities at Tinker AFB in and of themselves are only indirectly dependent on any of the elements associated with future climate scenarios (e.g., meteorological changes). At this time, no future climate scenario or

potential climate stressor would have appreciable effects on any element of Alternative 1, including the B-21 maintenance and associated air operations.

Table 3-5. Effects of Potential Climate Stressors on the Proposed Action

Potential Climate Stressor	Effects on the Proposed Action
Changing stream flow and snow melt	negligible
Longer fire seasons and more severe wildfires	negligible
Changes in precipitation patterns	negligible
Increased in temperature	negligible
Harm to water resources, agriculture, wildlife, ecosystems	**negligible**

Source: NCA 2014

3.1.3.2 ALTERNATIVE 2 – MROTC SITE

Alternative 2 would have similar short- and long-term, minor, adverse effects on air quality as Alternative 1. Short-term effects would be due to fugitive dust and equipment exhaust generated by heavy equipment during construction. Long-term effects would be due to increases in aircraft operations, ground support equipment, aircraft maintenance, new personnel, and heating of proposed buildings at Tinker AFB. Permitting requirements and applicable regulations and guidelines would be the same as those outlined under Alternative 1.

As with Alternative 1, Alternative 2 is within an area that is in full attainment with the NAAQS, and the general conformity rule does not apply. **Table 3-6** lists total direct and indirect emissions resulting from Alternative 2. The total construction and change in building area would be less than outlined under Alternative 1, subsequently both construction and operational emissions would be less. As with Alternative 1, Alternative 2 would not create emissions greater than the significance indicator threshold values, or lead to a violation of any federal, state, or local air regulation; therefore effects would be minor.

Table 3-6. Annual Emissions Compared to *De Minimis* Thresholds – MROTC Alternative

Activity/Source	CO	NO_x	VOC	SO_x	PM_{10}	$PM_{2.5}$	Significance Indicator [tpy]	Exceeds Significance Indicator? [Yes/No]
Construction/Demolition	6.0	6.2	3.6	<0.1	12.4	0.3	250	No
Operations	29.4	32.9	6.3	1.7	4.2	2.9	250	No

Source: USEPA 2020b.
Notes: NOx and VOCs are precursors to O3.
Lead is not a pollutant of concern for the proposed action.

Like Alternative 1, small increases in GHG emissions from Alternative 2 would primarily come from the fuel used during B-21 run-up activities, but would not meaningfully contribute to the potential effects of global climate change. **Table 3-5**, above compares the estimated annual GHG emissions from Alternative 2 to the global, nationwide, statewide, and installation wide annual GHG emissions. GHG emissions from Alternative 2 would be 32 percent less than Alternative 1 because of the reduced level of construction and no demolition. As with Alternative

1, and for similar reasons, no future climate scenario or potential climate stressor would have appreciable effects on any element of the Alternative 2, including the B-21 maintenance and associated air operations. These effects would be negligible.

3.1.3.3 NO ACTION ALTERNATIVE

The No Action Alternative would have no effects on air quality at Tinker AFB. There would be no short-term increases in emissions from construction and demolition, or long-term increases in aircraft maintenance, operations, or personnel. Ambient air quality would remain unchanged when compared to existing conditions.

3.2 Biological Resources

3.2.1 Definition of the Resource

Biological resources include native or naturalized plants and animals and the habitats (e.g., grasslands, forests, wetlands) in which they exist. Protected and sensitive biological resources include ESA listed species (threatened or endangered) and those proposed for ESA-listing as designated by the USFWS (terrestrial and freshwater organisms). Migratory birds are protected species under the Migratory Bird Treaty Act (MBTA). Sensitive habitats include those areas designated or proposed by USFWS as critical habitat protected by the ESA and as sensitive ecological areas designated by state or other federal rulings. Sensitive habitats also include wetlands, plant communities that are unusual or limited in distribution, and important seasonal use areas for wildlife (e.g., migration routes, breeding areas, crucial summer and winter habitats).

The ESA (16 USC § 1531 et seq.) establishes a federal program to protect and recover imperiled species and the ecosystems upon which they depend. The ESA requires federal agencies, in consultation with USFWS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. Under the ESA, “jeopardy” occurs when an action is reasonably expected, directly or indirectly, to diminish numbers, reproduction, or distribution of a species so that the likelihood of survival and recovery in the wild is appreciably reduced. An “endangered species” is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined by the ESA as any species likely to become an endangered species in the foreseeable future. The ESA also prohibits any action that causes a “take” of any listed animal. “Take” is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.” Listed plants are not protected from take, although it is illegal to collect or maliciously harm them on federal land. Section 7 of the ESA, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. The USAF is currently consulting with USFWS under Section 7 of the ESA and will update this EA as consultation progresses. No decision based on this EA would be made until the successful completion of any required Section 7 consultation. Materials supporting the Section 7 consultation process are contained in **Appendix F**.

Critical habitat is designated if USFWS determines that the habitat is essential to the conservation of a threatened or endangered species. Federal agencies must ensure that their activities do not adversely modify designated critical habitat to the point that it will no longer aid in the species' recovery.

The MBTA of 1918 (16 USC 703–712), as amended, and EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds, require federal agencies to minimize or avoid impacts on migratory birds. Unless otherwise permitted by regulations, the MBTA makes it unlawful to (or attempt to) pursue, hunt, take, capture, or kill any migratory bird, nest, or egg. Federal agencies with activities that could have measurable negative impacts on migratory birds are directed by EO 13186 to develop and implement a Memorandum of Understanding with USFWS to promote the conservation of migratory bird populations.

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA), which prohibits the "take" of bald or golden eagles in the United States without a permit under 50 CFR § 22.26. BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." For purposes of these guidelines, "disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause: (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

The Federal Noxious Weed Act (Public Law [P.L.] 93-629) mandates control of noxious weeds by limiting possible weed seed transport from infested areas to noninfested sites. EO 13112, Invasive Species, requires all Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize their economic, ecological, and human health impacts. Under EO 13112, installations shall not, to the extent practicable, authorize, fund, or carry out management actions that are likely to cause the introduction or spread of invasive species.

3.2.2 Existing Conditions

Tinker AFB occurs along the eastern edge of the Central Great Plains Ecoregion near the Cross Timbers Ecoregion (Woods et al. 2005). Because Tinker AFB occurs within an ecotone (transition between two biological communities) between the eastern deciduous forest and the western prairie grasslands, the vegetation is a mixture of a tallgrass prairie species and woody tree species. Much of the natural habitat has been converted into cropland and rangeland with woody vegetation encroaching into the relic grassland areas (Tinker AFB 2019a). Historically, tallgrass species such as big bluestem (*Angropogon gerardii*), indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*) were dominant in bottomland habitats while little bluestem (*Schizachyrium scoparium*), grama grass (*Bouteloua* spp.), and buffalo grass (*Bouteloua dactyloides*) were more dominant in upland areas. Woody vegetation would have been primarily isolated in bottomland areas associated with riparian corridors. Tree species found in the bottomland areas would have included elm (*Ulmus* spp.), ash (*Fraxinus* spp.),

sugarberry (*Celtis laevigata*), oak (*Quercus* spp.), walnut (*Juglans* spp.), cottonwood (*Populus deltoides*), and willow (*Salix* spp.). Woody shrub species would have included sumac (*Rhus* spp.), coralberry (*Symphoricarpos orbiculatus*), lead plant (*Amphora canescens*), green briar (*Smilax bona-nox*), roughleaf dogwood (*Cornus drummondii*), and buttonbush (*Cephalanthus occidentalis*) (Tinker AFB 2019a). Precipitation levels in this ecoregion increases eastward, ranging from 22 to 38 inches annually (Woods et al. 2005).

Tinker AFB and the surrounding suburban area outside of Oklahoma City are heavily urbanized with limited unimproved open space. As classified within the 2019 Tinker AFB Integrated Natural Resources Management Plan (INRMP) (Tinker AFB 2019a), the airfield and adjacent areas of Tinker AFB is covered mostly by fescue (*Festuca* spp.) and other nonnative grasses. Within areas that have been converted to urban and industrial use, the plant community is comprised primarily of turf grasses and ornamental trees and shrubs. The predominant turfgrass on Tinker AFB is exotic Bermuda grass (*Cynodon dactylon*). Native buffalograss is often found mixed with Bermuda grass. Other more rural areas are typically a mixture of nonnative and native plants. Other common vegetation community types are mixed native prairie and prairie restoration areas, old world bluestem (*Bothriochloa bladhii*) nonnative grassland, and mixed native shrubland (Tinker AFB 2014b).

The proposed DLA alternative is a 41.5-acre site largely composed of urban paved or developed land but also has areas of broomsedge bluestem (*Andropogon virginicus*), annual ragweed (*Ambrosia artemisiifolia*), Canadian horseweed (*Conyza canadensis*), Eastern Ruderal Grassland Alliance, improved turf and mixed non-native vegetation, with a 12-acre stand of pecan, cedar, elm, and sugarberry mixed forest. Within the mixed forest is a jurisdictional wetland and perennial stream, as well as a detention pond on the western portion of the site. Wetlands are discussed further in **Section 3.10.2**. The 133-acre MROTC site contains 48 acres of developed area. The remaining 85 acres of undeveloped land at the MROTC site is mapped as warm-season open lawn and recreational open lawn vegetation. This area is comprised of semi-improved non-native and native grass species such as crabgrass (*Digitaria* sp.) and bluegrass (*Poa* sp.).There is an additional 80 acres adjacent to the site proposed for acquisition that is composed of mixed nonnative and native grasslands as well as mixed forested areas. The analysis of the land acquisition was covered under a separate action. Vegetation community types found on the DLA and MROTC sites are described in **Table 3-7**. **Figure 3-1** shows the identified vegetation communities on Tinker AFB and the proposed project areas.

Table 3-7. Vegetation Communities within the DLA and MROTC Sites

Vegetation Type	Area (Acres)	Percent Cover
DLA and Warehouse Site		
Urban	33.05	42.5
Broomsedge Bluestem - Annual Ragweed - Canadian Horseweed Eastern Ruderal Grassland Alliance	20.73	26.6
Pecan - Cedar Elm - Sugarberry Floodplain Forest Alliance	12.11	15.6
Warm-Season Open Lawn Cultural Subgroup	8.66	11.1
Silver bluestem - Canada Goldenrod - Sunflower Ruderal Herbaceous Alliance	3.26	4.2
Total:	**77.81**	**100**
MROTC Site		
Urban	46.89	59.8
Warm-Season Open Lawn Cultural Subgroup	28.73	36.6
Recreational Open Lawn	2.81	3.6
Total:	**133***	**100**

Notes: * Total acreage includes the land acquisition on the eastern boundary of the installation.

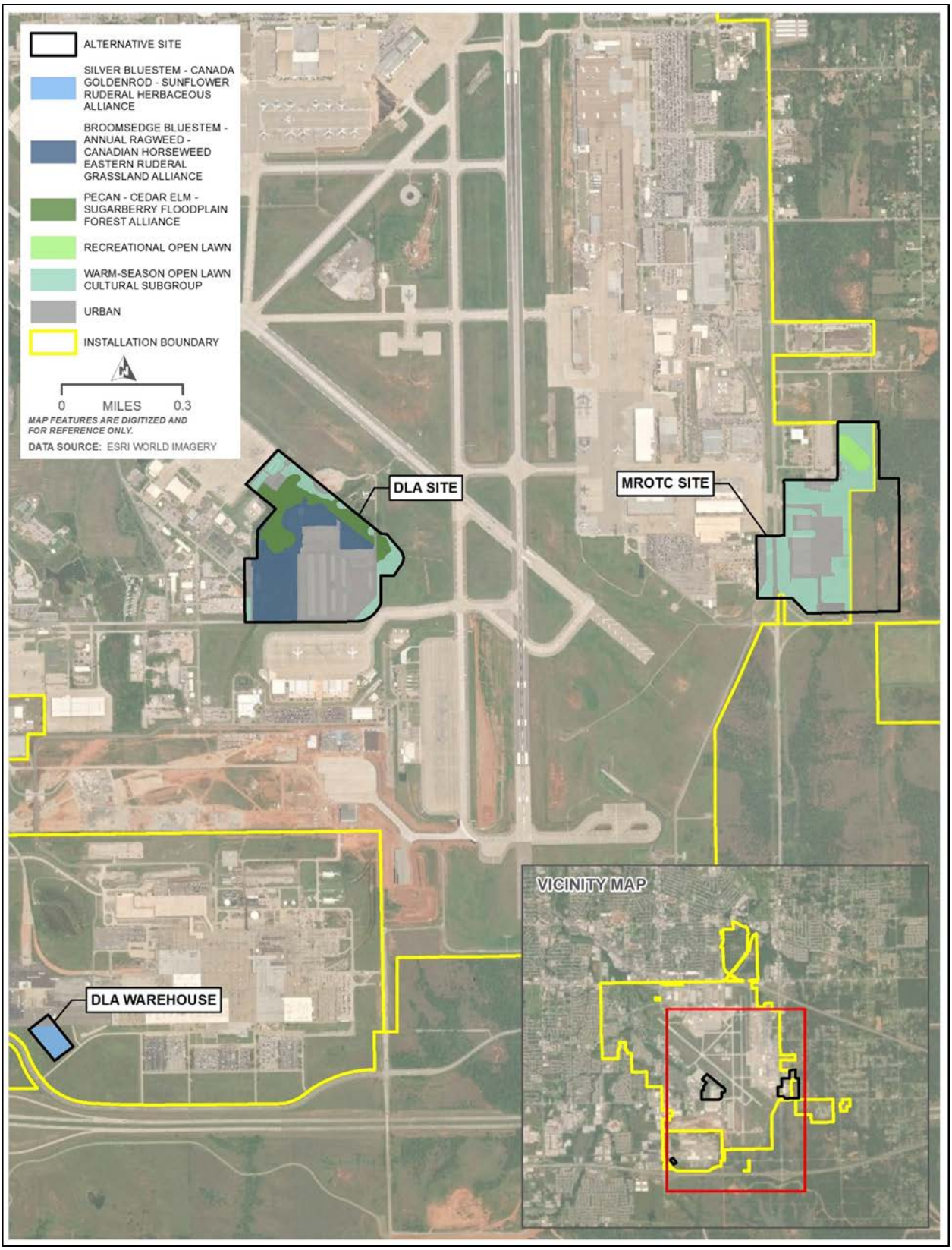


Figure 3-1. Vegetation Communities within the DLA and MROTC Sites.

Green Infrastructure. To promote and support many of its missions, Tinker AFB has created a Green Infrastructure (GI) network, defined by the Natural Resources Program as "an interconnected network of waterways, wetlands, woodlands, grasslands, and other natural areas of base-wide significance" (Tinker AFB 2019a). The purpose of the GI is to create a system of natural areas both on and off Tinker AFB property connected by undisturbed habitat corridors. Benefits of a GI system to Tinker AFB include pollution control, increased military readiness by providing natural environments for training, reduction of potential property damage in the event of a 100-year flood event, enhancing the natural aesthetics of the base, increasing the wellness of base personnel by providing green areas for relaxation and recreation, and providing undisturbed habitat to wildlife on base. Based on the 2014 Tinker AFB INRMP, the GI area covered 1,033 acres of Tinker AFB, or 21 percent of the total base land area (Tinker AFB 2014b). Current GIS data indicates there are approximately 1,016 acres of GI on base. Of the two project areas, the DLA Infill site has the most GI with 36 acres of regulated area, accounting for 3.5 percent of the base's GI. There is no GI within the DLA warehouse relocation area. Within the base the MROTC site does not contain any GI, although there are 12.7 acres of area identified as off base GI. **Figure 3-2** shows the current GI within the alternative sites.

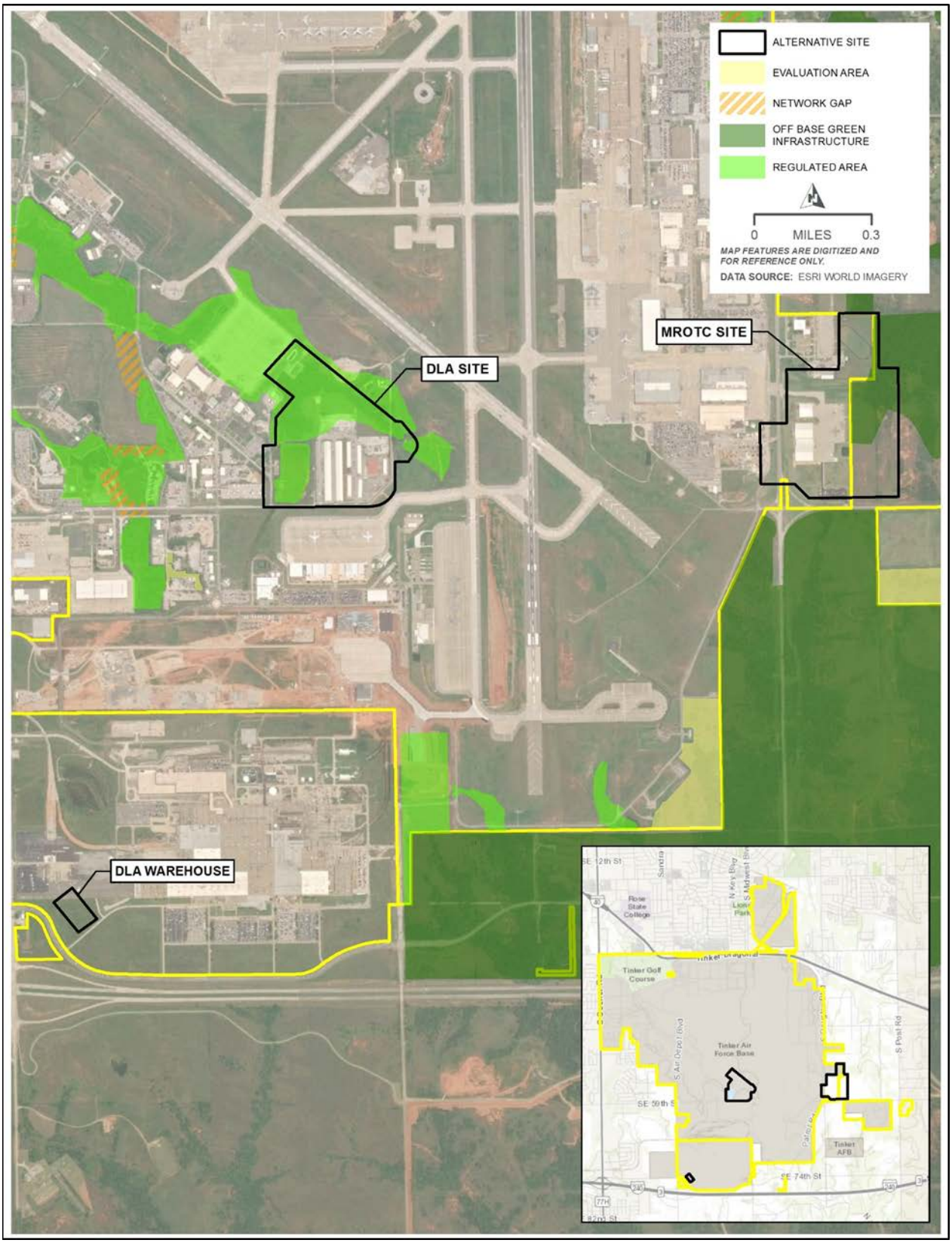


Figure 3-2. Green Infrastructure within the DLA and MROTC Sites.

Invasive Species/Noxious Weeds. EO 13112, *Invasive Species*, requires all Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize their economic, ecological, and human health impacts. Oklahoma lists 31 noxious weed species that are managed (ODA 2020). **Appendix C, Table C-1** provides a list of the noxious weed species, that if found within the area of the proposed action, should be managed to prevent possible spread into adjacent uninfested areas.

Wildlife. Over 300 native and exotic vertebrate species have been documented on Tinker AFB. This includes 36 mammals, 212 birds, 35 reptiles, 12 amphibians, and 30 fish (Tinker AFB 2019a). Most of the 36 mammal species are common throughout the vicinity, including the DLA and MROTC sites (Tinker AFB 2019a). Common species include fox squirrels (*Sciurus niger*), eastern cottontail rabbits (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and various rodent species (*Neotoma* spp., *Peromyscus* spp., *Sigmodon* spp., etc.). Recent studies concluded that species diversity of mammals was higher within green spaces, such as the GI, than in more developed areas throughout Tinker AFB, including within riparian corridors and upland habitats. Conversely, species diversity of mammals was found to be lower near airfields and industrial areas on the installation (Tinker AFB 2019a).]

There are over 400 species of birds known to occur in the state of Oklahoma, 212 of which have been observed on Tinker AFB. Seasonal species richness of the area is greatest in the spring, followed by the summer, autumn, and winter (Tinker AFB 2019a). Much of this diversity can be attributed to Tinker AFB's location along the Central Flyway, a migratory route extending from Canada, through central United States, and into Mexico (USFWS 2020a). Over 90 percent of birds observed in the vicinity of Tinker AFB are considered migratory and are therefore protected under the MBTA. The most abundant bird species observed on Tinker AFB are the eastern meadowlark (*Sturnella magna*), Franklin gull (*Leucophaeus pipixcan*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), northern cardinal (*Cardinalis cardinalis*), and the barn swallow (*Hirundo rustica*) (Tinker AFB 2019a). Similar species would be expected on the MROTC and the DLA sites due to common habitat types and close proximity of the sites to each other.

Thirty-five species of reptiles and 12 species of amphibians are known to occur on Tinker AFB. Representative reptiles species include three-toed box turtle (*Terrapene carolina*), red-eared slider (*Trachemys scripta*), northern prairie lizard (*Sceloporus undulates garmani*), and plain-bellied water snake (*Nerodia erythrogaster*) (Tinker AFB 2019a). Representative amphibian species include American bullfrog (*Rana catesbeiana*), gray tree frog (*Hyla versicolor*), plains leopard frog (*Rana Blairi*), Woodhouse's toad (*Fufo woodhousei*), and smallmouth salamander (*Ambystoma texanum*). Only one venomous snake, the copperhead (*Agkistrodon contortrix*), has been confirmed on Tinker AFB. A state species of concern, the Texas horned lizard (*Phrynosoma cornutum*), is known to occur on Tinker AFB, primarily in the southern and southwestern areas of the base (Tinker AFB 2019a).

Tinker AFB has recorded 30 fish species present on base within ponds, wetlands, and the Crutcho Creek Drainage Basin. Some of the more common fish species observed during

surveys in 2009 and 2010 (Tinker AFB 2019a) include: red shiner (*Cyprinella lutrensis*), sand shiner (*Notropis stramineus*), longear sunfish (*Lepomis megalotis*), bullhead minnow (*Pimephales vigilax*), bluegill sunfish (*Lepomis macrochirus*), western mosquitofish (*Gambusia affinis*), and bluntnose minnow (*Pimephales notatus*) (Tinker AFB 2019a).

Threatened and Endangered Species and Species of Concern. Six federally listed endangered or threatened species have the potential to occur on Tinker AFB within the vicinity of the proposed sites (**Table 3-3**). A list of federally listed species was obtained from the USFWS Information for Planning and Consultation (IPaC) system (USFWS 2020b) as well as the 2019 Tinker AFB INRMP (Tinker AFB 2019a). The USFWS IPaC system reports four federally listed species including the endangered least tern (*Sterna antillarum*) and whooping crane (*Grus americana*), and the threatened piping plover (*Charadrius melodus*) and red knot (*Calidris canutus rufa*) (USFWS 2020b). In addition to the four aforementioned species, the 2019 INRMP lists the endangered black-capped vireo (*Vireo atricapillus*) and Townsend's big-eared bat (*Corynorhinus towsendii*) (Tinker AFB 2019a). With the exception of the piping plover, and potentially the Townsend's big-eared bat, none of these federally listed species have been observed on Tinker AFB during previous surveys. Only one, the piping plover has been documented on base. The plover was found dead on Runway 36/18 on 11 May 2009, the result of a bird-aircraft strike. No others have been observed since 2009. Acoustic monitoring conducted in 2013 – 2014 by the University of Montana identified the Townsend's big-eared bat as potentially occurring. However, their recordings could not verify whether the calls were from the Western or the Ozark 'ingens' subspecies which is listed (Tinker AFB 2019a). No designated or proposed critical habitat for the listed species occurs on Tinker AFB (USFWS 2020b).

Table 3-8. Federally Listed Species with the Potential to Occur within the Area of the Alternative Sites

Species	Federal Status	Habitat	Likelihood of Occurrence
Birds			
Black-capped vireo (*Vireo atricapilla*)	E	Prefers low thickets in scrub-oak woodlands, arid hilly regions and ledges on steep hills near water.	Low
Least tern (*Sterna antillarum*)	E	Terns use a wide array of habitat types for foraging, including large rivers, lakes, ponds, and shallow wetlands. Nests on the ground and require open areas of sand and gravel that are largely devoid of vegetation. Historically, interior least terns nested along all of the large, sandy prairie river systems in Oklahoma. This included the Cimarron, Canadian, Arkansas, and Red rivers (ODWC 2020a).	Low

Species	Federal Status	Habitat	Likelihood of Occurrence
Piping plover (*Charadrius melodus*)	T	Nests above the high tide line on coastal beaches, sand flats at the ends of sandpits and barrier islands, gently sloping fore dunes, blowout areas behind primary dunes, sparsely vegetated dunes, and wash over areas cut into or between dunes. Feeding areas include inter-tidal portions of ocean beaches, wash over areas, mudflats, sand flats, wrack lines, and shorelines of coastal ponds, lagoons or salt marshes. Plovers also occur in grasslands with scattered trees or scattered clumps of trees, a type of community intermediate between grassland and forest.	Low
Red knot (*Calidris canutus rufa*)	T	Breeding habitat consists of slightly vegetated land in the tundra where it is sunny and windy. The nests are built about 50 kilometers offshore and less than 150 meters above sea level near wetlands. Wintering and migration habitats consist of large, sandy tidal flats and coastlines near inlets of bays and estuaries that have remained undeveloped.	Low
Whooping crane (*Grus americana*)	E	Nesting habitat consists of open areas close to large amounts of water and vegetation. Whooping cranes nest in wetland and marsh areas or close to shallow ponds or lakes. The habitats chosen typically include willow, sedge meadows, mudflats, and bulrush and cattail (*Typha latifolia*) marshes. During migration, whooping cranes seek similar habitats in wetlands, submerged sandbars and agricultural fields. In the winter, wet habitats are also sought out in the form of brackish bays and coastal marshes.	Low
Mammals			
Townsend's big-eared bat (*Corynorhinus towsendii*)	E	Eastern populations of Townsend's big-eared bats are generally found in oak-hickory forests. Roosts most commonly in caves, cliffs, and rock ledges but have been found in abandoned mines and other man-made structures.	Low

Notes: E = Endangered, T = Threatened
Source of species list: USFWS 2020b, Tinker AFB 2019a
Source of Habitat Descriptions: ADW 2020

No suitable habitat occurs within or near the DLA or MROTC Sites for any of the federally listed species. Least terns nesting habitat includes large rivers, lakes, ponds, and shallow wetlands. They nest on the ground and require open areas of sand and gravel that are largely devoid of vegetation. However, the large graveled roof tops on base could provide marginal nesting habitat for least terns. Although marginal habitat does occur, this species has not been observed on Tinker AFB. Least terns have been documented at the 2,900-acre Stanley Draper Lake approximately one mile to the southeast of Tinker AFB. Therefore, it is possible this

species could be transient across the base, but without suitable habitat, stopovers would be highly unlikely.

There are no federally listed or state species of concern flora species occurring within or near Tinker AFB. However, one rare species, the Oklahoma penstemon (*Penstemon oklahomensis*), does occur on Tinker AFB. The Oklahoma penstemon is endemic to Oklahoma and north Texas and is found at several locations on Tinker AFB. The Oklahoma penstemon occurs in fragmented remnant native prairie communities, primarily in the southeast portion of Tinker AFB including the airfield, Cyber Engineering Installation Group area, and leased land immediately adjacent to and south of Landfill 6. Another small population occurs in the northeastern portion of Glenwood (Tinker AFB 2019a). None of these populations would be affected by the Proposed Action.

There are currently no state-listed endangered or threatened species identified by the ODWC as occurring in Oklahoma County. Although there are no state-listed species, there are 48 state species of concern and/or Birds of Conservation Concern (BCC) that have been documented on Tinker AFB and have the potential to occur within or near the DLA and MROTC Sites. Most observations of species of concern were documented within the GI habitat and have even been reported within or near the DLA site (Tinker AFB 2019a). **Table C-2** in **Appendix C** presents each species, its state status, habitat preferences, and the likelihood of occurrence on Tinker AFB.

Based on Appendix D of the 2019 Tinker AFB INRMP (Tinker AFB 2019c) the sighting of a chicken turtle (*Deirochelys reticularia*) is an unconfirmed sighting. Texas horned lizards (*Phrynosoma cornutum*) occur primarily in the southwest corner of Tinker AFB with isolated pockets in the southeast and Glenwood Area where the lizards' preferred habitat, a mosaic of grassland and bare ground areas, is present. The GIS layer has data for over 700 lizards with over 21,000 capture/relocation points throughout the base (Tinker AFB 2019a).

Of the 44 bird species of special concern, 17 species were observed during the 2008-2009 Inventory of Avian Species (Tinker AFB 2019c), 4 were observed by on-site staff biologists, and the other species have been observed incidentally between 2007 and 2011. Furthermore, 21 species are considered non-breeding in Oklahoma, 11 occur during the breeding season, 1 is a migrant species, and the remaining 11 do not have survey data available (Tinker AFB 2019c).

The little brown bat (*Myotis lucifugus*) occurrence is unconfirmed by an on-site base biologist, while the silver-haired bat (*Lasionycteris noctivagans*) has been confirmed (Tinker AFB 2019c).

3.2.3 Environmental Consequences

The biological resources analysis discusses impacts from the construction, demolition, renovation of facilities for the B-21 campus as well as the B-21 aircraft operations and maintenance operations on vegetation, wildlife, and protected and sensitive species from the Proposed Action and alternatives. For vegetation and wildlife, each species has unique, fundamental needs for food, shelter, water, and space and can be sustained only where their specific combination of habitat requirements are available. Removal of sustaining elements of a species' habitat impacts its ability to exist. Therefore, the evaluation of impacts on wildlife and

vegetation is based on whether the action would cause habitat displacement resulting in reduced feeding or reproduction, removal of critical habitat for sensitive species, and/or behavioral avoidance of available habitat as a result of noise or human disturbance. The level of impacts on biological resources is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to the proposed activities, and (4) the duration of ecological ramifications. Impacts on biological resources are considered significant if species or special habitats are adversely affected over large areas, or disturbances cause reductions in population size or distribution of a species of special concern.

3.2.3.1 ALTERNATIVE 1 – DLA SITE

Vegetation. The development of the DLA site would have short- and long-term, direct, adverse impacts on vegetation. Long-term direct impacts include the construction of the B-21 campus. The construction would increase the impervious surfaces in the DLA site by 30 acres and convert the proposed area into 100 percent impervious surfaces. This would result in the permanent removal of approximately 12 acres of mixed riparian forest comprised of native habitat that is less common on Tinker AFB. This includes the sugarberry mixed forest habitat in the floodplain area. In addition, 23 acres of native/nonnative grasslands, and 8 acres of improved turf areas within the site would be lost to construction of maintenance infrastructure. This permanent loss of 43 acres would constitute a long-term, moderately adverse, and potentially significant impact on native and nonnative vegetation communities on Tinker AFB, which would be mitigated to less than significant. Short-term, direct impacts on vegetation includes the sedimentation and crushing of adjacent non-target vegetation during construction, demolition, and renovation activities from heavy equipment and construction personnel. In addition, 3.5 percent of the Tinker AFB green infrastructure would be lost due to implementation of Alternative 1. Although this is a small overall percentage, this loss would need to be mitigated through incorporation of new natural areas into the installation green infrastructure network.

To mitigate for the loss of 12 acres of riparian forest as a result of the campus construction, a higher quality woodland habitat with similar or other high quality native species would be created elsewhere on Tinker AFB or off-base (Tinker AFB 2013b). Four potential on-base (Sites 10, 11, 12, and 13) and one potential off-base (Site 4) riparian mitigation areas are shown on **Figure 3-11** in Section **3.10.3**. Tinker AFB would prioritize on-base sites before off-base mitigation is pursued. Some of the riparian mitigation options in these areas would likely require further hydraulic and hydrologic study and design to determine feasibility to serve as viable riparian habitat mitigation locations.

Aircraft operations of the B-21 campus would have long-term, direct, negligible adverse impacts on vegetation. The vegetation in the area would be permanently removed and unable to return to a naturalized state. Furthermore, routine maintenance of any remaining or landscaped vegetation would occur to reduce the risk of fire and encroachment of noxious weeds in and adjacent to the campus, not allowing the community to return to a naturalized state. The increase in activity and soil disturbance from B-21 personnel would increase the risk of spreading of noxious weeds and other invasive species. Personnel would be expected to follow

the installation's noxious weed and invasive species management protocols to reduce the spread of noxious weed and invasive species.

Wildlife. Short- and long-term, direct and indirect, moderate, adverse impacts on wildlife species would be expected from the construction of the B-21 campus on the DLA site. Although much of the vegetation in the area is considered nonnative, this area, as well as the mixed forest, wetlands, stream, and grassland areas provide suitable nesting and foraging habitat for various songbirds, raptors, reptiles, amphibians, fish, and mammals. Long-term, direct moderately adverse impacts may occur on some smaller species that are less mobile or have smaller home ranges. These individuals may be permanently displaced or killed during the permanent removal of habitat associated with construction activities. Although individuals may be affected, it would not impact regional population viability or cause a downward trend in regional species populations because additional habitat is present in the region that would continue to support these species. Therefore, impacts on local wildlife species would not be considered significant. Short-term, minor, direct impacts on wildlife individuals would occur from increased noise associated with heavy equipment and construction. Individuals would temporarily avoid nearby habitat adjacent to the construction areas. After construction is complete, wildlife would gradually acclimate to the disturbance and utilize adjacent open space. Because there is comparable woodland and grassland habitat in the vicinity, these impacts are expected to affect individuals and would not impact local or regional wildlife populations. Mitigation to offset loss of woodland habitat for migratory birds is discussed above in the vegetation impacts.

To reduce potential impacts on migratory birds, it is recommended that land clearing associated with construction occur outside the central Oklahoma breeding season for migratory birds (i.e., clearing only 1 August – 1 April). If, despite this effort, migratory birds were to nest within the construction site and present a conflict to construction activities, then Tinker AFB would need to obtain a Relocation Permit from the USFWS which would authorize removal of the nests, eggs, birds, etc. by a qualified biologist (Tinker AFB 2013b).

If clearing activities must occur during the breeding season, then Tinker AFB should conduct intensive surveys for nesting migratory birds and, if needed, obtain a Relocation Permit from the USFWS to remove active nests, eggs, or birds. This method, however, is not preferred over avoiding the breeding season because locating all active bird nests would be very improbable (Tinker AFB 2013b).

The operations of B-21 aircraft may increase the potential for a bird/wildlife-aircraft strike hazard, although this potential is minor due to the limited number of proposed operations. B-21 aircrews would follow the guidance in the Tinker AFB Bird Aircraft Strike Hazard (BASH) Plan to minimize the potential for bird/wildlife-aircraft strikes. Features such as the stormwater detention basins that may be constructed could attract birds and, thereby, possibly increase bird populations near the airfield. Because these features would be on Tinker AFB, birds at or near these features would be managed in accordance with the Tinker AFB BASH Plan, which would require modification to include bird management at/around any new features created as a result of the Proposed Action.

The potential for bird/wildlife-aircraft strikes could fluctuate as a result of the cyclical patterns of bird populations. Historically, one-half of one percent of all reported bird/wildlife-aircraft strikes involving USAF aircraft resulted in a serious mishap. Therefore, the proposed action would result in negligible impacts from bird/wildlife-aircraft strike incidents to aircrews or to the public, or damage to property (other than the aircraft).

Long-term, direct and moderately adverse impacts on fish species would be associated with the development of the DLA site. Long-term, direct impacts include the permanent loss of six acres of detention ponds and approximately 0.69 miles of Crutcho Creek headwaters, constituting a moderately adverse impact on Tinker AFB aquatic habitat. This loss of aquatic habitat would impact fish species, including native fish species, by permanent displacement or potential harm during construction activities. To mitigate for the loss of aquatic habitat, an upstream portion of Crutcho Creek will be selected to increase riparian corridors, which will positively increase water quality. This will result in a healthier aquatic habitat, provide long-term benefit for fish species and mitigate the aquatic habitat loss to a long-term minor impact.

Threatened and Endangered Species. There are no recorded sightings of federally- or state-protected species on the DLA site. As mentioned above, a piping plover was found dead on Runway 36/18 in 2009; and a Townsend's big-eared bat was potentially identified through echolocation monitoring in 2013 (Tinker AFB 2019a). Many of the species listed in **Table 3-8** have a low probability of occurring in the vicinity of the DLA site, as there is no suitable habitat present. However, if a listed species were to utilize the DLA site it would likely be along Crutcho Creek in the mixed riparian forested area or near the detention basin. Utilization of these areas would be short-term and inconsistent as there is a more suitable habitat in the vicinity.

As mentioned above, there would be a 100 percent permanent loss of the vegetation in the DLA site, including forested areas, wetlands, grasslands, streams, and an open water feature. Furthermore, any transient species may temporarily avoid the area during construction activities due to the increase in noise from heavy machinery. The construction would have no effect on federally listed species because there is no suitable habitat present in the DLA Site.

Forested, grassland, and wetland habitat on the DLA site could be utilized by a variety of state species of concern. This suitable foraging and nesting habitat would be permanently removed. However, there is similar habitat less than a half mile to the northwest of the DLA site on Tinker AFB property in other GI areas. As described above, new high quality grassland/riparian wooded habitat would be created on Tinker AFB, which would offset the majority of this habitat loss (Tinker AFB 2014a).

In addition, there have been several sightings of the state species of concern Texas horned lizard southwest of the DLA site from 2003 through 2011, although it is not considered a resident of the area (Tinker AFB 2014a). This area is not considered suitable habitat, and known Texas horned lizard habitat is located approximately 0.3 miles to the west of the DLA site on Tinker AFB (Tinker AFB 2002b). Texas horned lizards may wander into developed areas from nearby suitable habitat, it is possible that individual lizards may enter the DLA site, and subsequently may be injured or incidentally killed during the construction of the B-21 campus. Surveys by a qualified biologist should occur prior to the start of construction. To avoid potentially harming individuals, silt fencing should be installed around the perimeter to restrict

their entry into the site. Should a Texas horned lizard, or suspected Texas horned lizard, be identified during construction or demolition activities, the contractor would notify Tinker AFB natural resources personnel for the relocation of the lizard.

Tinker AFB is consulting with USFWS under Section 7 of the ESA in support of this EA. This consultation covers the construction portions of the Proposed Action because any potential impacts to threatened or endangered species due to aircraft operations are covered under a separate programmatic Section 7 consultation for aircraft operations at multiple USAF installations. An informal consultation letter was sent to USFWS with a determination that the action will have no effect on threatened or endangered species. All correspondence or other materials related to this consultation are presented in **Appendix F**.

The B-21 aircraft operations would have long-term, direct, negligible impacts on federally-protected species and avian species of concern and other protected species of concern. Federally-protected avian species and other avian species of special concern may be involved in a bird/aircraft strike with the additional B-21 aircraft. Any aircraft operations associated with Alternative 1 would be covered under the Programmatic Biological Opinion currently being developed between the USAF and USFWS for airfield flight operations at 32 USAF installations in the Continental United States, including Tinker AFB.

3.2.3.2 ALTERNATIVE 2 – MROTC SITE

Vegetation. Short- and long-term, direct and indirect, negligible adverse impacts on vegetation would occur with the development of the B-21 campus and aircraft operations on the MROTC site. Long-term, direct, negligible adverse impacts from the construction of the B-21 campus would occur. The B-21 campus would increase the impervious surfaces at the MROTC site by 28 acres to a total of 76 acres. Most of the open space that would be permanently removed is landscaped turf comprised of nonnative grass species. Short-term, direct, negligible adverse impacts on vegetation include the sedimentation and crushing of adjacent non-target vegetation during construction, demolition, and renovation activities from heavy equipment and construction personnel. Off-base land that would be incorporated into the overall site under Alternative 2 includes 12.7 acres of area mapped as off-base green infrastructure. It is assumed this green infrastructure area would be lost to construction of the proposed maintenance facilities. Although not considered significant, this loss represents a minor, long-term adverse impact on vegetation and potential habitat.

Aircraft operations at the B-21 campus would have long-term, direct, negligible adverse impacts on vegetation. The vegetation in the area would be permanently removed and unable to return to a naturalized state. Furthermore, routine maintenance of any remaining or landscaped vegetation would occur to reduce the risk of fire and encroachment of noxious weeds in and adjacent to the campus, not allowing the community to return to a naturalized state. The increase in activity and soil disturbance from B-21 personnel would increase the risk of spreading of noxious weeds and other invasive species. To minimize or avoid impacts personnel would be expected to restrict their travel to designated pathways.

Wildlife. Short- and long-term, direct and indirect, negligible to minor adverse impacts on wildlife species would be expected from the construction of the B-21 campus and aircraft operations on the MROTC site. Although all of the vegetation in the area is considered

nonnative, this area provides suitable foraging habitat for various songbirds, raptors, reptiles, amphibians, and mammals. Long-term, direct, minor adverse impacts may occur on some smaller species that are less mobile or have smaller home ranges. These individuals may be permanently displaced or killed during the permanent removal of habitat associated with construction activities. Although individuals may be affected, it would not impact regional population viability or cause a downward trend in regional species populations because additional habitat is present in the region that would continue to support these species. Therefore, impacts on local wildlife species would not be considered significant. Short-term direct impacts on wildlife individuals would occur from increased noise associated with heavy equipment and construction. Individuals would temporarily avoid nearby habitat adjacent to the construction areas. After construction is complete, wildlife would gradually acclimate to the disturbance and utilize adjacent open space. Because there is comparable habitat in the vicinity, these impacts are expected to affect individuals and would not impact local or regional wildlife populations.

It is recommended that land clearing associated with construction occur outside the central Oklahoma breeding season for migratory birds (i.e., clearing only 1 August – 1 April). If, despite this effort, migratory birds were to nest within the construction site and present a conflict to construction activities, then Tinker AFB would need to obtain a Relocation Permit from the USFWS which would authorize removal of the nests, eggs, or birds by a qualified biologist (Tinker AFB 2013b).

If clearing activities must occur during the breeding season, then Tinker AFB should conduct intensive surveys for nesting migratory birds and, if needed, obtain a Relocation Permit from the USFWS to remove active nests, eggs, or birds. This method, however, is not preferred over avoiding the breading season because locating all active bird nests would be very improbable (Tinker AFB 2013b).

The operations of B-21 aircraft may increase the potential for a bird/wildlife-aircraft strike hazard. B-21 aircrews would follow the guidance in the Tinker AFB BASH Plan to minimize the potential for bird/wildlife-aircraft strikes. Features such as the stormwater detention basins that may be constructed could attract birds and, thereby, possibly increase bird populations near the airfield. Because these features would be on Tinker AFB, birds at or near these features would be managed in accordance with the Tinker AFB BASH Plan, which would require modification to include bird management at/around the new features.

The potential for bird/wildlife-aircraft strikes could fluctuate as a result of the cyclical patterns of bird populations. Historically, one-half of one percent of all reported bird/wildlife-aircraft strikes involving USAF aircraft resulted in a serious mishap. Therefore, the proposed action would result in negligible impacts from bird/wildlife-aircraft strike incidents to aircrews or to the public, or damage to property (other than the aircraft).

Threatened and Endangered Species. There are no recorded sightings of federally- or state-protected species on the MROTC site. As mentioned above, a piping plover was found dead on Runway 36/18 in 2009; and a Townsend's big-eared bat was potentially identified through echolocation monitoring in 2013 (Tinker AFB 2019a). Many of the species listed in **Table 3-3** have a low probability of occurring in the vicinity of the MROTC site as it lacks suitable habitat,

but if a listed species were to utilize the MROTC site it would be short-term and inconsistent as there is suitable habitat in the vicinity.

There would be no impacts associated with construction activities. As mentioned above, 28 acres of open area would be converted into impervious surfaces, removing turf grasslands, not considered suitable habitat for any listed species.

Any B-21 aircraft operations associated with Alternative 2 would be covered under the Programmatic Biological Opinion currently being developed between the USAF and USFWS for airfield flight operations at 32 USAF installations in the Continental United States, including Tinker AFB.

Tinker AFB is consulting with USFWS under Section 7 of the ESA in support of this EA. An informal consultation letter was sent to USFWS with a determination that the action will have no effect on threatened or endangered species. All correspondence or other materials related to this consultation are presented in **Appendix F**.

3.2.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative the B-21 aircraft would not conduct depot-level maintenance operations on Tinker AFB. USAF would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any property acquisitions occur at Tinker AFB to accommodate the new mission requirement for the B-21 maintenance operations. The current existing conditions of the biological resources (vegetation, wildlife, and federally and state-protected species) would remain the same.

3.3 Geology and Soils

3.3.1 Definition of the Resource

Geological resources consist of the Earth's surface and subsurface materials. Within a given physiographic province, these resources typically are described in terms of geology, topography and physiography, and soils.

Geology is the study of the Earth's composition and provides information on the structure and configuration of surface and subsurface features. Such information derives from field analysis based on observations of the surface and borings to identify subsurface composition.

Topography and physiography pertain to the general shape and arrangement of a land surface, including its height and the position of its natural and human-made features.

Soils are the unconsolidated materials overlying bedrock or other parent material. Soils typically are described in terms of their complex type, slope, and physical characteristics. Differences among soil types in terms of their structure, elasticity, strength, shrink-swell potential, and erosion potential affect their abilities to support certain applications or uses. In appropriate cases, soil properties must be examined for their compatibility with particular construction activities or types of land use. Prime farmland is designated by the United States Department of Agriculture (USDA) as land that has the appropriate characteristics for producing particular crops and is available for this use. Some of the characteristics considered for prime farmland

include soil quality, growing season, and availability of water, such that high yields of crops are produced from these farmlands.

3.3.2 Existing Conditions

Tinker AFB is located in the Central Redbed Plains section of the Central Lowland Physiographic Province, which is characterized by level to gently rolling hills, broad flat plains, and bottomlands bisected by small- to medium-sized water courses. Tinker AFB elevations range from approximately 1,200 feet above mean sea level (MSL) at Crutcho Creek in the northwestern portion of Tinker AFB to 1,310 feet MSL in the southeastern portion of Tinker AFB (Tinker AFB 2019a)**.**

A majority of Tinker AFB surface geology consists of the Hennessey Group reddish-brown and silty shale formation, extending from the northwest corner of the installation southeastward to the Engineering Installation Group area. Most of the remaining surface geology is Garber Sandstone with some alluvium along streams. The Sandstone is orange-red to reddish-brown, fine-grained, and poorly cemented with subangular to sub-rounded grains composed of quartz. The surficial Hennessey Group is underlain by Garber Sandstone, which is in turn underlain by the Wellington Formation (Tinker AFB 2019a).

Ashport silty loam soils are mapped in the north central portion of the Alternative 1 – DLA site. The Grainola-Ashport and Grainola-Urban land-Ironmound complex are mapped in the northwest and northeast portions of the site, respectively. These soils are well drained calcareous clays. Lawrie loams are mapped in the center of the site and Latrass loams are mapped on the eastern edge of the site. These soils are well drained silt loams or clay loams.

Lawrie-Urban land complex is also mapped in the center of the site, and has been altered by development. The Renthin silty clay loam and the Renthin-Urban land complex are mapped on the southwest corner and northern portions of the site. The Latrass loam has low to moderately low capacity to transmit water, the Grainola-Ironmound and Grainola-Ashport soils have very low to moderately high capacities to transmit water, and the Lawrie and Ashport have moderately high to high capacities. These soils are derived from fine silty alluvium, except the Grainola complex, whose parent material is described as residuum weathered from sandstone and shale. Urban land complex soils are mapped in the south portion of the site. The acreages of soils mapped at the DLA site are presented in **Table 3-9**. The most erodible soil type is the Latrass series, with Renthin soils just slightly less erodible than Latrass. Grainola and Lawrie soils are less erodible than the aforementioned soils, while the least erodible soil is the Ashport series (Tinker AFB 2019a).

Table 3-9. Soil Composition at Alternative 1 - DLA Site

Soil Unit	Area Coverage (Acres)
Urban land	35.08
Ashport silt loam, 0 to 1 percent slopes, frequently flooded	17.37
Renthin-Urban land complex, 1 to 5 percent slopes	4.02
Lawrie loam, 0 to 1 percent slopes, rarely flooded	3.29

Lawrie-Urban land complex, 0 to 1 percent slopes, rarely flooded	3.15
Latrass loam, 1 to 45 percent slopes	1.86
Renthin silty clay loam, 3 to 5 percent slopes, eroded	0.56
Grainola-Ashport complex, 0 to 8 percent slopes	0.38
Grainola-Urban land-Ironmound complex, 3 to 12 percent slopes	0.19
Lawrie loam, 0 to 1 percent slopes, rarely flooded	0.004
Total Area	**65.90**

Lawrie loam, 0 to 1 percent slopes, rarely flooded soils are the only soil type at the Alternative 1 – DLA site which are listed as prime farmland soils. These soils occur on approximately 3.29 acres in the central portion of the DLA site area, where a creek, a drainage ditch, and roads are observed (Tinker AFB 2019a).

The new DLA Warehouse site consists of urban land and Kirkland silt loam, 0 to 1 percent slopes, which are well drained silt loams. These soils have very low to moderately low capacities to transmit water and are derived from clayey alluvium derived from sedimentary rock. These soils are listed as prime farmland (USDA NRCS 2020). The acreages of soils at the new DLA Warehouse site are presented in **Table 3-10**.

Table 3-10. Soil Composition at the New DLA Warehouse Site

Soil Unit	Area Coverage (Acres)
Kirkland silt loam, 0 to 1 percent slopes	3.37
Urban Land	0.45
Total Area	**3.82**

The MROTC site is mapped with Renthin silty clay loam, 3 to 5 percent slopes, eroded across a large swath of the northern and southern portions of the site. The middle of the site is covered by a mixture of Stephenville-Darnell complex, 1 to 5 percent slopes, Stephenville-Darnell complex, 1 to 5 percent slopes, eroded, and Harrah fine sandy loam, 3 to 5 percent slopes. The Stephenville-Darnell complex, 1 to 5 percent slopes and Stephenville-Darnell complex, 1 to 5 percent slopes, eroded consist of moderately to excessively drained sandy loams, which have very low to high capacity to transmit water and are generally derived from residuum weathered from sandstone. A small portion of the southern extent of the site is covered by Stephenville-Darnell-Newalla complex, 3 to 8 percent slopes. This soil type consists of moderately well to excessively drained sandy loams, which have very low to moderately high capacity to transmit water and are derived from residuum weathered from sandstone. The western portion of the site is covered by the Stephenville-Darnell-Gullied land complex, 3 to 8 percent slopes, which are well to excessively drained sandy loams. They have moderately low to high capacity to transmit water and are derived from residuum weathered from sandstone. Urban land covers small portions of the site to the west and northwest. The acreages of soils at the MROTC site are presented in **Table 3-11**. None of the soils at the MROTC site are considered prime farmland (USDA NRCS 2020).

Table 3-11. Soil Composition at Alternative 2-MROTC Site

Soil Unit	Area Coverage (Acres)
Renthin silty clay loam, 3 to 5 percent slopes, eroded	43.74
Stephenville-Darnell complex, 1 to 5 percent slopes	9.76
Harrah fine sandy loam, 3 to 5 percent slopes	7.51
Stephenville-Darnell complex, 1 to 5 percent slopes, eroded	6.86
Urban Land	4.00
Stephenville-Darnell-Gullied land complex, 3 to 8 percent slopes	2.70
Stephenville-Darnell-Newalla complex, 3 to 8 percent slopes	0.74
Total Area	**75.31**

3.3.3 Environmental Consequences

Impacts on geology and soils would be considered significant if they alter the lithology (i.e., the character of a rock formation), stratigraphy (i.e., the layering of sedimentary rocks), and geological structures that control groundwater quality, distribution of aquifers and confining beds, and groundwater availability; or result in long-term erosion without the implementation of management techniques. Impacts to topography may be significant if the change in elevation at the project site would prevent further implementation of a proposed action. Impacts on soils would be considered significant if they were to substantially reduce quantity or productivity of soils.

3.3.3.1 ALTERNATIVE 1 – DLA SITE

Short- and long-term, negligible to minor, adverse impacts on geological resources would occur as a result of implementing the B-21 depot maintenance campus at the Alternative 1 site.

Long-term, negligible, adverse impacts on topography would occur as a result of grading, cut, and fill required to level the area to support construction. Topography would be stabilized following construction activities.

Short- and long-term, minor, adverse impacts on soils would occur as a result of soil compaction, disturbance, and erosion. Demolition and new construction would result in clearing of vegetation and grading. During clearing and grading, disturbances to drainage ways would be avoided. Clearing of vegetation and an increase in impervious surfaces would increase erosion and sedimentation potential. An erosion and sediment control plan would be developed and implemented both during and following site development to contain soil and runoff on-site, and reduce the potential for adverse impacts associated with erosion and sedimentation and transport of sediments in runoff. Additionally, implementation of stormwater controls favoring methods that allow for stormwater to reenter the groundwater system rather than leaving the site as surface flow would minimize the potential for erosion and sediment generation during future storm events. Once construction activities have been completed and operations have begun, re-vegetation would occur where possible to minimize long-term soil erosion and sedimentation rates. Soil productivity would decline in disturbed areas and be eliminated in the 30 acres at the DLA site and the approximately 5 acres at the new DLA Warehouse site that would be converted to impervious surfaces. Approximately 3.29 acres in the central portion of the DLA Site, and 3.37 acres at the DLA Warehouse site are considered prime farmland soils.

Although they are prime farmland soil, the loss is not significant because prime farmland protection policies to not apply to construction in support of national defense. In addition, the loss of 3.29 acres in the central portion of the DLA site is not considered significant because this area is surrounded by industrial use related to current military operations including flight operations and could not be farmed. The 3.37 acres of prime farmland soils at the DLA warehouse site currently supports a hay agricultural lease. The productivity would be lost if the DLA warehouse were constructed at this site, leading to a long-term, minor, adverse, direct impact on the existing soil productivity. This would also not be considered significant.

3.3.3.2 ALTERNATIVE 2 – MROTC SITE

Similar to Alternative 1, an addition of 28 acres of new impervious surface would reduce soil productivity and increase erosion and sedimentation potential. Therefore, the effects on geological resources under Alternative 2 would be similar to the effects under Alternative 1, as described in **Section 3.3.3.1**, and no significant impacts are expected.

3.3.3.3 NO ACTION ALTERNATIVE

Impacts on geological resources would not be expected under the No Action Alternative. Geological resource conditions would remain unchanged when compared with existing conditions.

3.4 Hazardous Materials and Wastes

3.4.1 Definition of the Resource

Hazardous Materials, Hazardous Wastes, and Petroleum Products. Hazardous materials are defined by 49 CFR § 171.8 as hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (49 CFR § 172.101), and materials that meet the defining criteria for hazard classes and divisions in 49 CFR § 173. Hazardous wastes are defined by Resource Conservation and Recovery Act (RCRA) at 42 USC § 6903(5), as amended by the Hazardous and Solid Waste Amendments, as "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

Petroleum products include crude oil or any derivative thereof, such as gasoline, diesel, or propane. They are considered hazardous materials because they present health hazards to users in the event of incidental releases or extended exposure to their vapors.

Evaluation of hazardous materials and wastes focuses on the storage, transportation, handling, and use of hazardous materials, as well as the generation, storage, transportation, handling, and disposal of hazardous wastes. In addition to being a threat to humans, the improper release or storage of hazardous materials, hazardous wastes, and petroleum products can threaten the health and well-being of wildlife, habitats, soil systems, and water resources.

Toxic Substances. Toxic substances are substances that might pose a risk to human health and are addressed separately from hazardous materials and hazardous wastes. A toxic substance is a chemical or mixture of chemicals that may present an unreasonable risk of injury to health or the environment. These substances include asbestos-containing materials (ACMs), lead-based paint (LBP), and polychlorinated biphenyls (PCBs), all of which are typically found in older buildings and utilities infrastructure. The USEPA is given authority to regulate these substances by the Toxic Substances Control Act (TSCA) (15 USC § 53).

Asbestos is regulated by USEPA under the CAA; Toxic Substances Control Act; and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). USEPA has established that any material containing more than 1 percent asbestos by weight is considered an ACM. USEPA has implemented several bans on various ACMs between 1973 and 1990, so ACMs are most likely in older buildings (i.e., constructed before 1990). ACMs are generally found in building materials such as floor tiles, mastic, roofing materials, pipe wrap, and wall plaster. LBP was commonly used prior to its ban in 1978; therefore, any building constructed prior to 1978 may contain LBP. PCBs are man-made chemicals that persist in the environment and were widely used in building materials (e.g., caulk) and electrical products prior to 1979. Structures constructed prior to 1979 potentially include PCB-containing building materials.

Environmental Contamination. CERCLA governs the response or cleanup actions to address releases of hazardous substances, pollutants, and contaminants into the environment and includes federal facilities such as Tinker AFB. The Defense Environmental Restoration Program was formally established by Congress in 1986 to provide for the cleanup of DoD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the United States and its territories. Areas of known or suspected contamination are grouped into sites, and each site is investigated and appropriate remedial actions are taken under the supervision of applicable federal and state regulatory programs. When no further remedial action is necessary for a given site, the site is closed and it no longer represents a threat to human health.

Radon. Radon is a naturally occurring odorless and colorless radioactive gas found in soils and rocks that can lead to the development of lung cancer. Radon tends to accumulate in enclosed spaces, usually those that are below ground and poorly ventilated (e.g., basements). USEPA established a guidance radon level of 4 picocuries per liter (pCi/L) in indoor air for residences, and radon levels above this amount are considered a health risk to occupants.

3.4.2 Existing Conditions

Hazardous Materials, Petroleum Products, and Hazardous Wastes. The USAF uses hazardous materials and petroleum products such as liquid fuels, pesticides, oils, lubricants, coolants, batteries, cleaners, hydraulic fluids, adhesives, paints, and solvents for everyday operations at Tinker AFB. The use of these hazardous materials and petroleum products results in the generation and storage of hazardous wastes and used petroleum products on the installation. Tinker AFB is a RCRA Large Quantity Generator (USEPA identification number OK1571724391) (Tinker AFB 2018c). RCRA Large Quantity Generators generate more than 1,000 kilograms of hazardous waste in any one month. Hazardous materials, hazardous

wastes, and petroleum products are used and generated at several locations within the DLA and MROTC sites (Tinker AFB 2017a).

USAF installations manage hazardous materials through Air Force Instruction (AFI) 32-7086, *Hazardous Materials Management*, and hazardous wastes through AFI 32-7042, *Waste Management*. Tinker AFB has implemented installation-wide oil and hazardous substance integrated contingency; stormwater pollution prevention; and hazardous waste management plans. These plans define roles and responsibilities, address record keeping requirements, and provide spill contingency and response requirements (Tinker AFB 2016c, Tinker AFB 2017e, Tinker AFB 2018c).

Toxic Substances. ACMs on Tinker AFB are managed in accordance with the installation's asbestos management plan and through a database that contains detailed and updated information on surveys and abatement actions. The plan addresses asbestos management practices on Tinker AFB. The plan is designed to 1) protect personnel who live and work on Tinker AFB from exposure to airborne asbestos fibers, and 2) ensure Tinker AFB remains in compliance with all USAF, federal, state, and local asbestos regulations. The plan assigns responsibilities, establishes inspection and repair capabilities, and provides repair procedures and personal protection instructions (Tinker AFB 2016a). Facilities constructed prior to 1990 have the greatest potential to contain ACMs in building materials. **Table 2-2** provides the construction year for the buildings proposed for demolition. Many buildings are from before 1990 and have the potential to contain ACMs.

The installation's LBP management plan provides guidance to properly manage LBP within Tinker AFB facilities. The plan is designed to 1) protect personnel who live and work on Tinker AFB from exposure to airborne lead and damaged painted surfaces and 2) ensure Tinker AFB remains in compliance with all USAF, federal, state, and local LBP regulations. The locations of LBP in facilities is communicated to appropriate personnel in order to identify potential hazards and avoid disturbance of affected building materials (Tinker AFB 2016e). Facilities constructed prior to 1978 have the greatest potential to contain LBP. As noted in **Table 2-2**, some of the buildings on the DLA site were constructed before 1978 and have the potential to contain LBP.

Facilities constructed prior to 1979 have the greatest potential to contain PCBs in building material. Older electrical infrastructure, such as light fixtures and surge protectors, within these buildings might also contain PCBs. As noted in **Table 2-2**, some of the buildings on the DLA site were constructed before 1979 and have the potential to contain PCBs.

Environmental Contamination. Two environmental contamination sites coincide with the project sites. These sites are described as follows.

- Landfill Number 5 is an approximately 6-acre former landfill used from 1968 to 1970 to dispose of approximately 75,000 cubic yards of general refuse and small quantities of industrial waste. A cap was constructed over the landfill to prevent direct access to landfilled material and to reduce surface water infiltration so as to minimize the possibility of metal and organic compounds migrating to groundwater. Land use restrictions prohibit the construction of new buildings on top of the cap. Landfill Number 5 coincides with the east-central portion of the DLA site. Groundwater contamination at

Landfill Number 5 is addressed under the East Groundwater Management Unit (Tinker AFB 2010).

- East Groundwater Management Unit is an approximately 1,100-acre area in the southeast quadrant of Tinker AFB where groundwater is monitored for contaminants originating from multiple sources including Landfill Number 5. Monitored natural attenuation is the selected remedy for this site, and groundwater use restrictions are imposed on the site. Site closure is expected in 2027. East Groundwater Management Unit coincides with the majority of the DLA site and the westernmost portion of the MROTC site. Several groundwater plumes are within the DLA site, and the easternmost edge of an adjacent groundwater plume is within the MROTC site (Tinker AFB 2010).

Figure 3-3 shows the boundaries of Landfill Number 5, East Groundwater Management Unit, and the groundwater plumes that coincide with the DLA and MROTC sites. No environmental contamination sites have been documented at the buildings proposed for renovation or the new DLA warehouse site (Tinker AFB 2017a).

Radon. USEPA rates Oklahoma County, Oklahoma, as radon zone 3. Counties in zone 3 have a predicted average indoor radon screening level less than 2 pCi/L (USEPA 1993).

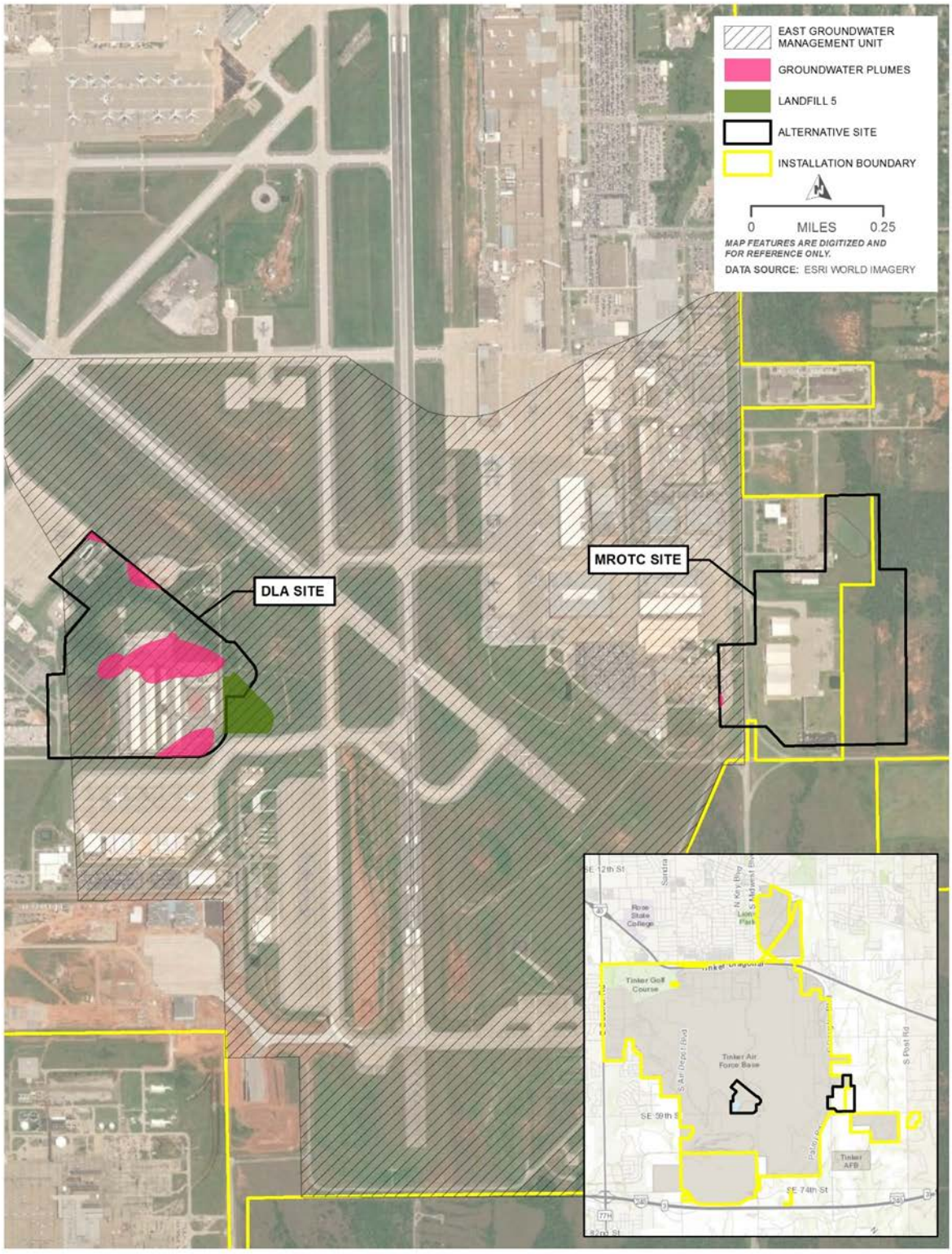


Figure 3-3. Environmental Contamination Sites and Groundwater Plumes at the DLA and MROTC sites

3.4.3 Environmental Consequences

Impacts on or from hazardous materials and wastes would be considered significant if a proposed action would result in noncompliance with applicable federal or state regulations, or increase the amounts generated or procured beyond current management procedures, permits, and capacities. Impacts on contaminated sites would be considered significant if a proposed action would disturb or create contaminated sites resulting in negative impacts on human health or the environment, or if a proposed action would make it substantially more difficult or costly to remediate existing contaminated sites.

3.4.3.1 ALTERNATIVE 1 – DLA SITE

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Short-term, minor, adverse impacts would occur from the use of hazardous materials and petroleum products and the generation of hazardous wastes during facility construction, demolition, and renovation. These impacts would last for the duration of site development, which is up to 15 years from FY 2025 to FY 2040. Hazardous materials that could be used include paints, welding gases, solvents, preservatives, and sealants. Additionally, hydraulic fluids and petroleum products, such as diesel and gasoline, would be used in the vehicles and equipment supporting facility construction. Construction would generate negligible to minor quantities of hazardous wastes. Contractors would be responsible for the disposal of hazardous wastes in accordance with federal and state laws. All hazardous materials, petroleum products, and hazardous wastes used or generated during construction would be contained, stored, and managed appropriately (e.g., secondary containment, inspections, spill kits) in accordance with applicable regulations to minimize the potential for releases. All construction equipment would be maintained according to the manufacturer's specifications and drip mats would be placed under parked equipment as needed. Hazardous materials, hazardous wastes, and petroleum products currently within the DLA site would be relocated to similar facilities to accommodate the proposed construction.

Long-term, minor, adverse impacts would occur from a permanent increase in the use of hazardous materials and petroleum products and hazardous wastes generation during B-21 maintenance. Additional quantities of hazardous materials, hazardous wastes, and petroleum products would be delivered, stored, used, and disposed of appropriately at Tinker AFB for maintenance of the additional aircraft. However, Tinker AFB is anticipated to have sufficient delivery, storage, and disposal capacity to accommodate the increased hazardous materials, petroleum products, and hazardous wastes requirements. The quantities of hazardous materials, petroleum products, and hazardous wastes required for maintenance of individual B-21 aircraft would be similar and proportional to those required for other aircraft serviced at Tinker AFB.

New hazardous materials storage and hazardous waste collection points would be established, as necessary, for the proposed B-21 maintenance depot and most likely would be sited in hangars and engine test facilities. The Tinker AFB Oil and Hazardous Substance Integrated Contingency Plan; Stormwater Pollution Prevention Plan; and Hazardous Waste Management Plan would be amended, as needed, for any new hazardous material, hazardous waste, or

petroleum product capabilities. These plans would continue to be followed to lessen the potential for a release.

Toxic Substances. Short-term, minor, adverse impacts from toxic substances might occur from the proposed demolition and renovation of buildings potentially containing ACMs, LBP, and PCBs that could be disturbed. Surveys for these substances would be completed, as necessary, by a certified contractor prior to work activities to ensure that appropriate measures are taken to reduce potential exposure to, and release of, these substances. Contractors would wear appropriate personal protective equipment and would be required to adhere to all federal, state, and local regulations as well as the installation's management plans for toxic substances. All ACM- and LBP-contaminated debris would be disposed of at a USEPA-approved landfill. New building construction is not likely to include the use of these substances because federal policies and laws limit their use in building construction applications. Long-term, negligible, beneficial impacts through renovation and demolition would occur from reducing the potential for future human exposure to and reducing the amount of ACMs, LBP, and PCBs to maintain at Tinker AFB.

Environmental Contamination. No short- or long-term impacts associated with environmental contamination sites would occur. While the DLA site partially coincides with Landfill Number 5 and East Groundwater Management Unit, these contamination sites would not impede development of the proposed B-21 maintenance campus. No buildings would be constructed on top of Landfill Number 5 so as to respect that site's land use controls. Automobile parking or airfield pavement might be constructed on top of the landfill and would be a permissible type of development. East Groundwater Management Unit does not prohibit future development but bans the use of groundwater for drinking purposes. All proposed facilities would be connected to the installation's existing potable water distribution system and groundwater production wells would not be constructed onsite. The plumes of East Groundwater Management Unit are expected to naturally attenuate by 2027 and may no longer exist when construction of the proposed B-21 maintenance facility occurs from FY 2025 to FY 2040. Groundwater monitoring wells within the footprint of construction would be closed, filled, and replaced, as needed.

Contractors performing construction and demolition could encounter undocumented soil or groundwater contamination. If soil or groundwater that is believed to be contaminated were discovered, the contractor would be required to immediately stop work, report the discovery to the installation, and implement appropriate safety measures. Commencement of field activities would not continue in this area until the issue was investigated and resolved.

Radon. No impacts associated with radon would be expected from implementation of the Proposed Action because Oklahoma County has a low potential for radon accumulation greater than 2 pCi/L within buildings.

3.4.3.2 ALTERNATIVE 2 – MROTC SITE

Hazardous Materials, Petroleum Products, and Hazardous Wastes. Alternative 2 would have similar short- and long-term, minor, adverse impacts from the use of hazardous materials and petroleum products and the generation of hazardous wastes during facility construction and renovation and during B-21 maintenance as Alternative 1. **Section 3.4.3.1** lists the types of hazardous materials, petroleum products, and hazardous wastes that could be needed to

support construction of the proposed B-21 maintenance depot as well as maintenance on the aircraft. Hazardous materials, hazardous wastes, and petroleum products currently within the MROTC site would be relocated to similar facilities to accommodate the proposed construction.

Toxic Substances. Alternative 2 would have similar but lesser short- and long-term, adverse impacts from toxic substances as Alternative 1. Because this alternative does not entail any building demolition, the amount of ACMs, LBP, and PCBs potentially encountered during site development would be less than that of Alternative 1 and limited to the buildings proposed for renovation. Surveys for these substances would be completed, as necessary, by a certified contractor prior to renovation activities to ensure that appropriate measures are taken to reduce potential exposure to, and release of, these substances. **Section 3.4.3.1** provides further details on the steps that would be taken to control toxic substances.

Environmental Contamination. No short- or long-term impacts associated with environmental contamination sites would occur. Only the westernmost portion of the MROTC site coincides with East Groundwater Management Unit, and the easternmost edge of an adjacent groundwater plume occupies a small portion of the site. As stated in **Section 3.4.3.1**, neither the East Groundwater Management Unit or groundwater plumes represent impediments to development of the proposed B-21 maintenance depot.

Radon. No impacts associated with radon would be expected from implementation of the Proposed Action because Oklahoma County has a low potential for radon accumulation greater than 2 pCi/L within buildings.

3.4.3.3 NO ACTION ALTERNATIVE

The No Action Alternative would not impact hazardous materials and wastes. No facility construction, demolition, or renovation would occur, and there would be no changes in aircraft operations or maintenance activities. Additional quantities of hazardous materials, petroleum products, and hazardous wastes would not be used, stored, or generated, and the management of hazardous materials, petroleum products, and hazardous wastes would not change. Toxic substances would remain and would continue to require maintenance by USAF personnel. No impacts on environmental contamination sites and radon would occur. Hazardous materials and wastes conditions at Tinker AFB would remain unchanged when compared to existing conditions described in **Section 3.4.2**.

3.5 Health and Safety

3.5.1 Definition of the Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death or serious injury. The elements of an accident-prone environment include the presence of unnecessary hazards and an exposed population at risk of encountering hazards. This section addresses the current conditions for military personnel and civilian safety, as well as health and safety following the implementation of the Proposed Action.

Safety and accident hazards can often be identified and reduced or eliminated. Necessary elements for an accident-prone situation or environment include the presence of the hazard itself together with the exposed (and possibly susceptible) population. The degree of exposure

depends primarily on the proximity of the hazard to the population. The proper operation, maintenance, fueling, and repair of aircraft and equipment also carry important safety implications. Activities that can be hazardous include transportation, maintenance and repair activities, construction, and activities that occur in extremely noisy environments. Safety can be improved by following regulatory requirements designed for the benefit of employees and through implementation of operational practices that reduce risks of illness, injury, death, and property damage.

The health and safety of onsite military and civilian workers are safeguarded by DoD and USAF regulations designed to comply with standards issued by the Occupational Safety and Health Administration (OSHA) and state occupational safety and health agencies. Safety standards regulate the management of the operational environment in order to improve safety. These standards may include reducing the magnitude of a hazard through engineering and administrative controls, safety checklists, and audits, as well as implementing the use of proper personal protective equipment (PPE).

DoD Directive 4715.1E, *Environment, Safety, and Occupational Health*, DoD Instruction 6055.1, DoD *Safety and Occupational Health (SOH) Program*, Air Force Policy Directive (AFPD) 91-2, *Safety Programs*, and AFI 91-202, *The U.S. Air Force Mishap Prevention Program*, provide safety guidance for implementation of the Air Force Mishap Prevention Program. The purpose of these guidance documents is to minimize loss of DoD and USAF resources and to protect personnel from occupational deaths, injuries, or illnesses by managing risks.

AFPD 91-2, *Safety Programs*, establishes aircraft mishap prevention program requirements, safety programs to identify and mitigate hazards, and guidelines for necessary safety training. AFMAN 91-203, *Air Force Occupational Safety, Fire and Health Standards* , defines the minimum safety, fire protection, and occupational health standards; assigns responsibilities to individuals or functions to help Commanders manage their safety and health programs to ensure they comply with OSHA and USAF guidance; and apply to all USAF activities. Additionally, all military aircraft fly in accordance with 14 CFR Part 91, *Federal Aviation Administration (FAA) General Operating and Flight Rules*, which addresses aircraft operations. AFI 11-202V3, *General Flight Rules*, prescribes general flight rules that govern the operation of USAF aircraft and includes regulations regarding aircrew readiness, aircraft speed, hazard avoidance, aircraft movement on the ground, procedures for aviation safety reporting, and other health and safety regulations. There are also a number of directives, instructions, and manuals that provide guidance on maintaining USAF health and safety standards including, but not limited to, the identification and mitigation of safety hazards, investigation of reportable mishaps, and required safety training.

According to AFMAN 91-223, *Aviation Safety Investigations and Reports*, USAF defines aircraft accidents (mishaps) as unplanned occurrences, or a series of occurrences, that result in damage to DoD property, occupational illness, or property damage; and may occur as the result of mid-air collisions, collisions with manmade structures or terrain, weather-related accidents, mechanical failure, pilot error, or bird/wildlife-aircraft strikes. USAF defines five categories of aircraft mishaps: Classes A, B, C, D, and E. For the purposes of this analysis, only Class A mishaps, which result in a direct mishap cost totaling $2.5 million or more, a fatality or

permanent disability, destruction of a DoD aircraft, or permanent loss of primary mission capability of a DoD aircraft, will be evaluated.

3.5.2 Existing Conditions

Tinker AFB is a secure military installation with access limited to military personnel, civilian employees, and military families. Operations and maintenance activities conducted on Tinker AFB are performed in accordance with applicable USAF safety regulations, published USAF Technical Orders, and standards prescribed by USAF Occupational Safety and Health requirements. Adherence to industrial-type safety procedures and directives ensures safe working conditions. The handling, processing, storage, and disposal of potentially hazardous materials associated with these activities are accomplished in accordance with all federal and state requirements applicable to the substance generated. Tinker AFB provides emergency services (e.g., fire and law enforcement), which include emergency response and force protection, for the installation.

Occupational Safety. Both natural and created environmental hazards may be present at Tinker AFB at any time due to the varied activities that take place on the installation. Naturally-occurring health and safety hazards on Tinker AFB may include climatic conditions including heat and cold stress and the potential for severe storms. Created health and safety hazards may include occupational noise exposure, ground traffic, the potential for injury while working with hand or power tools, and injuries while working with and in support of aircraft. Day-to-day operations and maintenance activities conducted at Tinker AFB follow applicable USAF safety regulations, published Air Force Technical Orders, and AFOSH requirements.

The fire suppression system at Tinker AFB consists of four fire stations and four water towers that provide additional water pressure and supplies when necessary. The fire stations are primarily in the vicinity of the airfield, within Building 117 near the northern portion of Runway 18/36, in Building 989 near the southern portion of Runway 18/36, and in Building 3102 adjacent to Taxiway 3. An additional fire station is in Building 7017 near the intersection of South Air Depot Boulevard and Southeast 44th Street. Community fire stations within two miles of the installation perimeter include the Midwest City Fire Department Station No. 2 approximately 1 mile north of Tinker Gate, the Del City Fire Department Central Station approximately 2 miles northwest of Tinker Gate and 1.5 miles west of Vance Gate, and the Oklahoma City Fire Department Station No. 13 approximately 1 mile south of Gott Gate. The Oklahoma City Fire Department Station No. 13 is the primary first responder to the existing MROTC site, as the site is separated from the main base by Douglas Boulevard (Tinker AFB 2013a). The Del City Police Department is less than 2 miles west of Tinker Gate.

The Environmental Health facility in Building 3334 is an outpatient care facility on the installation. The facility includes Occupational Medicine, Bioenvironmental Engineering, Public Health, Audiology, and supporting OC-ALC activities. Capacity of the medical facility is adequate to support the current Tinker AFB mission (Tinker AFB 2017a). Emergency services and inpatient care are diverted to neighboring civilian hospitals. The closest civilian hospitals to the installation include the Oklahoma Heart Hospital approximately 2.5 miles north of the northern installation perimeter and the Oklahoma Heart Hospital South approximately 1.5 miles southeast of the southern installation perimeter.

Runway Safety. Clear Zones (CZs) and Accident Potential Zones (APZs) are areas at each end of a runway that possess a higher potential for aircraft accidents. USAF designates these safety zones around the airfield and restricts incompatible land uses in these areas to reduce the public's exposure to safety hazards. The CZ begins immediately adjacent to each end of the runway and is the area of highest accident potential. There are two APZs (APZ I and APZ II) that lie beyond each CZ and have increasingly less accident potential as you move away from the runway, but still enough to warrant safety concerns. At Tinker AFB, there are two runways (18/36 and 13/31). Each of Tinker AFB's CZs encompasses an area 3,000 feet wide by 3,000 feet long. Each APZ I is 3,000 feet wide by 5,000 feet long and each APZ II is 3,000 feet wide by 7,000 feet long. Runway 18/36 runs in a north/south direction. Portions of the CZs and northern APZ I are outside the installation boundary while both APZ IIs are outside the installation boundary. Runway 13/31 runs in a northwest/southeast direction. A small portion of the southeast CZ is outside of the installation boundary, while the majority of both APZ Is are outside the installation boundary and both APZ IIs are completely outside the installation boundary (Tinker AFB 2006).

Aircraft Mishaps. Class A mishaps are the most serious of aircraft-related accidents and represent the category of mishap most likely to result in a crash. Although the B-21 aircraft does not have mishap data available, Class A mishap data for other bomber aircraft including the B-1, B-2, and B-52 were used to represent the likelihood of a mishap. **Table 3-12** lists the Class A mishap rates for the B-1, B-2, and B-52 aircraft. The table reflects USAF-wide data for all phases of flight and all missions and operations for each aircraft type (Tinker AFB 2006).

Table 3-12. Class A Mishap Rates for Selected Aircraft

Aircraft	5-year average Class A rate[1]	10-year average Class A rate[1]	Lifetime average Class A rate[1]
B-1	1.51	2.13	3.91
B-2	0.00	0.00	0.70
B-52	3.13	2.73	1.32

Sources: USAF 2019a, USAF 2019b, USAF 2019c

[1] "Rate" refers to the number of mishaps per 100,000 flight hours.

3.5.3 Environmental Consequences

An impact on health and safety would be considered significant if implementation of the Proposed Action were to substantially increase risks associated with aircraft activities, safety of personnel, contractors, military personnel, or the local community; hinder the ability of Tinker AFB or the surrounding community to respond to an emergency; or introduce new health or safety risks for which USAF or the surrounding community is not prepared or does not have adequate management and response plans in place.

3.5.3.1 ALTERNATIVE 1 – DLA SITE

Occupational Safety. Under Alternative 1, short-term, minor, adverse impacts on health and safety could occur during construction and demolition activities at the DLA site and DLA warehouse site, and during renovation activities at the proposed administrative office space proposed sites. Impacts could result from the exposure of workers to the inherent safety

hazards associated with the Proposed Action. Examples of such safety hazards include slips, trips, and falls; exposure to hot, cold, and wet conditions; biological hazards; and fire, mechanical, vision, noise, and respiratory hazards. Safety impacts construction workers would be dependent on activity levels, activity types, and length of the construction period.

Due to the use of large, powerful, and noisy equipment, construction activities are inherently dangerous. To minimize safety risks, all applicable safety regulations, AFOSH and OSHA safety standards, and management procedures including AFPD 91-2 would be followed during all phases of construction. Construction workers would be required to wear appropriate PPE such as reflective vests, ear protection, safety-toed boots, hard hats, gloves, and other safety gear. To avoid safety impacts to civilian and military personnel on the installation, areas undergoing construction would be fenced and appropriately marked for hazard potential. Trucks, tractors, and other heavy equipment such as graders and loaders used in construction would use roads appropriately and contractors would make all reasonable efforts to protect the safety of construction crews and others. Increases in safety risks would be temporary and construction hazards would cease following the completion of demolition, construction, and renovation activities.

Following construction, an additional 800 military and civilian personnel would be required to support B-21 depot maintenance operations at full capacity. This increase in personnel could increase the potential for occupational safety incidents. However, occupational safety operations and maintenance procedures for the B-21 would not differ greatly from current conditions for maintenance of the B-1. All operational and depot maintenance activities would continue to be conducted in accordance with applicable regulations, and USAF and AFOSH standards. The new maintenance campus and technological upgrades would create an efficient environment with minimal safety risk that would help to mitigate any potential for increase in occupational safety incidents. A slight increase in ground incidents may occur and could cause an influx of outpatient visits at the Environmental Health facility on the installation, or in emergency or outpatient visits to the regional hospitals. However, all medical centers within the area have sufficient capacity to support additional patients. Additionally, Tinker AFB would be the first responder if an emergency were to occur at the DLA site and it is anticipated that the installation's emergency response services have sufficient capacity to support the potential increase in ground incidents. Therefore, the anticipated change in occupational safety as a result of Alternative 1 would result in long-term, negligible, adverse impacts.

Runway Safety. The DLA site is not located within any CZs or APZs, and would not affect existing CZs or APZs.

Aircraft Mishaps. Long-term, negligible, adverse impacts on health and safety would occur under Alternative 1 because an additional 10 monthly aircraft operations would occur at Tinker AFB, resulting in an increase in the potential for an aircraft mishap. This would represent an increase in annual aircraft operations of less than 0.3 percent. Although these increases would present an increased risk of aircraft accidents, it would not, necessarily, translate into an actual increase of aircraft accidents. Although studies have been conducted on the relationship between operational tempo and accident rates, data proving a direct cause and effect result are inconclusive because so many other unpredictable hazard factors (e.g., weather, operating

environments, and pilot proficiency) can contribute to whether an accident actually occurs or is prevented. Because a bomber maintenance mission already exists on the installation, transition to the B-21 on the installation would not present new flight safety issues. Using the Class A mishap rates for similar bomber aircraft presented in **Table 3-12**, the risk that a B-21 aircraft would be involved in a Class A mishap at or around Tinker AFB would be low.

3.5.3.2 ALTERNATIVE 2 – MROTC SITE

Occupational Safety. Under Alternative 2, short-term, minor, adverse impacts on health and safety could occur during construction and renovation activities at the MROTC site, and during renovation activities at the proposed administrative office space site and the proposed warehouse site. Potential impacts from construction on ground health and safety would be the same as those described for Alternative 1. To minimize impacts on health and safety from construction and renovation activities, and to ensure the health and safety of military and civilian personnel, and the public, all applicable safety regulations, AFOSH and OSHA standards, and management procedures would be followed appropriately, and appropriate PPE would be worn by construction crews as needed to reduce safety risk.

Long-term negligible, adverse impacts on occupational safety could occur from the implementation of Alternative 2. An increase in occupational safety incidents could occur from the influx of 800 military and civilian personnel required to support B-21 maintenance operations. Potential impacts from an increase in personnel would be the same as those described for Alternative 1. Operational and depot maintenance activities would continue to be conducted in accordance with applicable regulations, and USAF and AFOSH standards.

Runway Safety. The MROTC site is not located within any CZs or APZs, and would not affect existing CZs or APZs.

Aircraft Mishaps. Impacts on aircraft mishap rates at Tinker AFB would be the same as those described for Alternative 1. Long-term, negligible, adverse impacts would occur from an increase in annual aircraft operations of less than 0.3 percent, and the risk that a B-21 aircraft would be involved in a Class A mishap at or around Tinker AFB would be low.

3.5.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the B-21 aircraft would not be brought to Tinker AFB for depot-level maintenance operations and USAF would not construct or demolish any facilities. Therefore, no impacts on health and safety of military and civilian personnel, or the surrounding community would occur.

3.6 Infrastructure, Utilities, Transportation

3.6.1 Definition of the Resource

Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is wholly man-made with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as “urban” or developed. The availability of infrastructure and its capacity to support growth are generally regarded as essential to the economic growth of an area. The infrastructure components discussed in this section are utilities such as electricity, natural gas, communications, potable

water, wastewater, stormwater, and solid waste. Other man-made infrastructure components discussed are the airfield and aircraft parking ramps, and the installation gates.

Transportation refers to major and minor roadways that feed into the installation and the roadways and parking areas on the installation. Public transit, rail, and pedestrian networks are also elements of transportation. Street and highway operations are primarily regulated by the Federal Highway Administration and implemented by the Oklahoma Department of Transportation. Local street operations and maintenance are managed by the Oklahoma City, Oklahoma County, Del City, Midwest City, and Tinker AFB. Roadway transportation conditions are evaluated using capacity estimates that depend on several factors including number of lanes, width of lanes, roadway gradient, obstructions, bus and truck volumes, and other physical characteristics of the roadway network.

3.6.2 Existing Conditions

Electricity. Electricity at Tinker AFB is supplied by Oklahoma Gas and Electric Company (OG&E), which is capable of providing 450,000 megawatt hours (MWh) annually to the installation. The installation currently uses 57,592 MWh of electricity annually, which is approximately 13 percent of the available electricity capacity. Nearly 72 emergency power generators provide backup power to key facilities in the event of an emergency.

According to the U.S. Energy Information Administration, the average residential monthly consumption of energy for 1,764,980 households in Oklahoma was 1,139 kilowatt hours (kWh) per customer in 2018 (USEIA 2019). OG&E has an electric generation capacity of 7,122 megawatts (Mw) and currently serves 858,000 customers throughout a 30,000 square mile service territory in central Oklahoma and west Arkansas (OG&E 2020). The net demand of electricity for OG&E customers was 5,934 Mw in 2019 (OG&E 2018). Assuming there were 858,000 customers in 2019, the average customer would have used approximately 6.9 kW of electricity within the year.

Natural Gas. Natural gas at Tinker AFB is provided by Oklahoma Natural Gas via a government supply contract administrated by the Defense Energy Supply Center and delivered at three metered delivery points. Natural gas on the installation is used as fuel for steam-producing boilers, providing space heating, domestic water heating, and process applications. The majority of the system was built in the 1950s and has not been upgraded since then (Tinker AFB 2017a). Oklahoma Natural Gas also supplies natural gas to the Oklahoma City Region and much of Oklahoma (ONE Gas Inc. 2018).

Communications. The communications system at Tinker AFB consists of underground copper fiber optic cable networks. An FY2017 project was proposed to upgrade the communications system and increase fiber optic capacity at the southern end of the installation (Tinker AFB 2017a). Because the MROTC site is not contiguous with the main Tinker AFB, the communication system at the site is somewhat separated. Internet service is provided to the site through a commercial service and a wireless system has been installed so that access maintenance systems, email, and other systems used by Tinker AFB are available at the MROTC site (Tinker AFB 2013a).

Potable Water. Potable water at Tinker AFB is supplied by 22 on-installation groundwater wells that range in depth from 380 feet to 706 feet. Supplementary potable water is purchased from the Oklahoma City municipal water supply. Water is drawn from the Garber-Wellington Groundwater Basin, which is a part of the Garber-Wellington Aquifer system. Tinker AFB maintains two water rights permits and a drinking water permit from the Oklahoma Water Resources Board (Tinker AFB 2001, Tinker AFB 2008, Tinker AFB 2005). The drinking water at the installation currently meets all federal and state requirements. The total supply/capacity of the installation's distribution system is 4,284,000 gpd which is adequate to meet the current average demand of 2,300,000 gpd (approximately 54 percent of capacity) and peak demand of 3,344,000 gpd (approximately 78 percent of capacity) (Tinker AFB 2017a).

Wastewater. Sanitary wastewater is collected onsite at Tinker AFB and conveyed to the Oklahoma City Wastewater Treatment Plant (WWTP) through four metered discharge points. Industrial wastewater is first treated at the Industrial WWTP on the installation and is then conveyed to the Oklahoma City WWTP through a transfer line at the western perimeter of the installation. The total capacity of the Oklahoma City WWTP is 80,000,000 gpd, which is adequate to meet the current Tinker AFB average demand of 1,076,000 gpd (approximately 1.3 percent of capacity) and the peak demand of 1,670,000 gpd (approximately 2 percent of capacity). The total capacity of the on-installation Industrial WWTP is 2,700,000 gpd, which is adequate to meet the average treatment demand of approximately 900,000 gpd (approximately 33 percent of capacity) (Tinker AFB 2017a).

Solid Waste. Solid waste generated at Tinker AFB is picked up for off-site disposal in a licensed landfill facility and handled by a private contractor. Construction and demolition debris are not included in the contract for solid waste disposal. Therefore, construction contractors are primarily responsible for the disposal and recycling of construction wastes. Several best management practices (BMPs) for waste management are applied at Tinker AFB and are outlined in an Integrated Solid Waste Management Plan. Based on information available for solid waste management at Tinker AFB, the solid wastes generated pose no constraints to operation and development at the installation (Tinker AFB 2017a).

Airfield and Aircraft Parking Ramps. There are two runways at Tinker AFB. The primary runway, Runway 18/36, runs in a north/south direction and Runway 13/31 runs in a northwest/southeast direction. The average Pavement Condition Index (PCI) for Runway 18/36 is 75 and the average PCI for Runway 13/31 is 92. The average PCI for all airfield surfaces including aprons, overruns, runways, taxiways is 72, which is considered in good condition. There are a total of 110 aircraft parking spaces at Tinker AFB while the current demand is 125 aircraft parking spaces. To receive additional aircraft, Tinker AFB would need to increase aircraft parking capacity by expanding existing ramps or building new ramp spaces. In 2006, it was estimated that over 46,000 aircraft operations occur at Tinker AFB yearly (Tinker AFB 2017a, Tinker AFB 2006).

Base Access/Gates. Tinker AFB can be accessed from 10 gates, all of which allow vehicular traffic to enter the installation. The Truck Gate can accommodate commercial vehicles 30 feet or longer and is the sole entry point for delivery trucks and commercial vehicles. The Truck Gate was recently upgraded to improve efficiency of inspections, however, trucks accessing the

points of delivery on eastern parcels within the base and the existing MROTC facility must be processed at the Truck Gate, exit the installation, and then re-enter the installation at gates along the eastern perimeter or at the MROTC entrance on Douglas Boulevard. The 10 gates, their processing capacities, and hours of operation are listed in **Table 3-13**. Traffic volume entering the installation peaks between 5:00 a.m. and 8:00 a.m. and traffic volume exiting the installation peaks between 3:00 p.m. and 5:00 p.m. Currently, many of the Tinker AFB gates are operating beyond their capacity, which can result in long queueing lines and untimely deliveries. Additionally, the gates do not meet Unified Facility Criteria requirements (Tinker AFB 2017a).

Table 3-13. Processing Capacity and Operating Hours for Tinker AFB Gates

Gate	Location	Capacity/Processing Hourly Rate (# of vehicles)	Operating Hours
Tinker Gate (Main Gate)	S Air Depot Boulevard	4,281	24/7
Hruskocy Gate	Industrial Boulevard	2,863	Mon-Fri 5:30 a.m. – 6:00 p.m.
Liberator Gate	SE 44th Street	2,301	Mon-Fri 5:30 a.m. – 6:00 p.m.
Hope Gate	SE 44th Street	362	Mon-Fri 5:30 a.m. – 6:00 p.m.
Gott Gate	S Air Depot Boulevard	4,727	Mon-Fri 5:30 a.m. – 6:00 p.m.
Piazza Gate	SE 59th Street	2,636	Mon-Fri 5:30 a.m. – 6:00 p.m.
Vance Gate	Doolittle Avenue	2,928	Mon-Fri 5:30 a.m. – 6:00 p.m.
Eaker Gate	Town Center Drive	1,021	Mon-Fri 6:00 a.m. – 8:00 a.m.
Lancer Gate	Staff Drive	3,945	24/7
Truck Gate	SE 59th Street	N/A[1]	24/7

Sources: Tinker AFB 2017a
[1] N/A = not available

Traffic accessing the current DLA site primarily use Gott Gate for installation access. Gott Gate is approximately 0.5 miles from the DLA site. Traffic accessing the existing MROTC site use a gate specific to the MROTC facility to access the site. The gate is on an unnamed roadway that can be accessed using S Douglas Boulevard and SE 49th Street east of the installation perimeter. The closest gate to the MROTC site with access to the main base is Piazza Gate, approximately 0.8 miles away. The Truck Gate is approximately 5 miles from the MROTC gate. The closest gates to the proposed renovation sites are Eaker Gate (approximately 0.5 miles west of the north renovation site) and Gott Gate (approximately 0.9 miles northwest of the south renovation site).

Regional Transportation Network. Tinker AFB is bounded by I-40 and Southeast 29th Street to the north, I-240 to the south, South Douglas Boulevard to the east, and South Sooner Road and South Air Depot Boulevard to the west. Several arterial roadways including South Air Depot Boulevard, Industrial Boulevard, South Douglas Boulevard and South Sooner Road connect the installation with surrounding highways and communities in all directions. Tinker Gate, or the main gate, at the north end of the installation, can be accessed from I-40. I-40 is a major highway that runs across the entire country, from California to North Carolina, and runs through central Oklahoma City. Gott Gate, at the south end of the installation, can be accessed using I-240 and South Air Deport Boulevard. The existing MROTC site is separated from the main base by South Douglas Boulevard, a four-lane arterial roadway. The transportation network within the

region is maintained by Oklahoma City, Oklahoma County, Midwest City, Del City, and the Oklahoma Department of Transportation.

Public transportation in the region is provided by Embark Transit, however, there are no stops with direct access to Tinker AFB. The primary civilian airport in the region is Will Rogers World Airport (OKC), 16 miles west of Tinker AFB. Passenger and freight rail services within the region are provided by AMTRAK, Union Pacific Railroad, and Burlington Northern and Santa Fe Railway. Because Tinker AFB is adjacent to many major roads and highways, the off-installation pedestrian network is limited (Tinker AFB 2017a).

Installation Transportation Network. Tinker AFB maintains over 44 miles of roadway. Arterial roads on the installation include South Air Deport Boulevard, Arnold Street, Munitions Road, and Perimeter Road. Collector roads include 5th Avenue, Reserve Road, 74th Street, McNamey Avenue, and Rawling Avenue. The collector roads distribute traffic from the arterial roadways to local streets or directly to intended destinations. There are a total of 31,230 personnel who likely use on-installation roadways daily (Tinker AFB 2019b)

Because the existing MROTC site is separated from the main base by South Douglas Boulevard, a public roadway, aircraft are towed across the roadway with the help of local law enforcement, who close the roadway. It takes approximately 10 minutes for each aircraft to be transported across South Douglas Boulevard. The Oklahoma City Police department is informed one week to several days prior to aircraft towing and are responsible for notifying area first responders (e.g., Oklahoma City Fire Department, hospitals, and medical centers) of the planned road closures. The temporary closure of South Douglas Boulevard occurs approximately 36 times yearly. Additionally, on-installation portions of Warehouse Road are closed for aircraft towing (Tinker AFB 2013a).

There are no bus route or active rail lines at Tinker AFB. Pedestrian facilities can be found throughout the installation and many sidewalks are adjacent to roadways in housing and recreation areas. Additionally, there is an installation-wide multi-use trail and conservation area called the Tinker AFB Greenway (Tinker AFB 2017a).

3.6.3 Environmental Consequences

Impacts on infrastructure are evaluated based on their potential to disrupt or improve existing infrastructure service levels and create additional needs. An impact on infrastructure or a utility could be considered significant if a proposed action resulted in exceeding a utility capacity, placed unreasonable demand on a specific utility, or created a long-term interruption in the operation of a utility.

Impact analysis for transportation considers changes to roadway and intersection level of service, and travel patterns and accessibility (i.e., ease of drivers to reach a desired destination). An impact on transportation could be considered significant if a proposed action resulted in a substantial decline in service level; reduced traffic safety leading to increased risk of vehicular accidents; or substantial and permanent changes to roadway and pedestrian network accessibility.

3.6.3.1 ALTERNATIVE 1 – DLA SITE

Electricity. Short-term, negligible, adverse impacts on the electrical system at Tinker AFB would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Temporary electrical disruptions could occur when buildings are disconnected from or connected to the electrical system during demolition, construction, and renovation activities. However, disruptions would be temporary and coordinated with area users prior to potential interruptions.

Long-term, negligible, adverse impacts on the Tinker AFB electrical system would occur from B-21 maintenance operations at the DLA site. Electricity to the site would continue to be provided to the site by OG&E, and new connections would need to be created for the DLA warehouse site. There is sufficient electrical capacity at Tinker AFB to support any additional electricity requirements. Impacts would also occur on the regional electricity supply as up to 1,200 additional military and civilian personnel, and their dependents, would live off-installation in the surrounding area. To conservatively estimate the additional regional electricity demand of the additional personnel, the residential electrical use for 1,200 households was calculated. Assuming each new OG&E household uses electricity at the 2019 rate of 6.9 KW, a total of 8,280 KW, or 8.28 MW of electricity would be required to support each household. This number represents less than 0.2 percent of OG&E's electricity capacity of 7,122 MW per year. The increase in regional electricity use would have a negligible effect on the OG&E electrical distribution system.

Natural Gas. Short-term, negligible, adverse impacts on the natural gas distribution system at Tinker AFB would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Temporary interruptions in natural gas supply would occur when buildings are disconnected from or connected to the natural gas distribution system during demolition, construction, and renovation activities. However, disruptions would be temporary and coordinated with area users beforehand.

No long-term, adverse effects would occur because it is not anticipated that the new B-21 maintenance depot, new DLA warehouse, or renovated facilities would require a natural gas supply beyond the distribution capacity at Tinker AFB. Long-term, minor, beneficial impacts on the natural gas system at the installation may occur from the demolition of older buildings and removal of outdated infrastructure, and the installation of updated, more efficient infrastructure at the proposed sites.

Communications. Short-term, negligible, adverse impacts on the communications system at Tinker AFB would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Temporary interruptions would occur when buildings are disconnected from or connected to the communication system during demolition, construction, and renovation activities. However, disruptions would be temporary and coordinated with area users prior to potential interruptions.

Long-term, negligible, adverse impacts would occur from the influx of up to 1,200 personnel to Tinker AFB placing additional demand on the communications system. However, because the communications system within the southern portion of the installation has recently been upgraded, an increase in personnel at the DLA site would not likely affect the communications

capacity at Tinker AFB. Long-term, minor, beneficial impacts on the communications system at the installation would occur from the demolition of older buildings and removal of outdated communications infrastructure, and the installation of upgraded communications systems at the new DLA site, DLA warehouse, and the renovated facilities.

Potable Water. Short-term, negligible, adverse impacts on the water distribution system would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Temporary interruptions would occur when buildings are disconnected from or connected to the system during demolition, construction, and renovation activities. However, disruptions would be temporary and coordinated with area users beforehand. Water necessary for construction activities, such as for dust suppression, would have a negligible effect on the installation's overall water supply capacity.

Long-term, negligible, adverse impacts on the water supply system at Tinker AFB could occur from the removal of the water pump station associated with the DLA site under Alternative 1. However, the installation has sufficient water supply capacity in other areas to continue to support affected areas. The installation, along with the Oklahoma City municipal water supply, also has sufficient capacity to support any additional water needed at the proposed B-21 maintenance depot. Additionally, the influx of up to 1,200 new military and civilian personnel, and their dependents, is not anticipated to affect the water supply capability of the area.

Wastewater. Short-term, negligible, adverse impacts on the sanitary and industrial wastewater systems at Tinker AFB would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Temporary interruptions could be experienced when buildings are disconnected from or connected to the wastewater systems on the installation during demolition, construction, and renovation activities. However, disruptions would be temporary and coordinated with area users beforehand.

Long-term, negligible, impacts on the industrial wastewater system would be anticipated from the potential for additional industrial wastewater discharges from B-21 maintenance operations. It is not expected that increased industrial wastewater discharges would affect the capacity of the on-installation Industrial WWTP. The addition of up to 1,200 military and civilian personnel and their dependents to the area would have a long-term, negligible effect on the regional wastewater system. It is anticipated that municipal wastewater discharges to the Oklahoma City WWTP would not affect the capacity of the system.

Solid Waste. Short-term, minor, adverse impacts on solid waste management at Tinker AFB would be expected from the creation of demolition, construction, and renovation debris. Solid waste generated from Alternative 1 would consist of building materials such as solid pieces of concrete, metals (e.g., conduit, piping, and wiring), lumber, cement, and asphalt. To maximize landfill diversion rates, contractors would be required to recycle construction and demolition debris in accordance with applicable federal and installation policies. In some cases, construction debris can be reused in place or repurposed at another facility. The contractor would be responsible for disposing of non-recyclable debris at permitted waste facilities. Long-term, minor, adverse impacts on solid waste management would occur from the addition of debris in local landfills from construction activities, and from increased waste generation from the influx of up to 1,200 new military and civilian personnel and their dependents, permanently

reducing the landfill capacity of the area. Minor, long-term adverse effects would also be expected from wastes produced during daily operation that would be collected and landfilled under the existing base maintenance contract. However, the additional solid waste generation would not exceed capacities of the existing waste management stream.

Airfield and Aircraft Parking Ramps. Alternative 1 would result in an additional 10 aircraft operations per month, an increase of less than 0.3 percent. The slight increase in aircraft operations would not affect the condition of the airfield pavement. Long-term, minor, beneficial, impacts would occur on aircraft parking capacity from the expansion of aircraft parking ramp space at the DLA site, which would reduce the strain on Tinker AFB aircraft parking capacity.

Base Access/Gates. Short-term, minor, adverse impacts on gate access and vehicle processing rates would occur from the implementation of Alternative 1 during facility demolition, construction, and renovation. Additional construction traffic including daily commutes from workers and material hauling would increase the daily number of vehicles accessing the installation. It is assumed that 175 construction personnel would commute daily to Tinker AFB from off-installation. Contractors and construction crews would likely access the installation using Gott Gate and all commercial vehicles would be required to use the Truck Gate. Both gates are approximately 0.5 miles west of the DLA site. The closest gate to the proposed new DLA warehouse facility is Gott Gate, which is approximately 1 mile north of the proposed site. The closest gate to the proposed administrative office space renovation site on the south side of the installation is Gott Gate, approximately 0.9 miles northwest of the site. The closest gate to the parts warehouse renovation site is Eaker Gate, approximately 0.5 miles west of the site. The greatest congestion at the installation gates would occur during peak travel time, typically 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. The level of impact on traffic volumes would be dependent on construction vehicle routes from Gott Gate, Eaker Gate, and the Truck Gate, frequency of travel, peak times for construction vehicle activity, and length of the construction period. Construction traffic would compose a small percentage of the total traffic volume accessing the installation when compared with existing conditions. Some heavy equipment such as dozers, loaders, and graders would be left at the construction site or staging area during the duration of the construction period, and would not contribute to the increase in vehicles accessing the installation daily. Temporary partial or full gate closures, traffic pattern changes, and detours would be communicated to installation personnel via electronic signs, bulletins, and memos. Additional gate traffic due to construction at Tinker AFB would cease once construction activities are completed.

Long-term, minor, adverse impacts on gate access and processing rates would occur from the implementation of Alternative 1. Incoming military and civilian personnel would likely live in off-installation housing and access the installation using Gott Gate, approximately 0.5 miles west of the DLA site. The capacity of Gott Gate is 4,727 vehicles per hour. An increase of up to 1,200 personnel during the overlap of B-1 and B-21 missions, and 800 personnel during the B-21-only mission would represent approximately 25 percent and 17 percent of Gott Gate capacity, respectively. Although most additional personnel would enter and exit the installation during peak travel times, typically from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m., it is likely that some personnel would maintain adjusted working hours and access Gott Gate during slow travel times. Additionally, some personnel may use other gates to access the proposed B-

21 maintenance depot, DLA warehouse, administrative office space, or B-21 parts warehouse, which would decrease the potential for congestion at Gott Gate.

Regional Transportation Network. Short-term, negligible, adverse impacts on the regional road network would occur from the implementation of Alternative 1 during facility demolition, construction, and renovation. No demolition, construction, or renovation activities would occur beyond the installation perimeter, therefore, impacts to regional roadways would likely be traffic-related only. Increased traffic on roadways used to access installation gates would likely result from the daily commutes of contractors and construction crews, delivery of materials, and removal of construction debris. However the increase in traffic would have a negligible effect and likely would not affect the service level of the roadways.

Long-term, negligible, adverse impacts on regional roadways near Gott Gate, the Truck Gate, and Eaker Gate could occur from additional vehicles accessing the installation daily, however, the increase in traffic would likely not affect the service level of any regional roadway.

No impacts on the regional public transportation system, civilian airports, passenger or freight train services, or pedestrian facilities would occur from the implementation of Alternative 1.

Installation Transportation Network. Short-term, minor, adverse impacts on installation roadways would be expected from the implementation of Alternative 1 during facility demolition, construction, and renovation. Demolition, construction, and renovation activities would require contractors and construction crews to travel on installation roadways daily. Construction traffic on the installation could also include delivery of materials and removal of debris from project sites. Location of increased traffic would primarily be within the southern portion of the installation, however, some traffic would be concentrated in the northern portion near the B-21 parts warehouse renovation site. Construction traffic would compose a small percentage of the total traffic on the installation and many of the construction vehicles would remain within a project site for the duration of the construction period, which would minimize impacts on installation roadways. Any potential increases in traffic volume associated with the construction activities would be temporary, and partial or full road closures, traffic pattern changes, and detours would be communicated to installation personnel via electronic signs, bulletins, and memorandums.

Long-term, negligible, adverse impacts on installation roadways may occur from an increase in up to 1,200 personnel on the installation and the increase in the number of vehicles on the roads daily. However, this increase represents a 3.8 percent increase from existing conditions and will not likely have an effect on on-installation roadway service levels.

No impacts on installation pedestrian facilities would occur from the implementation of Alternative 1.

3.6.3.2 ALTERNATIVE 2 – MROTC SITE

Electricity. Short-term, negligible, adverse impacts on the electrical system at Tinker AFB would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts would be the same as those described for Alternative 1.

Long-term, negligible, adverse impacts would be expected on the Tinker AFB electrical system from the implementation of Alternative 2. Electricity to the MROTC site would continue to be provided by OG&E, which has sufficient distribution capacity to support any addition energy required by B-21 maintenance operations. Additional impacts would occur on the regional electrical distribution system from the influx of up to 1,200 personnel moving to the area. Additional regional energy requirements would be the same as those described for Alternative 1 and the increase in regional electricity use will have a negligible effect on the OG&E electrical distribution system.

Natural Gas. Short-term, negligible, adverse impacts on the natural gas distribution system at Tinker AFB would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts would be the same as those described for Alternative 1.

No long-term effects on the natural gas distribution system would occur because it is not anticipated that the new B-21 maintenance depot at the MROTC site or renovated facilities would require a natural gas supply beyond the distribution capacity at Tinker AFB. Long-term, minor, beneficial impacts on the natural gas system at the installation may occur from the removal of outdated infrastructure, and the installation of updated, more efficient infrastructure at the proposed sites.

Communications. Short-term, negligible, adverse impacts on the communications system at Tinker AFB would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts would be the same as those described for Alternative 1.

Long-term, negligible, adverse impacts would occur from the influx of up to 1,200 personnel to Tinker AFB. However, because the communications system at the MROTC site is managed commercially, an increase in personnel would not likely affect the communications capacity at Tinker AFB. Long-term, minor, beneficial impacts on the communications system at the installation would occur from the installation of upgraded communications systems at the updated MROTC site and the renovated facilities.

Potable Water. Short-term, negligible, adverse impacts on the water distribution system would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts from construction and renovation activities would be the same as those described for Alternative 1.

Long-term, negligible, adverse impacts on the water supply system at Tinker AFB would occur from possible increases in potable water demand. However, the installation and the Oklahoma City municipal water supply has sufficient water supply capacity to support the water needs of B-21 maintenance activities. Additionally, the influx of up to 1,200 new military and civilian personnel is not anticipated to affect the water supply capability of the area.

Wastewater. Short-term, negligible, adverse impacts on the sanitary and industrial wastewater systems at Tinker AFB would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts from construction and

renovation activities would be the same as those described for Alternative 1. Long-term, negligible, adverse impacts on the on-installation Industrial WWTP and the Oklahoma City WWTP would be the same as those described for Alternative 1.

Solid Waste. Short-term, minor, adverse impacts and long-term, negligible, adverse impacts on solid waste at Tinker AFB would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. All impacts associated with construction and renovation waste generation and disposal would be the same as those described for Alternative 1.

Airfield and Aircraft Parking Ramps. Alternative 2 would result in an additional 10 aircraft operations per month, an increase of less than 0.3 percent. The slight increase in aircraft operations would not affect the condition of the airfield pavement. Long-term, minor, beneficial, impacts would occur on aircraft parking capacity from the construction of new pavements for aircraft apron space at the MROTC site, which would reduce the strain on Tinker AFB aircraft parking capacity.

Base Access/Gates. Short-term, minor, adverse impacts on gate access and vehicle processing rates would occur from the implementation of Alternative 2 during facility demolition, construction, and renovation. Additional construction traffic including daily commutes from 175 workers and material hauling would increase the daily number of vehicles accessing the installation. Contractors and construction crews would access the MROTC site using the existing MROTC gate, which is not contiguous with the main base. All commercial vehicles would be required to be processed using the Truck Gate at the southern end of the installation, exit the installation, and travel approximately 5 miles to the MROTC gate. Commercial vehicles accessing the administrative office space or B-21 parts warehouse renovation sites would also access the installation using the Truck Gate. Construction personnel accessing the renovation sites would likely enter the installation through Gott Gate, approximately 0.9 miles northwest of the proposed administrative office space, and Eaker Gate, approximately 0.5 miles west of the proposed B-21 parts warehouse. The greatest congestion at the installation gates would occur during peak travel time, typically 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. The level of impact on traffic volumes would be dependent on construction vehicle routes from Gott Gate, Eaker Gate, the Truck Gate, and the MROTC gate, frequency of travel, peak times for construction vehicle activity, and length of the construction period. Because the MROTC site is not contiguous with the main base, general military and civilian personnel who work on the installation do not use the gate; therefore, traffic congestion at that gate is unlikely. Some heavy equipment such as dozers, loaders, and graders would be left at the construction site or staging area during the duration of the construction period, and would not contribute to the increase in vehicles accessing the installation daily. Temporary partial or full gate closures, traffic pattern changes, and detours would be communicated to installation personnel via electronic signs, bulletins, and memos. Additional gate traffic due to construction at Tinker AFB would cease once construction activities are completed.

Long-term, negligible, adverse impacts on gate access and processing rates would occur from the implementation of Alternative 2. Incoming military and civilian personnel would likely live in off-installation housing and access the B-21 maintenance depot using the existing MROTC

gate. Up to 1,200 personnel during the overlap of B-1 and B-21 missions, and 800 personnel during the B-21-only mission, would likely be the sole users of the gate. Increase in traffic at other installation gates would be minimal and would not likely affect vehicle processing rates. Personnel accessing the administrative office space and B-21 parts warehouse would likely use Gott Gate and Eaker Gate, respectively, however, increase in traffic at those gates would be negligible.

Regional Transportation Network. Short-term, negligible, adverse impacts on the regional road network would occur from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts from construction and renovation activities would be the same as those described for Alternative 1.

Long-term, negligible, adverse impacts on regional roadways near Gott Gate, Eaker Gate, the Truck Gate, and the existing MROTC gate could occur from additional vehicles accessing the installation daily, however, the increase in traffic would likely not affect the service level of any regional roadway.

No impacts on the regional public transportation system, civilian airports, passenger or freight train services, or pedestrian facilities would occur from the implementation of Alternative 2.

Installation Transportation Network. Short-term, minor, adverse impacts on installation roadways would be expected from the implementation of Alternative 2 during facility demolition, construction, and renovation. Temporary impacts from construction and renovation activities would be the same as those described for Alternative 1.

Although the proposed B-21 maintenance depot site is on the installation, aircraft transportation to and from the facility would require towing across South Douglas Boulevard, a public roadway. Because aircraft towing across South Douglas Boulevard is already required for the existing MROTC site, long-term, negligible, adverse impacts would likely occur from B-21 aircraft towing as part of maintenance activities. Because the B-21 has not previously been towed across the roadway, additional actions may be needed by B-21 maintenance personnel, Tinker AFB personnel, and local law enforcement to prepare for aircraft towing. Tinker AFB is currently working with the local municipality to close off the portion of South Douglas Boulevard adjacent to Tinker AFB, which was studied under a separate action unrelated to the proposed B-21 maintenance depot. Should this section of the road become permanently closed, there would be no impact to local traffic due to towing of the B-21 to the MROTC site. However, this road closure could lead to unrelated minor impacts to local off-installation traffic patterns.

Long-term, negligible, adverse impacts on installation roadways may occur from an increase in up to 1,200 personnel on the installation and the increase in the number of vehicles on the roads daily. However, this increase represents a 3.8 percent increase from existing conditions and will not likely have an effect on on-installation roadway service levels. Additionally, most additional personnel would only need to access the new B-21 maintenance depot separated from the main base by South Douglas Boulevard, which would prevent additional traffic on main installation roadways and further decrease the potential for effects on roadway service levels.

No impacts on installation pedestrian facilities would occur from the implementation of Alternative 2.

3.6.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the B-21 aircraft would not be brought to Tinker AFB for depot level maintenance operations and USAF would not construct or demolish any facilities or infrastructure. Therefore, no new impacts on infrastructure, utilities, or transportation at Tinker AFB or within the region would occur.

3.7 Noise

3.7.1 Definition of the Resource

Sound is a physical phenomenon consisting of vibrations that travel through a medium, such as air, and are sensed by the human ear. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise intrusive. Human response to noise varies depending on the type and characteristics of the noise, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise is often generated by activities essential to a community's quality of life, such as aircraft operations, construction, or vehicular traffic.

Sound varies by both intensity and frequency. Sound pressure level, described in decibels (dB), is used to quantify sound intensity. The dB is a logarithmic unit that expresses the ratio of a sound pressure level to a standard reference level. Hertz are used to quantify sound frequency. The human ear responds differently to different frequencies. "A-weighing," measured in A-weighted decibels (dBA), approximates a frequency response expressing the perception of sound by humans. Sounds encountered in daily life and their sound levels are provided in **Table 3-14**.

Table 3-14. Common Sounds and Their Levels

Outdoor	Sound Level (dBA)	Indoor
Jet flyover at 1,000 feet	100	Rock band
Gas lawnmower at 3 feet	90	Food blender at 3 feet
Downtown (large city)	80	Garbage disposal
Heavy traffic at 150 feet	70	Vacuum cleaner at 10 feet
Normal conversation	60	Normal speech at 3 feet
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room

Source: Harris 1998

The sound pressure level noise metric describes discrete noise levels during a sound event and the level varies with the intensity of the sound. However, few sound events are steady with a single sound pressure level that describes noise; therefore, additional noise metrics have been developed to describe noise including:

- Equivalent Sound Level (L_{eq}) – L_{eq} is the average sound level in decibels of a given event or period of time.

- Maximum Sound Level (L_{max}) – L_{max} is the maximum sound level of an acoustic event in decibels (e.g., when an aircraft is directly overhead).

- Sound Exposure Level (SEL) – SEL is a measure of the total energy of an acoustic event. It represents the level of a one-second long constant sound that would generate the same energy as the actual time-varying noise event such as an aircraft overflight. SEL provides a measure of the net effect of a single acoustic event, but it does not directly represent the sound level at any given time.

- Day-night Sound Level (DNL) – DNL is the average sound energy in a 24-hour period with a penalty added to the nighttime levels. Due to the potential to be particularly intrusive, noise events occurring between 10:00 p.m. and 7:00 a.m. are assessed a 10 dB penalty when calculating DNL. DNL is a useful descriptor for aircraft noise because it: (1) averages ongoing yet intermittent noise, and (2) measures total sound energy over a 24-hour period. DNL provides a measure of the overall acoustical environment, but it does not directly represent the sound level at any given time.

Regulatory Review and Land Use Planning. The Noise Control Act of 1972 directs federal agencies to comply with applicable federal, state, and local noise control regulations. The Noise Control Act specifically exempts both aircraft operations and military training activities from state and local noise ordinances. There are no federal, state, or local noise regulations directly applicable to the Proposed Action. The USAF's land use guidelines for noise exposure are outlined in AFI 32-7063 *Air Installations Compatible Use Zone Program*. **Table 3-15** provides a general overview of recommended noise limits from aircraft operations for land use planning purposes. Detailed guidelines for the compatibility of various land uses with noise exposure levels are included in **Appendix E**.

Table 3-15. Recommended Noise Limits for Land Use Planning

General Level of Noise	Percent Highly Annoyed	Aircraft Noise (DNL)	General Recommended Uses
Low	<15%	< 65 dBA	Noise-sensitive land uses acceptable
Moderate	15%-39%	65–75 dBA	Noise-sensitive land uses normally not recommended
High	>39%	> 75 dBA	Noise-sensitive land uses not recommended

Source: USAF 2015

3.7.2 Existing Conditions

Background Noise. Existing sources of noise on and adjacent to the installation include military and civilian aircraft overflights, road traffic, and other noises such as lawn maintenance equipment, construction, and bird and animal vocalizations. Background noise levels without aircraft operations (L_{eq} and DNL) were estimated for the areas surrounding the installation using the techniques specified in the *American National Standards Institute - Quantities and*

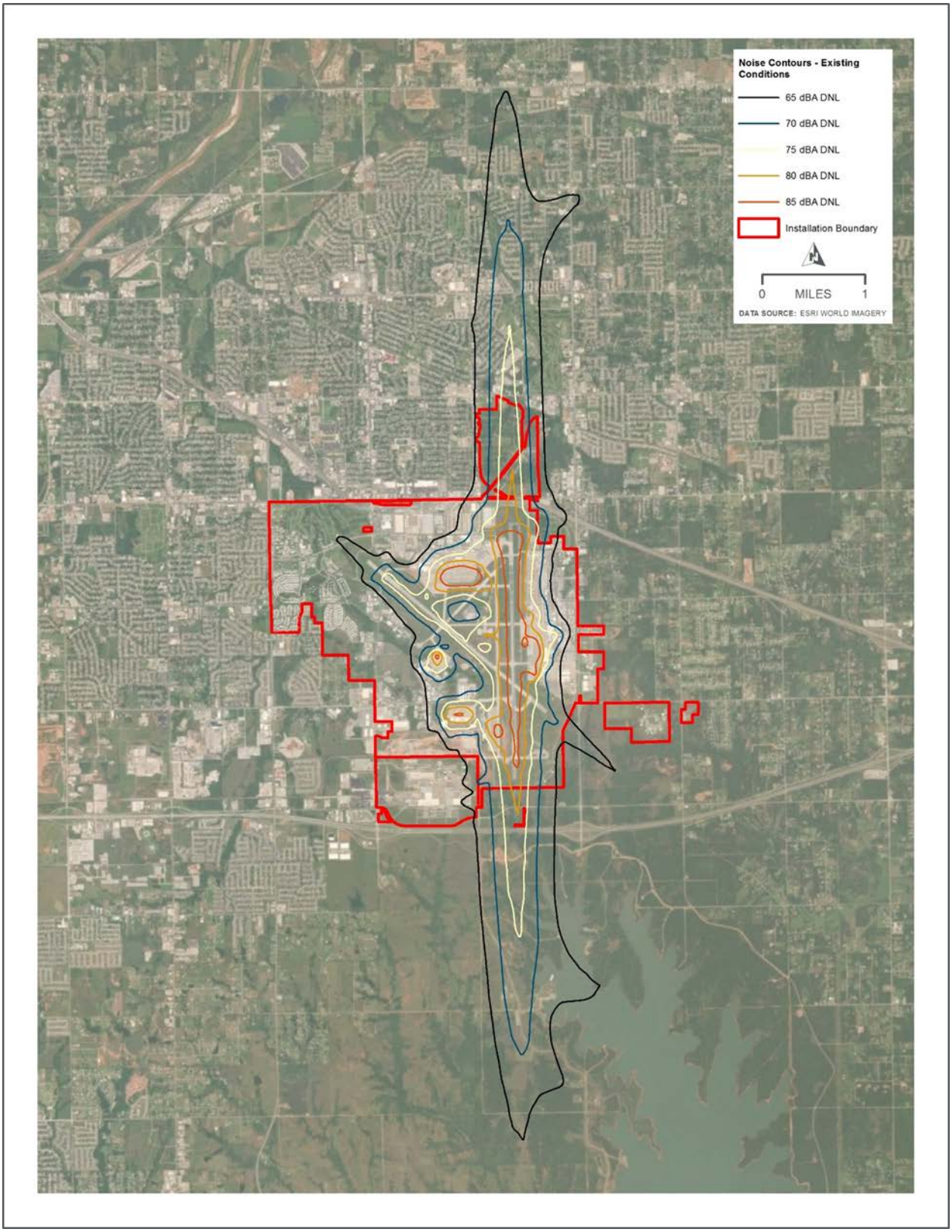
Procedures for Description and Measurement of Environmental Sound Part 3: Short-term measurements with an observer present. **Table 3-16** outlines the estimated background noise levels for the land uses surrounding the installation. DNL is greater than the L_{eq} because the noise occurring between 10:00 p.m. and 7:00 a.m. is assessed a 10 dB penalty.

Table 3-16. Background Noise Levels Surrounding Tinker AFB

Direction	General Land Use Category	L_{eq} (dBA)		DNL (dBA)
		Daytime	Nighttime	
South	Rural Residential	40	34	42
East	Quiet Suburban Residential	45	39	47
North/West	Normal Suburban Residential	50	44	52

Source: ANSI 2013

Overall Aircraft Noise. NOISEMAP (NMAP) is a suite of computer programs and components developed by the USAF to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations (USAF 2016). NMAP Version 7.3 was used to calculate the existing DNL noise contours at Tinker AFB. **Figure 3-4** shows the existing DNL noise contours plotted in 5 dB increments, ranging from 65 to 85-dBA DNL. The noise contours, as shown, depict 2014-2015 operational conditions as outlined in the KC-46A Main Operating Base Number 3 Environmental Impact Statement (USAF 2017). There have been no substantial changes in operations or missions at the base since they were developed, and have been carried forward as a comparative baseline to determine the level of effects under NEPA. The existing 65-dBA DNL noise contour extends approximately four miles from both ends of the installation's main north-south runway, and one-half a mile from the ends of the secondary runway. The 65-dBA DNL is the noise level below which generally all land uses are compatible with noise from aircraft operations.



Sources: USAF 2016

Figure 3-4. Existing Noise Contours

Table 3-17 presents the existing land acreage exposed to noise levels 65-dBA DNL or greater. There are 2,674 acres off the installation and 2,662 acres on the installation that are within the 65-dBA DNL contour under the existing conditions. There are two schools, three churches, and several residential neighborhoods within the existing 65-dBA DNL contour, primarily north of the base.

Table 3-17. Area within Noise Contours at Tinker AFB - Existing Conditions

Noise Contour (dBA DNL)	Area Under Contours (Acres)		
	On-Installation	Off-Installation	Total
65-70	710	1,718	2,428
70-75	625	760	1,385
75-80	707	187	895
80-85	352	8	360
>85	269	0	269
Total	**2,662**	**2,674**	**5,336**

Sources: USAF 2016

It should be emphasized that these noise levels, which are often shown graphically as contours on maps, are not discrete lines that sharply divide louder areas from land largely unaffected by noise. Instead, they are part of a planning tool that depicts the general noise environment around the installation based on typical aviation activities. Areas beyond 65-dBA DNL can also experience levels of appreciable noise depending upon training intensity or weather conditions. In addition, DNL noise contours may vary from year to year due to fluctuations in operational tempo due to unit deployments, funding levels, and other factors.

Individual Overflights. Individual overflights generate distinct acoustical events. **Table 3-18** outlines the L_{max} and SEL for individual aircraft overflights for the primary aircraft at Tinker AFB. Mid- to low-altitude overflights are similar to, but substantially louder than high altitude commercial aircraft overflights. Overflights conducted during takeoff and landing are clearly audible, sometimes loud, to individuals who are outdoors, and clearly perceptible inside nearby buildings. These effects are primarily focused in areas at the ends of each runway.

Table 3-18. Estimated Sound Levels for Existing Aircraft at Tinker AFB

Condition	Sound Level (dBA)													
	KC-135R		E- 3A		E-6		B-1		B-52H		KC-46		B-2	
	SEL	Lmax	SEL	Lmax	SEL	Lmax	SEL	Lmax	SEL	Lmax	SEL	Lmax	SEL	Lmax
Takeoff	92	86	109	101	93	87	123	118	111	104	95	87	109	104
Arrival	95	86	106	99	90	83	105	97	105	97	84	74	96	90
Visual Flight Rules (VFR) Pattern	88	79	98	91	85	77	98	91	102	95	83	72	88	81
Radar Pattern	88	80	93	90	83	77	91	84	100	91	79	73	86	79

Source: LPES-6N, USAF 2017

Noise Abatement Procedures. Aircraft noise reduction procedures at Tinker AFB have been designed to minimize effects on the surrounding community while maximizing operational capacity and flexibility. Although, there are no strict noise abatement measures outlined for Tinker AFB, takeoff flight patterns are routed to avoid noise-sensitive areas as much as possible and missions are schedule primarily to daytime hours. To the maximum extent possible, aircraft maintenance engine run-up locations have been established in areas to minimize noise for people in the surrounding communities, as well as for those on base. In addition, the Tinker AFB Public Affairs Office works with local governing entities and planning professionals to address complaints and concerns expressed by off-airfield neighbors (Tinker AFB 2006).

3.7.3 Environmental Consequences

This section discusses noise from construction, noise from individual aircraft, and potential changes to land use compatibility due to implementing the Proposed Action. Changes in noise would be considered significant if they would lead to a violation of any federal, state or local noise ordinance, or substantially increase areas of incompatible land use outside the installation.

3.7.3.1 ALTERNATIVE 1 – DLA SITE

Alternative 1 would have short- and long-term minor adverse effects on the noise environment. Short-term effects would be due to noise generated by heavy equipment during construction. Long-term effects would be due to incremental increases in aircraft noise in areas surrounding Tinker AFB. The Proposed Action would not lead to a violation of any federal, state or local noise ordinance, and would not substantially increase areas of incompatible land use adjacent to Tinker AFB.

Construction and Demolition. The proposed construction and demolition activities would require use of heavy equipment that would generate short-term increases in noise near the proposed DLA site. **Table 3-19** presents typical noise levels (dBA at 50 feet) for the main phases of outdoor construction. Individual pieces of heavy equipment typically generate noise levels of 80 to 90 dBA at a distance of 50 feet (FHWA 2006, USEPA 1971). With multiple items of equipment operating concurrently, noise levels can be relatively high within several hundred feet of active construction and demolition sites.

Table 3-19. Noise Levels Associated with Outdoor Construction

Construction Phase	L_{eq} (dBA)
Ground clearing	84
Excavation, grading	89
Foundations	78
Structural	85
Finishing	**89**

Sources: FHWA 2006 and USEPA 1971

All construction and demolition activities in support of Alternative 1 would be within the installation's property boundary, collocated with other existing noise-compatible activities, and end with completion of the facility construction and modification phase. The nearest off-

installation residential area is approximately 5,400 feet west of the proposed DLA site, and heavy equipment noise would be barely audible at this distance. These activities would be conducted in the context of an active AFB where aircraft and other types of noise are typical. Some people living or working near the DLA site may notice or potentially be annoyed by the noise. Given the temporary nature of proposed construction activities, distance to nearby noise-sensitive areas, and the existing noise environment, these effects would be minor. The following BMPs would be performed to further reduce any realized noise effects:

- Heavy equipment use would primarily occur during normal weekday business hours.
- Heavy equipment mufflers would be properly maintained and in good working order.
- Personnel, particularly equipment operators, would don adequate personal hearing protection to limit exposure and ensure compliance with federal health and safety regulations.

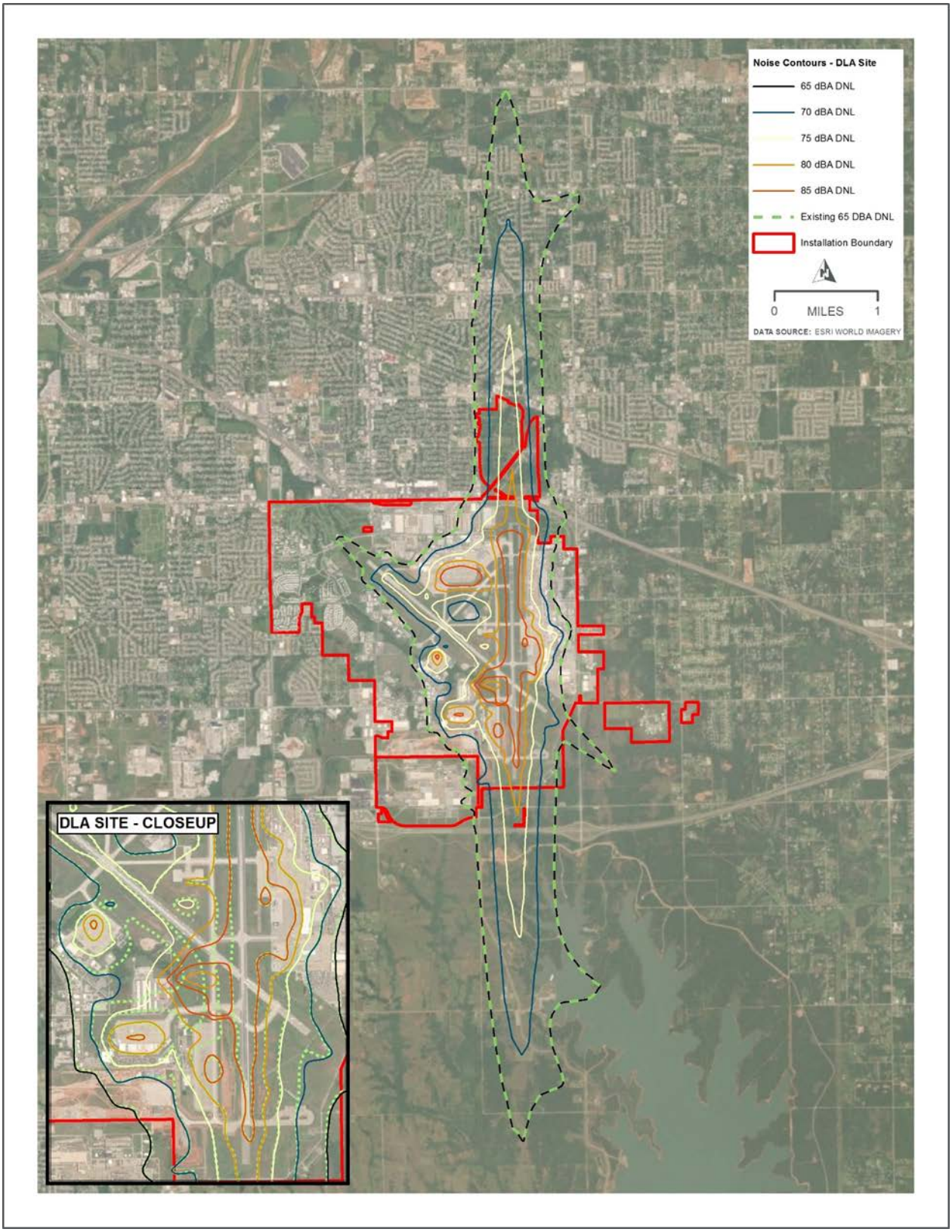
Overall Aircraft Noise. Noise levels on and adjacent to Tinker AFB with the proposed B-21 aircraft were calculated using NMAP 7.3 (USAF 2016). The addition of the ten B-21 operations per month and the establishment of a new maintenance run-up area would produce a minute, incremental increase in the noise levels surrounding Tinker AFB. **Figure 3-5** shows the base-wide DNL noise contours both with and without Alternative 1. The 65-dBA DNL noise contour would remain unchanged, continuing to extend approximately four miles from both ends of the installation's main north-south runway, and one-half a mile from the ends of the secondary runway. As shown in **Figure 3-5**, increases in maintenance activities would constitute a minor change in noise in areas near the proposed maintenance runup location. These increases in noise would be completely within installation boundaries and confined to areas near the runway.

Table 3-20 presents the land acreage exposed to noise levels 65-dBA DNL or greater both with and without Alternative 1. Alternative 1 would increase the areas off base exposed to greater than 65-dBA DNL from 2,674 acres to 2,695 acres. The additional 21 acres would be dispersed, and not in any concentrated location or area. Changes in the overall noise environment at and surrounding the installation would be minute and indistinguishable from existing conditions. Therefore, effects from overall aircraft noise from Alternative 1 would be negligible.

Table 3-20. Total Area within Noise Contours – Alternative 1

	Area Under Contours (Acres)					
	Existing Conditions			Alternative 1		
Noise Contour (dBA DNL)	On-Installation	Off-Installation	Total	On-Installation	Off-Installation	Total
65-70	710	1,718	2,428	648	1,733	2,381
70-75	625	760	1,385	633	763	1,396
75-80	707	187	895	700	190	890
80-85	352	8	360	366	9	374
>85	269	0	269	330	0	330
Total	**2,662**	**2,674**	**5,336**	**2,676**	**2,695**	**5,371**

Sources: USAF 2016



Sources: USAF 2016

Figure 3-5. Noise Contours for Alternative 1 – DLA Site

Because noise is measured on a logarithmic scale, two sources of equal value (e.g., takeoff and landing events along a runway) added together result in an increase of 3 dBA at all distances. Therefore, a doubling in air operations at an air installation would be required to increase the noise level by 3 dBA in nearby areas. For example, air traffic generating 60 dBA plus the same amount of air traffic at the same runway would yield a total noise level of 63 dBA. With the addition of ten B-21 operations per month, there would be a 0.31 percent increase in overall air operations when compared to existing conditions (USAF 2017). In general, a 0.31 percent increase in operations would translate to a 0.01 dB change in noise at any given location.

Individual Aircraft. Aircrews operating the B-21 aircraft would use similar flight procedures to those used by aircrews currently receiving maintenance at Tinker AFB. It is expected that noise from individual B-21 takeoffs and landings would be comparable to existing aircraft as shown on **Table 3-20.** Total Area within Noise Contours – Alternative 1. There would be a 0.31 percent increase in the number of aircraft operations at the base. As outlined above, these changes would not be perceivably different in areas surrounding the installation when compared to existing conditions. These effects would be negligible. Aircraft noise reduction efforts currently in place at Tinker AFB would continue to be implemented to reduce these already limited effects.

3.7.3.2 ALTERNATIVE 2 – MROTC SITE

Alternative 2 would have short- and long-term minor adverse effects on the noise environment. Short-term effects would be due to noise generated by heavy equipment during construction. Long-term effects would be due to incremental increases in aircraft noise in areas surrounding Tinker AFB. The Proposed Action would not lead to a violation of any federal, state or local noise ordinance, and would not substantially increase areas of incompatible land use adjacent to Tinker AFB.

Construction. The nature and overall level of effects from construction would be similar to those outlined under Alternative 1, but would be focused around the proposed MROTC site. As there would be less overall construction activities, these effects would not last as long as those described under Alternative 1. As with Alternative 1, all construction activities in support of Alternative 2 would be within the installation's property boundary, collocated with other existing noise-compatible activities, and end with completion of the construction phase. The nearest off-installation residential area is approximately 4,500 feet east of the proposed MROTC site, and heavy equipment noise would be barely audible at this distance. These activities would be conducted in the context of an active AFB where aircraft and other types of noise are typical. Some people living or working near the MROTC site may notice or potentially be annoyed by the noise. Given the temporary nature of proposed construction activities, distance to nearby noise-sensitive areas, and the existing noise environment, these effects would be minor. BMPs would be the same as those outlined under Alternative 1.

Overall Aircraft Noise. **Figure 3-6** shows the base-wide DNL noise contours both with and without Alternative 2. The 65-dBA DNL noise contour would remain largely unchanged, continuing to extend approximately four miles from both ends of the installation's main north-south runway, and one-half a mile from the ends of the secondary runway. As shown in **Figure 3-6**, increases in maintenance activities would constitute a minor change in noise in areas near the proposed maintenance run-up location. The 65-dBA DNL noise contour would expand in the

area of the proposed MROTC run-up location, but would remain predominantly on base. These areas would not encompass or be adjacent to any off-base residential areas.

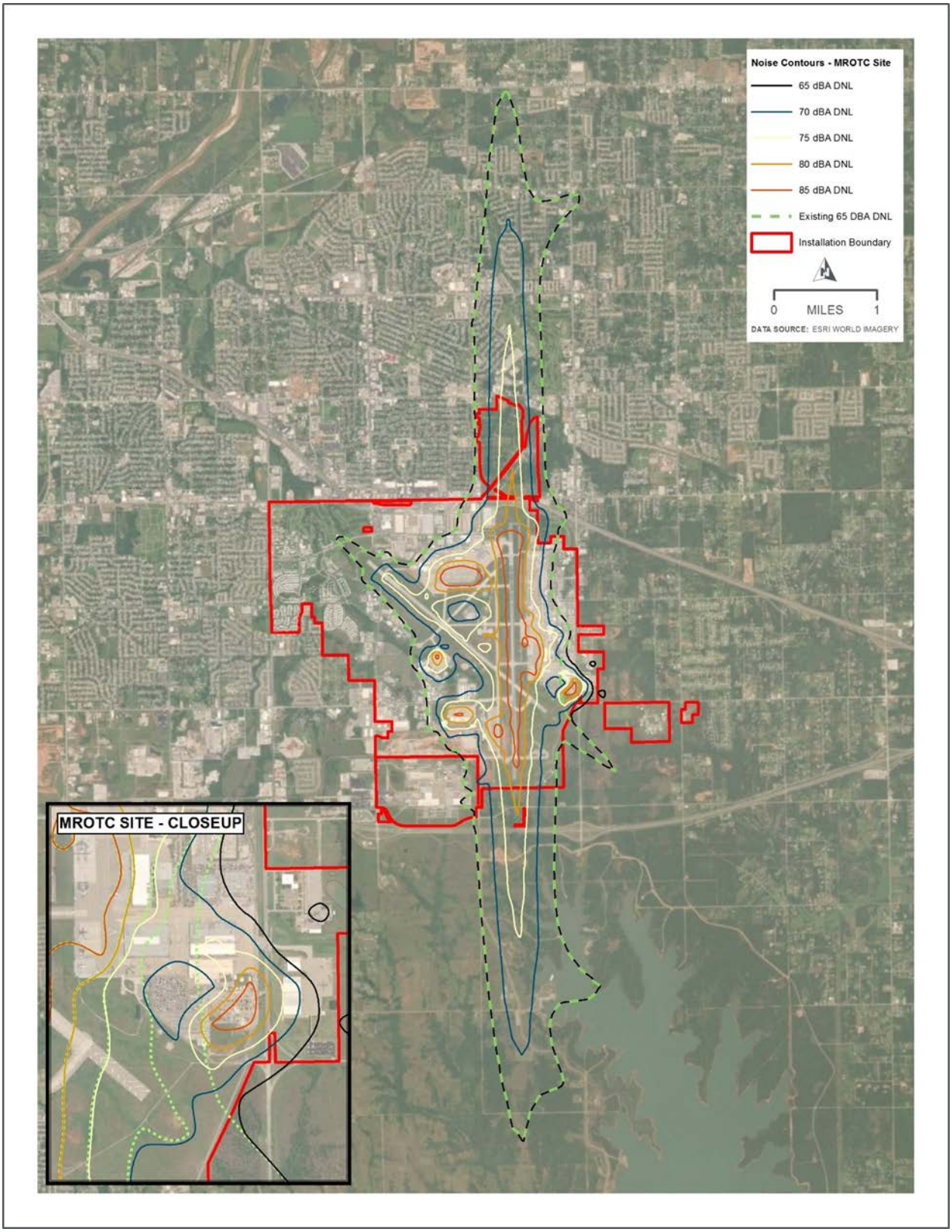
Table 3-21 presents the land acreage exposed to noise levels 65-dBA DNL or greater both with and without Alternative 2. Alternative 2 would increase the areas off base exposed to greater than 65-dBA DNL from 2,674 acres to 2,701 acres. The additional 27 acres would be dispersed, and not in any concentrated location or area. As with Alternative 1, with the addition of ten B-21 operations per month, there would be a 0.31 percent increase in overall air operations when compared to existing conditions (USAF 2017). In general, a 0.31 percent increase in operations would translate to a 0.01 dBA DNL change in noise at any given location. Changes in the overall noise environment at and surrounding the installation would be minute and indistinguishable from existing conditions. Therefore, effects from overall aircraft noise from Alternative 2 would be negligible.

Table 3-21. Total Area within Noise Contours – Alternative 2

	Area Under Contours (Acres)					
	Existing Conditions			Alternative 2		
Noise Contour (dBA DNL)	On-Installation	Off-Installation	Total	On-Installation	Off-Installation	Total
65-70	710	1,718	2,428	687	1,739	2,426
70-75	625	760	1,385	691	763	1,455
75-80	707	187	895	727	190	917
80-85	352	8	360	362	9	370
>85	269	0	269	274	0	274
Total	**2,662**	**2,674**	**5,336**	**2,741**	**2,701**	**5,442**

Sources: USAF 2016

Individual Aircraft. As with Alternative 1, aircrews operating the B-21 aircraft would use similar flight procedures to those used by aircrews currently receiving maintenance at Tinker AFB. It is expected that noise from individual B-21 takeoffs and landings would be comparable to existing aircraft as shown on **Table 3-18**. There would be a 0.31 percent increase in the number of aircraft operations at the base. As outlined above, these changes would not be perceivably different in areas surrounding the installation when compared to existing conditions. These effects would be negligible. Aircraft noise reduction efforts currently in place at Tinker AFB would continue to be implemented to reduce these already limited effects.



Sources: USAF 2016

Figure 3-6. Noise Contours for Alternative 2 – MROTC Site

3.7.3.3 NO ACTION ALTERNATIVE

Selecting the No Action Alternative would result in no effect to the noise environment. No construction or demolition would be undertaken, and there would be no changes in aircraft operations. Noise conditions would remain unchanged when compared to existing conditions at Tinker AFB.

3.8 Socioeconomics and Environmental Justice

3.8.1 Definition of the Resource

Socioeconomics. Socioeconomic resources are defined as the basic elements associated with the human environment, generally including factors associated with regional demographics and economic activity. Demographics can be described by the number, distribution, and composition of population and households. Economic activity is represented by the region's major industries, employment, and income characteristics. Direct impacts on either of these two fundamental socioeconomic indicators are typically accompanied by changes in other components, such as altered housing availability, education, and local and regional trends in economy and industry. The socioeconomics region of influence (ROI) is the area within which potential impacts on the local economy could occur because of the proposed construction and renovation projects, and an increase in personnel.

Environmental Justice. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, specifies that each federal agency shall "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." In an accompanying Presidential memorandum, the President specified that federal agencies shall analyze the environmental effects of their actions on minority and low-income communities, including human health, economic, and social effects when such analysis is required by NEPA.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, mandates the investigation of environmental effects on children. This EO acknowledges that children may suffer disproportionately from environmental health risks and safety risks; therefore, each federal agency is required to make it a priority to identify and assess environmental health and safety risks on children and ensure agency policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

The *Guide for Environmental Justice Analysis under the Environmental Impact Analysis Process*, November 2014, and the CEQ Environmental Justice Guidance under NEPA, December 1997 provide direction and guidelines for analyzing impacts on minority and low-income populations, elderly or children in NEPA documents. To determine if minority and low-income populations, elderly or children are disproportionately impacted, two areas of comparison must first be determined.

- The area where potential impacts on resources could occur (e.g., air quality, noise, land use), also known as the ROI, and

- The larger regional community that includes the affected area and serves as a Community of Comparison (COC).

Impacts on Environmental Justice communities would be directly related to impacts that could occur on other resource areas analyzed in this EA (e.g., air quality, noise, land use). The ROI for environmental justice includes the census tracts that encompass impacts on these resource areas. The ROI is geographically contained within the COC. Typically, the COC is the county which encompasses the ROI, which is Oklahoma County. ROI demographic data for low-income and minority populations is compared to COC data to determine whether percentages of these populations are higher in areas that would be adversely impacted by the Proposed Action.

For purposes of this EA, minority, low-income, and child populations are defined as follows:

Minority Populations – All persons identified by the U.S. Census Bureau (USCB) to be of Hispanic or Latino origin, regardless of race, plus non-Hispanic persons who are Black or African American, Native American or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, or members of some other (i.e., non-white) race or two or more races. CEQ also states, "A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds" (CEQ 1997).

Low-Income Populations – All persons who fall within the statistical poverty thresholds established by the USCB. For this analysis, low-income populations are defined as persons living below the poverty level. The percentage of low-income persons is calculated as the percentage of all persons for whom the USCB determines poverty status, which is generally a different number than the total population because it excludes institutionalized persons, persons in military group quarters and college dormitories, and unrelated individuals under 18 years of age.

Child Population – Children are defined as all people 17 years of age and under.

Elderly Population – Elderly are defined as all people 65 years of age and over.

3.8.2 Existing Conditions

3.8.2.1 SOCIOECONOMICS

For this analysis, the ROI includes Oklahoma City, whose economy is closely associated with Tinker AFB and represents the area that would be affected by the Proposed Action. It is assumed that the majority of the approximately 175 people required for construction and demolition, and approximately 800 support personnel for B-21 depot maintenance operations would be a mix of civilian and military that live and commute within the Oklahoma City region.

The scope of this section includes population, economic activity, housing and education. Socioeconomic data represented in this section are presented at city, county and state levels to characterize baseline socioeconomic conditions in the context of regional and state trends. Data has been collected from previously published documents issued by federal, state, and local agencies and from state and national databases will also be used for this analysis.

Population Characteristics. In 2018, the USCB, estimated the total population of Oklahoma County to be 782,051, of which 637,284 live in Oklahoma City. Oklahoma City is located entirely within Oklahoma County and experienced a faster growth rate than Oklahoma County. The population percent change for Oklahoma County from 2010 to 2018 was 11.1 percent, as compared to 13.1 percent for Oklahoma City, and 6.6 percent for the state of Oklahoma (USCB 2020a). Population data for 2010 to 2018 for Oklahoma City, Oklahoma County, and Oklahoma are presented in **Table 3-22**.

Table 3-22. Population Trends: 2010-2018

Location	Population Data		
	2010	2018	Percent Change
Oklahoma	3,675,339	3,918,137	6.6%
Oklahoma County	704,023	782,051	11.1%
Oklahoma City	563,571	637,284	13.1%

Source: USCB 2020a

Economic Activity. Tinker AFB generates economic activity in the region through employee payrolls, service contracts, construction programs, local procurements, and other expenditures. In FY 2019, Tinker AFB was Oklahoma's largest single-site employer. Tinker AFB employs approximately 30,689 personnel (6,480 military, 4,660 military dependents, and 19,549 civilians). Tinker AFB has an annual payroll of $1.76 billion and annual expenditures of $1.47 billion. Annually, Tinker AFB generates approximately $1.6 billion in jobs created with a total of $4.83 billion in total economic impact (Tinker AFB 2020).

According to the USCB, the 2018 per capita income in Oklahoma City was $29,581, as compared to the U.S. per capita income of $32,621. From 2014 to 2018, the unemployment rate for Oklahoma City was 4.8 percent, which was lower than Oklahoma County average rate of 4.9 percent, the state of Oklahoma average rate of 5.3 percent, and the U.S. average rate of 5.9 percent (USCB 2020b). Construction workers within Oklahoma City represent approximately 8.2 percent of the population (25,176 persons) (USCB 2020b).

The leading industries in Oklahoma City are educational services, and health care and social assistance (21 percent of working civilian employed population); retail trade (12.2 percent of the civilian employed population); professional, scientific, management, administrative, and waste management (10.5 percent of the civilian employed population); and arts, entertainment, and recreation, and accommodation and food services (10.0 percent of the civilian employed population) (USCB 2020b). Some of the major employers within the Oklahoma City area are the State of Oklahoma, Tinker AFB, University of Oklahoma, Federal Aviation Administration, INTEGRIS Health, Hobby Lobby Stores, Inc., Mercy Health System, and OGE Energy Corp (USHUD 2018).

Housing. Tinker AFB provides housing for unmarried military personnel in 14 dormitories containing approximately 950 beds and has about 650 privatized housing units for married military personnel and their families. The remaining military personnel and family members, approximately 7,000 households, reside off-base in the surrounding private housing market

(USHUD 2018). The Tinker AFB Referral Office utilizes the Automated Housing Referral Network (AHRN) website to refer all Service Members, DoD Civilians as well as DoD contractors looking for rental homes. AHRN is a community housing website sponsored by the DoD and utilized by all service branches that is designed to improve the process of connecting military members and their families with available housing. Currently, there are approximately 150 available rental listings posted on AHRN within Tinker AFB's housing market area (HMA) (AHRN 2020).

Oklahoma City has a variety of housing and rental options available. From 2014-2018 it was estimated that of approximately 270,200 housing units in Oklahoma City, 11.0 percent were vacant. Of the total housing units, 70.0 percent were single-unit structures, 26.0 percent were multi-unit structures, and 3.3 percent mobile homes (USCB 2020c).

The Oklahoma Metropolitan Statistical Area (MSA) is comprised of Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma counties in Central Oklahoma. Home sales market conditions in the Oklahoma City MSA are currently balanced with an estimated home sales vacancy rate of 1.6 percent as of March 2020. New and existing home sales were unchanged during the 12 months ending January 2020, and the average price for a home increased 3 percent to $196,300. New home sales increased 11 percent to 4,400 homes, and the average price for a new home increased 5 percent to $274,100 during the same period (USHUD 2020).

The Oklahoma City MSA has a rental vacancy rate of 8.5 percent as of March 2020, down from 10.4 percent in 2010. The average apartment vacancy rate as of March 2020, is 6.3 percent, down from 7.0 percent in 2019. The average apartment rent in the MSA is $710, up 2 percent from 2019. Average apartment rents range from $590 in the western portion of Oklahoma City to $1,400 in the downtown Oklahoma City area. About 575 rental units are under construction in the MSA and 2,800 are planned to be completed in the next three years (USHUD 2020).

Education. Children who live within the vicinity of Tinker AFB attend schools within the Midwest City-Del City School District. The school district includes 15 elementary schools, 5 middle schools, and 3 high schools. The Midwest City-Del City School District provides an educational program for approximately 14,500 students.

3.8.2.2 ENVIRONMENTAL JUSTICE

For this analysis, the ROI for environmental justice includes the two census tracts potentially affected by Alternative 1 and Alternative 2. Alternative 1 – DLA site is located in Census Tract 1075 and Alternative 2 – MROTC site is located partially in Census Tract 1075 and partially within Census Tract 1074.03 as shown in **Figure 3-7**. Oklahoma County is identified as the COC for this analysis. However, Oklahoma City, the state of Oklahoma, and the U.S. are also included for demographic context. **Table 3-23** summarizes census data for minority, low-income, children and elderly populations for Census Tracts 1074.03 and 1075 and community data.

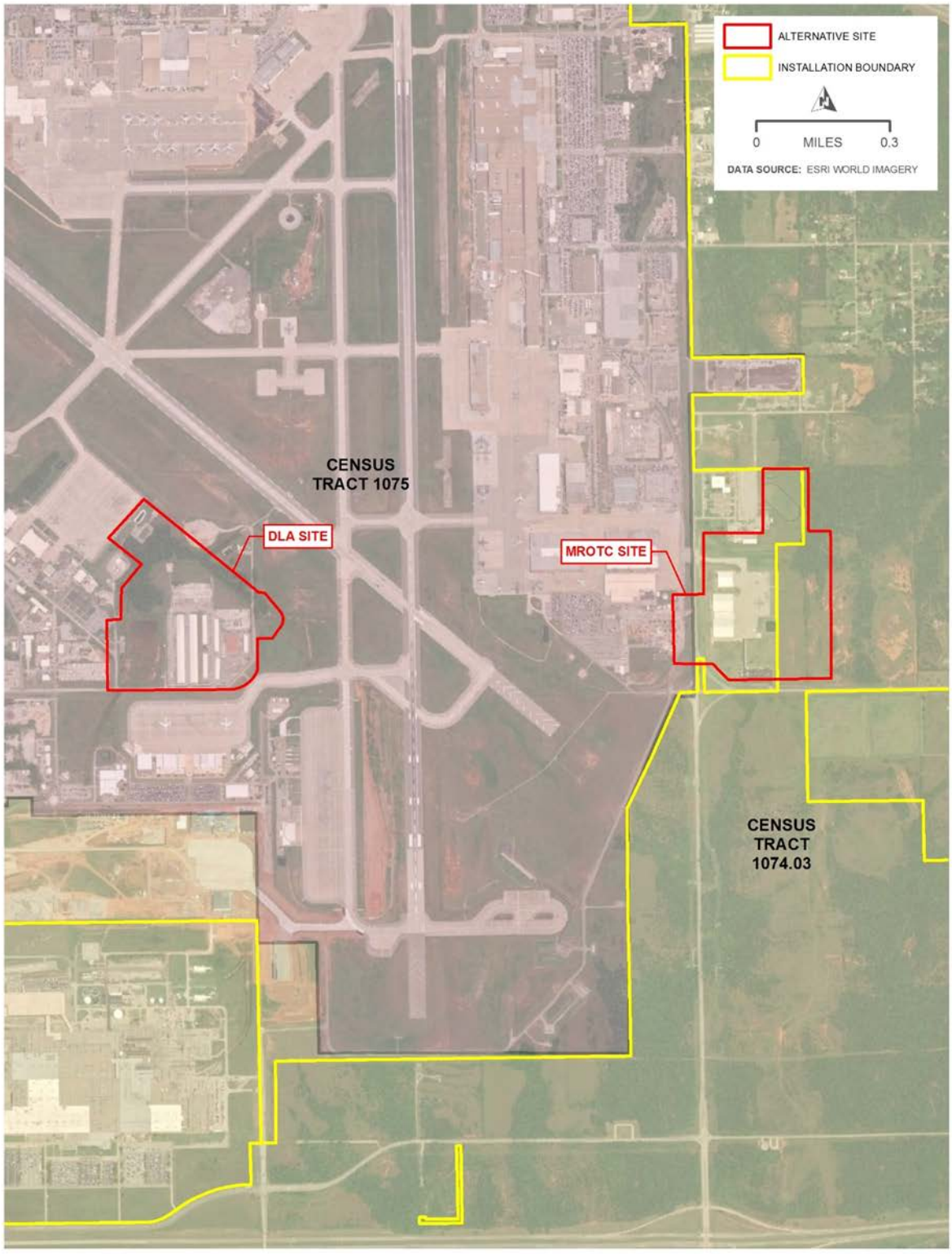


Figure 3-7. Census Tracts Identified in the ROI

Table 3-23. Percent Minority Population and Low-Income Population

Demographic Area	Total Population	Total Minority Population	Percent Minority[1]	Percent Low-Income Population	Percent of children *(age 17 and under)*	Percent of elderly *(age 65 and over)*
Region of Influence (ROI)						
Census Tract 1074.03	5,905	2,773	47	8.3	23.1	11.3
Census Tract 1075	3,277	1,185	36	12.2	27.6	0
Community Data (COC)						
Oklahoma County, OK *(Community of Comparison)*	782,051	341,270	44	16.7	25.7	13.0
Oklahoma City, OK	637,284	294,051	46	16.8	26.0	12.1
Oklahoma	3,918,137	1,332,027	34	16.0	24.5	15.0
United States	322,903,030	125,721,753	39	14.1	22.8	15.2

Source: USCB 2020b and USCB 2020d
Notes:
[1] Minority Race includes Black or African American; Native American and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; and some other race
[2] Orange highlight notates the presence of an Environmental Justice population and or a presence of a population that has a percentage of children higher than the COC

As shown in **Table 3-23**, Census Tract 1074.03 contains a slightly higher minority percentage (i.e., 47 percent) than that of the COC (i.e., 44 percent). The percentage of minority population in Census Tract 1075 is below that of the COC at 36 percent. The percentage of low-income population for both Census Tract 1074.03 and 1075 is below the COC. Census Tract 1075 contains a higher percentage of children than that of the COC (i.e., 25.7 percent) and Census Tract 1074.03 (i.e., 23.1 percent). The percentage of elderly within the ROI is less than the percentage of the COC.

3.8.3 Environmental Consequences

Socioeconomics. Socioeconomic impacts may be considered significant if the Proposed Action substantially affected the local economy, employment, or economic stability in the region, or resulted in a substantial change in the population that affected the demand for housing or education services.

Environmental Justice. The USAF has issued guidance on environmental justice analysis and analysis of the environmental health and safety of children, minorities, and low-income populations as part of EIAP. To comply with EO 12898, ethnicity and poverty status have been analyzed. The ROI for each resource area has been evaluated within the COC to identify the presence or absence of environmental justice populations. Percentages of environmental justice communities and populations within each ROI are compared to corresponding percentages for the COC to determine if disproportionate impacts will occur. A disproportionate impact is presumed to occur if percentages of the ROI are greater than or equal to the corresponding percentages in the COC. Additionally, to comply with EO 13045, environmental health and safety risks have been identified to determine if children could be disproportionately affected by

the Proposed Action. Impacts may be considered significant if the human health or environmental impacts resulting from the Proposed Actions were to disproportionately adversely impact children or minority or low-income populations.

The ROIs for Alternative 1 and Alternative 2 are the two census tracts potentially affected by the depot maintenance of the B-21. Given the demographic composition of the ROIs, there is one environmental justice population present within Census Tract 1074.03. This census tract has a higher minority percentage than that of the COC. Since it is unknown which residents within Census Tract 1074.03 are minorities, for this analysis, it is assumed that all residents are minorities. Census Tract 1074.03 will be referred to as an environmental justice population. Also within the ROIs for Alternative 1 and Alternative 2, Census Tract 1075 has a greater percentage of children than the COC, as presented in **Table 3-23**.

3.8.3.1 ALTERNATIVE 1 – DLA SITE

Socioeconomics. Under Alternative 1, short- and long-term, negligible to minor, adverse and beneficial impacts would be anticipated on socioeconomics from the proposed construction and personnel increases.

Population. Under Alternative 1, an estimated 175 people would be required for the demolition and construction of the B-21 depot maintenance facilities. The number of construction workers would represent less than a one percent increase in the daily installation population of 30,689 (including active duty, military dependent, and civilian workers). This increase would be short term, lasting only for the duration of the construction and demolition, and only occur during working hours. It is assumed that the 175 construction personnel would come from the local community and would not affect the local population.

The addition of B-21 office and maintenance personnel would be phased in beginning in FY2024, with full depot maintenance capabilities achieved in FY2040. It is assumed that as personnel are phased in, there could be an increase of up to 1,200 personnel from any overlap in the B-1 and B-21 missions; which would represent a temporary increase in the Tinker AFB population of 3.0 percent, during work hours. Once phasing was complete in 2040, approximately 800 people would be required for B-21 maintenance capabilities, which would result in a long-term increase in the Tinker AFB population by 2.0 percent.

It is assumed that the B-21 maintenance personnel would live in and commute within the Oklahoma City region. According to the 2018 USCB data from **Table 3-22**, the total population within the socioeconomic ROI (Oklahoma City) would increase by 0.2 percent with 800 additional long-term office and maintenance personnel. These increases would not affect the ability of any public services, transportation or infrastructure to support the community. Impacts from population changes associated with Alternative 1 would be less than significant.

Economic Activity. Under Alternative 1, the local economy would benefit from expenditures incurred from facility construction and demolition. Construction materials and goods would likely be purchased from the local area, increasing the amount of local business expenditures, which would result in short-term, beneficial impacts to the local economy. During construction, an estimated 175 people would be required for facility demolition and construction, which would provide a direct temporary increase in income for construction workers. Employment in the area

would not increase since it is expected that the construction companies would utilize their current employees. Within the ROI, approximately 25,000 workers currently are employed within the construction industry and could support the construction needs for Alternative 1 (USCB 2020b).

The employment of an estimated 800 personnel would increase the number of jobs that Tinker AFB provides to the community, as well as increase Tinker AFB's annual payroll and statewide economic impact. The expenditures and income associated with Alternative 1 would result in a long-term, beneficial impact on the local economy.

Housing. Under Alternative 1, there would be a long-term, negligible to minor impact on the demand for off-base housing. It is assumed that all personnel associated with Alternative 1 would reside in off-base housing due to limited on-base housing availability. The population increase would consist of 1.5 dependents per personnel (1,200 dependents), for a total of 2,000 personnel and dependents that would live off-installation. There are a variety of housing and rental options available in the ROI. From 2014-2018 it was estimated that of approximately 270,200 housing units in the ROI, 11.0 percent (approximately 29,700 units) were vacant. Therefore, current housing levels in the greater Oklahoma City area would have adequate capacity to accommodate the population change with off-base housing options.

Education. Under Alternative 1, it is assumed that all 800 personnel would be relocating to the area, and their dependent children would require education. Using the assumption that each of the estimated 800 personnel would be accompanied by 1.5 dependents, and assuming each personnel is married, then approximately 400 dependents would be school-age students new to the Midwest-Del City School District. These students would be spread out across various grade levels, schools, and existing classrooms. Although some new teachers may need to be hired to accommodate an increase in students, it would likely not exceed the capacity of the district, which typically enrolls about 14,000 students. Because the local school district would be able to accommodate this increase in school-age children, impacts on education under Alternative 1 would be less than significant.

Environmental Justice. There are no environmental justice communities present within the ROI for Alternative 1; therefore, there would be no disproportionately high and adverse impacts to environmental justice populations under Alternative 1. Census Tract 1075, within which the Alternative 1 site is located, does include a percentage of children higher than the COC. As mentioned in **Section 3.7** the 65-dBA DNL noise contour would remain unchanged for Alternative 1, continuing to extend approximately four miles from both ends of the installation's main north-south runway, and one-half mile from the ends of the second runway. No components of Alternative 1 would result in any disproportionately high or adverse human health or environmental effects on children or elderly.

3.8.3.2 ALTERNATIVE 2 – MROTC SITE

Socioeconomics. Socioeconomic impacts under Alternative 2 would be similar to those described for Alternative 1. Beneficial impacts on the economy and employment levels within the ROI would be expected because of the additional construction projects proposed under the Proposed Action. The proposed increase in personnel would be the same as under Alternative

1; therefore, there would be no difference in impacts associated with population, housing and education in the ROI.

Environmental Justice. The ROI for Alternative 2 contains an environmental justice population which could experience impacts from the Alternative 2. Construction activities would result in a short-term increase in noise levels at residences within Census Tract 1074.03; however, the distance of the construction activities to the residences would result in attenuation of construction noise. As stated within **Section 3.1.3.2,** all construction activities in support of Alternative 2 would be within the installation's property boundary, collocated with other existing noise-compatible activities. Construction and demolition would also generate air emissions; however, these emissions would attenuate rapidly with distance and would not be concentrated within Census Tract 1074.03, thereby not disproportionately affecting a single population. Short-term traffic congestion would increase on the installation and would equally affect all who transit on the installation. Therefore, no disproportionate impacts to a single population from transportation impacts would be expected. Census Tract 1075 is also located partially within Alternative 2, which includes a percentage of children higher than the COC. However, as described for Alternative 1, no components of Alternative 2 would result in any disproportionately high or adverse human health or environmental effects on children or elderly. The nearest off-installation residential area is approximately 4,500 feet east of the proposed MROTC site, and heavy equipment noise would be barely audible. While environmental justice populations could experience impacts from the Proposed Action, it is not anticipated that these impacts would be disproportionately high and adverse, and significant impacts are not anticipated.

Noise impacts associated with increased aircraft operations under Alternative 2 would be negligible and not expected to impact residential areas or human populations (see **Section 3.7.3.2)**. Therefore, impacts from a slight increase in aircraft operations does not present a potential for disproportionate impacts.

3.8.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, there would be no change from the baseline conditions as described in **Section 3.8.2**. Impacts on socioeconomics and environmental justice populations would not be expected under the No Action Alternative.

3.9 Cultural Resources

3.9.1 Definition of the Resource

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. Depending on the condition and historic use, such resources might provide insight into the cultural practices of previous civilizations, or they might retain cultural and religious significance to modern groups. The ROI for cultural resources is the same as the area of potential effects (APE), defined in the paragraph below.

Cultural resources that are listed in or eligible for listing in the NRHP are known as historic properties. Section 106 of the NHPA requires federal agencies to assess the potential impact of

their undertakings on historic properties in the APE. The APE is the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16[d]). USAF consulted under Section 106 of the NHPA with the Oklahoma SHPO, resulting in an agreement that no historic properties would be affected. USAF is also consulting with federally recognized tribes. Tribal consultations are ongoing. All materials related to the Section 106 consultation process are located in **Appendix D**, and no decision will be made based on this EA until successful conclusion to the Section 106 process. **Appendix D** and this section will be updated as the Section 106 process progresses. As a part of the Section 106 process, the USAF has defined the undertaking as the Proposed Action implemented at one of two site Alternatives, and defined the APE as the footprints of both site alternatives where ground disturbance or demolitions, renovations, or new construction would occur. The APE also includes a broader 0.25 mi radius around both site alternatives and renovations, representing the full geographical areas where potential atmospheric effects (such as visual, audible, or vibration effects) and indirect and cumulative effects from the Proposed Action may extend (see **Figure 3-8**).

Typically, cultural resources are subdivided into archaeological resources, architectural resources, or resources of traditional, cultural, or religious significance. Archaeological resources comprise areas where human activity has measurably altered the earth or deposits of physical remains are found (e.g., projectile points and bottles), but standing structures do not remain. Architectural resources include standing buildings, bridges, dams, other structures, and designed landscapes of historic or aesthetic significance. Generally, architectural resources must be more than 50 years old to warrant consideration for the NRHP. More recent structures might warrant protection if they are of exceptional importance or if they have the potential to gain significance in the future. Architectural resources greater than 45 years of age were considered in this document to account for the range of proposed construction dates. That is, resources that are currently 45 years of age could attain 50 years of age by the time facility projects are implemented. Resources of traditional cultural or religious significance can include archaeological resources, sacred sites, structures, prominent topographic features, habitat, plants, animals, or minerals considered essential for the preservation of traditional culture. The term Traditional Cultural Properties (TCP) is sometimes used to refer to resources of traditional cultural or religious significance that are eligible for NRHP listing.

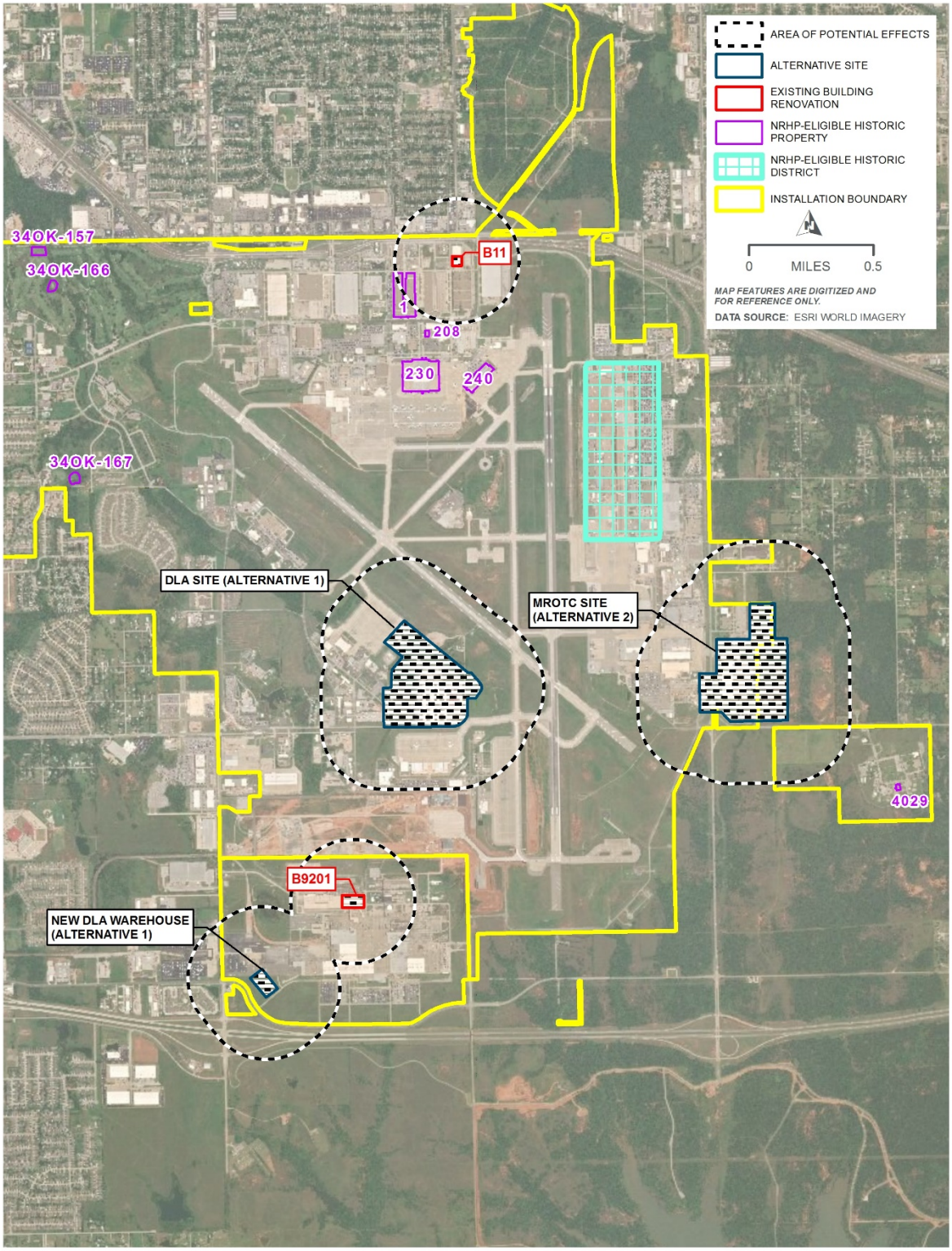


Figure 3-8. APE and Identified NRHP-Eligible Historic Properties

3.9.2 Existing Conditions

Background. In 1941, the Army originally selected a portion of the land now known as Tinker AFB, with support from the city and local organizations, to be developed as a depot. The Oklahoma City Air Depot began operations in downtown Oklahoma City in January 1942 and was named Tinker Field in late 1942. During WWII, the Douglas Cargo Airplane Plant manufactured C-47s at Tinker Field for the Army. After the end of WWII, the plant was closed and converted into new types of repair and test facilities, including facilities for testing and over-hauling jet engines. In January 1948, the installation became Tinker AFB. During the Cold War, Tinker AFB became the logistics center for several of the key functions of the nation's new aircraft, missiles, and communications equipment, including the logistics functions of the B-52 bomber (Tinker AFB 2017b).

Tinker AFB was a major repair site during the Korean War and was also the headquarters of the Combat Control Center during the Cuban Missile Crisis. During the Vietnam War, Tinker AFB's size and responsibilities for aircraft and vehicle repair were again expanded. Tinker AFB was the only overhaul depot for the J-57 engine, and it provided overhaul and repair services for the F-101 engine, the AGM-86A missile, and other military offensive aircraft. In the early 1990s, the base provided front-line support to the forces engaged in Operation Desert Shield and Desert Storm. Today, Tinker AFB continues to provide aircraft maintenance and repair as well as logistical support (Tinker AFB 2017b).

Architectural Resources. Several architectural surveys and building assessments were completed on Tinker AFB from 1992 through 2016, including an assessment of the Cold War missions and associated building alterations. In 2016, Tinker AFB completed a Historic Inventory and Building Evaluation Survey. Tinker AFB contains five individually NRHP-eligible historic buildings (Buildings 1, 208, 230, 240, 4029) and one historic district with seven contributing buildings, all of which were nominated in the 1994 *Nomination Package for Historic District Eligible for the National Register of Historic Places, Tinker AFB,* multiple property nomination (see **Figure 3-8**) (Woodward-Clyde Federal Services 1994). The historic resources are associated with aircraft construction and modification from 1942 through 1946 and with facilities associated with the Cuban Missile Crisis in 1962 (Tinker AFB 2017b).

One NRHP-eligible historic property, Building 1, was identified in the APE and is an architectural resource. Building 1 is a depot supply building and is determined individually eligible for NRHP listing (Tinker AFB 2017b). None of the facilities proposed for demolition or renovation in the APE are considered eligible for listing in the NRHP. Additionally, there are no aboveground resources requiring inventory or evaluation within the area off-installation currently proposed as part of the MROTC site.

Archaeological Resources. Of the 5,603 acres comprising Tinker AFB, archaeological inventory has occurred on 1,922 acres, and 3,681 acres are disturbed land; therefore, 100 percent of Tinker AFB property has been surveyed for archaeological resources. Previous surveys identified three historic (34OK-146, 34OK-157 and 34OK-228) and two prehistoric (34OK-166 and 34OK-167) archaeological sites on Tinker AFB. Three of the archaeological sites (34OK-157, 34OK-166 and 34OK-167) are eligible for NRHP listing (see **Figure 3-8**) (Tinker AFB 2017b). However, no known NRHP-eligible archaeological sites are within the APE.

A Phase I Archaeological Investigation was conducted in 2002 for a study area that fully encompassed the area off-installation currently proposed as part of the MROTC site. During this investigation, three historic sites were identified (34OK-170, 34OK-171, and 34-OK-172). None of the three sites were recommended eligible for the NRHP, nor do any of the three sites fall within the APE (Tinker AFB 2002a).

Resources of Traditional, Cultural, or Religious Significance. No properties of traditional cultural or religious significance have been identified at Tinker AFB. Tinker AFB has consulted previously with three federally recognized tribes including the Osage Nation, the Seminole Nation of Oklahoma, and the Muscogee (Creek) Nation, regarding their potential interest in cultural resources at Tinker AFB. Based on previous consultations, these tribes have noted a very low potential for traditional cultural resources at Tinker AFB (Tinker AFB 2017b).

3.9.3 Environmental Consequences

Under Section 106 of the NHPA and its implementing regulations (36 CFR 800), an adverse effect is found when an undertaking (or action) may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for NRHP eligibility in a manner that would diminish the property's historic integrity of location, setting, feeling, association, design, materials, or workmanship. Examples of adverse effects on cultural resources can include physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual or audible elements that are out of character with the property or that alter its setting; neglecting the resource to the extent that it deteriorates or is destroyed; or the sale, transfer, or lease of the property out of agency ownership (or control) without adequate legally enforceable restrictions or conditions to ensure preservation of the property's historic significance.

3.9.3.1 ALTERNATIVE 1 – DLA SITE

Architectural Resources. Under Alternative 1, no adverse effects are anticipated under Section 106 and no significant impacts are anticipated. The buildings subject to renovation or demolition under Alternative 1 are not considered eligible for listing in the NRHP. Building 1 is the only historic property located in the APE (Tinker AFB 2017b). Exterior renovations proposed under Alternative 1 would occur within the context of an active military installation and would be designed consistent with existing buildings and the industrial environment on Tinker AFB. Although exterior renovations could be visible from Building 1, it would not alter the existing military industrial setting of Building 1 in a manner that would diminish its integrity of setting, feeling, or association and the visual impact would be considered minor and would not be adverse.

Archaeological Resources. The APE was previously inventoried for archaeological resources and no archaeological resources were identified within the APE (Tinker AFB 2017b, Tinker AFB 2002a). There is a low potential to encounter previously unidentified, buried archaeological resources during construction associated with Alternative 1. However in the event of inadvertent discovery, the USAF would follow the standard operating procedures for inadvertent discoveries outlined in the installation's Integrated Cultural Resources Management Plan and comply with laws related to discovery of cultural materials or human burials, as applicable (Tinker AFB 2017b). Therefore, no significant impacts on archaeological resources are anticipated.

Resources of Traditional, Cultural, or Religious Significance. No traditional, cultural, or religious resources are known on Tinker AFB. Therefore, impacts on these resources are not expected. See **Appendix D** for government-to-government consultation correspondence.

Section 106 Consultation. Pursuant to 36 CFR § 800.S(b), on April 20, 2020 and May 20, 2020, Tinker AFB respectively initiated Section 106 consultation with the Oklahoma SHPO and federally recognized tribes for the Undertaking and the APE identified in **Figure 3-8.**

In a letter dated September 8, 2020, the USAF received SHPO concurrence with the No Adverse Effect determination for the Undertaking.

The USAF conducted additional follow-up with tribes after the Section 106 initiation letter was sent and received no comments on the identification of historic properties, the APEs, or the potential for effects. See **Appendix D** for documentation related to the Section 106 consultation.

[[Preparer's Note: Status of the Tribal consultation will be updated as it progresses.]]

3.9.3.2 ALTERNATIVE 2 – MROTC SITE

Similar to Alternative 1, the buildings subject to renovation or demolition under Alternative 2 are also not considered eligible for listing in the NRHP, and exterior renovations could be visible from Building 1. Additionally, no archaeological resources or traditional, cultural, or religious resources were identified within the APE. The effects on cultural resources under Alternative 2 would be the same as the effects under Alternative 1, as described in **Section 3.9.3.1**, and no significant impacts are expected.

The Section 106 consultation discussed above for Alternative 1 – DLA Site, also includes the MROTC Site alternative within the APE. Alternative 2 is included in the Section 106 consultation discussed above for Alternative 1.

3.9.3.3 NO ACTION ALTERNATIVE

Impacts on cultural resources would not be expected under the No Action Alternative. Cultural resource conditions would remain unchanged when compared with existing conditions

3.10 Water Resources

3.10.1 Definition of the Resource

Water resources include drainage, groundwater, surface water, wetlands, and floodplains. Evaluation of water resources examines the quantity and quality of the resource and its demand for various purposes.

Groundwater. Groundwater is water that collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. A deposit of subsurface water that is large enough to tap via a well is referred to as an aquifer. Groundwater originates from precipitation, percolates through the ground surface, and is often used for potable water consumption, agricultural irrigation, and industrial applications. Groundwater typically can be described in terms of its depth from the surface, aquifer or well capacity, water quality, surrounding geologic composition, and recharge rate. The State of Oklahoma defines groundwater as fresh water and

marginal water under the surface of the earth regardless of the geologic structure in which it is standing or moving outside the cut bank of any definite stream.

Surface Waters. Surface water includes natural, modified, and constructed water confinement and conveyance features above groundwater that may or may not have a defined channel and discernable water flows. These features are generally classified as streams, springs, wetlands, natural and artificial impoundments (e.g., retention and detention ponds, lakes), and constructed drainage canals and ditches. The retention pond has a permanent pool of water that fluctuates in response to precipitation and runoff from the contributing areas, while detention ponds serve as important flood control features. They are usually dry except during or after rain or snow melt. Their purpose is to slow down water flow and hold it for a short period of time such as 24 hours.

Surface water quality is protected through several laws and regulations. Water quality standards are regulated by USEPA, under the Safe Drinking Water Act (42 USC § 300[f] et seq.) and the CWA. ODEQ sets and implements standards for surface water quality in the state. The CWA (33 USC § 1251 et seq., as amended) establishes federal limits, through the NPDES, on the amounts of specific pollutants that are discharged to surface waters to restore and maintain the chemical, physical, and biological integrity of the water.

Wetlands. Wetlands are identified as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (USACE 1987). Jurisdictional wetlands are waters of the U.S. pursuant to the CWA that are regulated by the U.S. Army Corps of Engineers (USACE) and USEPA. USACE regulates the discharge of dredged or fill material into waters and wetlands of the U.S. pursuant to Section 404 of the CWA. Section 401 of the CWA requires that an applicant for a federal license or permit to conduct an activity that could result in a discharge into waters of the United States provide the permitting agency a certification from the state in which the discharge originates certifying that the license or permit complies with CWA requirements, including applicable state water quality standards.

Floodplains. A floodplain is the area adjacent to a watercourse, inundated by a particular flood event. The Federal Emergency Management Agency (FEMA) defines a regulatory floodplain as the 1 percent annual chance, or 100-year, floodplain. A floodway refers to the channel of a river or other watercourse and the adjacent land areas that must remain in order to convey the base flood without cumulatively increasing the water surface elevation more than a designated height. A floodway occurs within a floodplain.

The federal requirements for floodplains and floodways are specified at 44 CFR § 60.3(d) and 44 CFR § 65.12. Regulations in 44 CFR § 60.3 are intended to address the need for effective floodplain management and provide assurance that the cumulative effects of floodplain encroachment do not cause more than a 1-foot rise after the floodplain has been identified on the Flood Insurance Rate Map. EO 11988, *Floodplain Management* (42 Fed.Reg. 26951), requires federal agencies to identify potential floodplain encroachment by projects they fund and

to assess the impact of this encroachment on human health, safety, and welfare and on the natural and beneficial values of the floodplain.

3.10.2 Existing Conditions

Stormwater and Floodplains. Stormwater generated on Tinker AFB is managed by a system of natural and constructed features, including curbs, gutters, culverts, and pipes. Stormwater generated from the Northside Industrial District and the northeast portion of the installation discharges to Crutcho Creek, and stormwater generated on the western portion of the installation discharges to the South Forty District.

Stormwater generated at Tinker AFB is regulated by the following stormwater permits from ODEQ.

- General permit (OKR10) for stormwater discharges from construction activities within the state of Oklahoma (September 2012).
- General Permit (OKR04) for Phase II Small Municipal Separate Storm Sewer System Discharges within the state of Oklahoma (February 2005).
- General Permit (OKR05) for Stormwater Discharges from Industrial Facilities under the Multi-Sector Industrial General Permit within the state of Oklahoma (September 2011).
- Oklahoma Pollutant Discharge Elimination System (OPDES) Permit No. OK0000809 (November 2005).
- OPDES Permit No. OK0035203 (March 2009).

Approximately 36.5 acres of the DLA site are located within the 100-year Floodplain AE. Approximately 0.46 acres of the DLA site also falls within the 500-year floodplain. Approximately 5.5 acres of the MROTC site is located within the 100-year floodplain. The 100-year floodplains within the DLA and MROTC sites are shown in **Figure 3-9** and **Figure 3-10**, respectively.

EO 11988 prescribes a process for deciding whether floodplain development is the only practicable alternative for implementing a proposed action. Based on the purpose and need for the Proposed Action, and the alternative selection standards developed based on operational requirements for the B-21 Maintenance Depot Campus the, DLA site alternative and the MROTC site alternative are the only sites available for construction of the B-21 Maintenance Depot campus. As both alternative sites are with floodplain areas, there would be no practicable alternative to construction in floodplain areas.

Groundwater. The primary subsurface water zones identified at Tinker AFB include the Hennessey Water Bearing Zone, the Upper Saturated Zone (USZ), the Lower Saturated Zone (LSZ), and the Producing Zone (PZ). Tinker AFB is located in a recharge area for these water-bearing zones; groundwater is derived primarily from precipitation and from infiltration of surface streams. The UPZ, the LPZ, and the PZ are colloquial terms to Tinker AFB and are used to designate three identifiable saturated zones that comprise the upper portions of the Central Oklahoma Aquifer under the base. The Central Oklahoma Aquifer, also known as the Garber-Wellington Aquifer, underlies about 3,000 square miles of central Oklahoma and has a maximum thickness of approximately 1,000 feet. The aquifer serves as a public and domestic source of water for major communities in the central Oklahoma area. The productive formations associated with this aquifer are the Garber Sandstone and the Wellington Formation.

The USZ, LSZ, and PZ are associated with the Garber Aquifer. The Hennessey Group is the shallowest bedrock formation underlying Tinker AFB. Depth to shallow groundwater at Tinker AFB has been reported ranging from a few feet to about 70 feet (Tinker AFB 2014a). Groundwater in the upper 200 feet of this aquifer is typically unconfined while groundwater at greater depths is partly confined or confined (USGS 2020a). Unconfined aquifers are those into which water seeps from the ground surface directly above the aquifer. Confined aquifers are those in which an impermeable dirt/rock layer exists that prevents water from seeping into the aquifer from the ground surface located directly above (USGS 2020b).

The PZ is utilized for drinking water by Tinker AFB and Oklahoma City. The Tinker AFB water supply distribution system is comprised of 26 water wells ranging from a depth of 700 to 900 feet (Tinker AFB 2014a). Based on a review of Tinker AFB cross section maps, the groundwater "PZ" of the Garber-Wellington begins at a depth of approximately 200 feet below ground surface (bgs).

Surface Water. Tinker AFB and surrounding properties are located within the Lower North Canadian Watershed. Surface water features in the vicinity include Crutcho Creek, Soldier Creek, Kuhlman Creek, Elm Creek, and Hog Creek. Crutcho Creek is located on the western portion of Tinker AFB and receives stormwater runoff from the base. Crutcho Creek generally flows to the northwest and discharges into the North Canadian River, approximately six miles north of Tinker AFB. A section of East Crutcho Creek is located within the DLA site. Kuhlman Creek is a tributary of Crutcho Creek and originates in the northern portion of Tinker AFB. All creek flows on Tinker AFB are the result of stormwater runoff and groundwater seepage, with the exception of Soldier Creek which may be spring-fed where the creek starts on the north side of the Cyber Engineering Installation Group. This spring-fed stream becomes a losing stream—feeding the groundwater—a short distance downstream. There are 15 small man-made retention ponds and 7 detention ponds located on Tinker AFB (Tinker AFB 2019a). Surface water features for the DLA and MROTC sites are shown on **Figure 3-9** and **Figure 3-10**, respectively.

Wetlands. There are 42 identified wel areas on Tinker AFB, covering approximately 38 acres of land. In a 2002 survey, only two wetlands (Greenway and Prairie Ponds) were classified as being high quality wetlands. Thirty-four were classified as intermediate quality, and six as low

quality. Neither of the two high quality wetland ponds falls within the DLA or MROTC sites. The Greenway wetland is located approximately one-mile downstream from the DLA site (Tinker AFB 2018b).

The northern and western portion of the proposed DLA site has an area of jurisdictional waters of the U.S. identified as an unnamed intermittent stream that is 3,685 feet (0.69 miles) long and a 2.98 acres jurisdictional freshwater forested wetland falling within its boundaries. There are also two stormwater detention ponds, totaling 6 acres, that are considered non-jurisdictional. All the features within the DLA site account for 9.67 acres of water features. **Figure 3-9** shows the location of the wetlands and waterbodies on the DLA site. The MROTC site does not have any jurisdictional or non-jurisdictional wetland features. There is an approximately 0.20 mile long segment of Solider Creek, an intermittent stream that runs through the north portion of the site (**Figure 3-10**).

As previously mentioned in **Section 2** of this EA, EO 11990, *Protection of Wetlands*, requires federal agencies to take action to avoid indirectly or directly supporting new construction in wetlands when there is a practicable alternative.. It is USAF policy to seek to preserve the natural values of wetlands while carrying out its mission on both USAF lands and non-USAF lands. To the maximum extent practicable, USAF avoids actions that would either destroy or adversely modify wetlands. Due to the presence of both jurisdictional and non-jurisdictional wetlands on the Alternative 1 (DLA) site, construction on this site that adversely affects these wetlands would be inconsistent with EO 11990 and USAF policy.

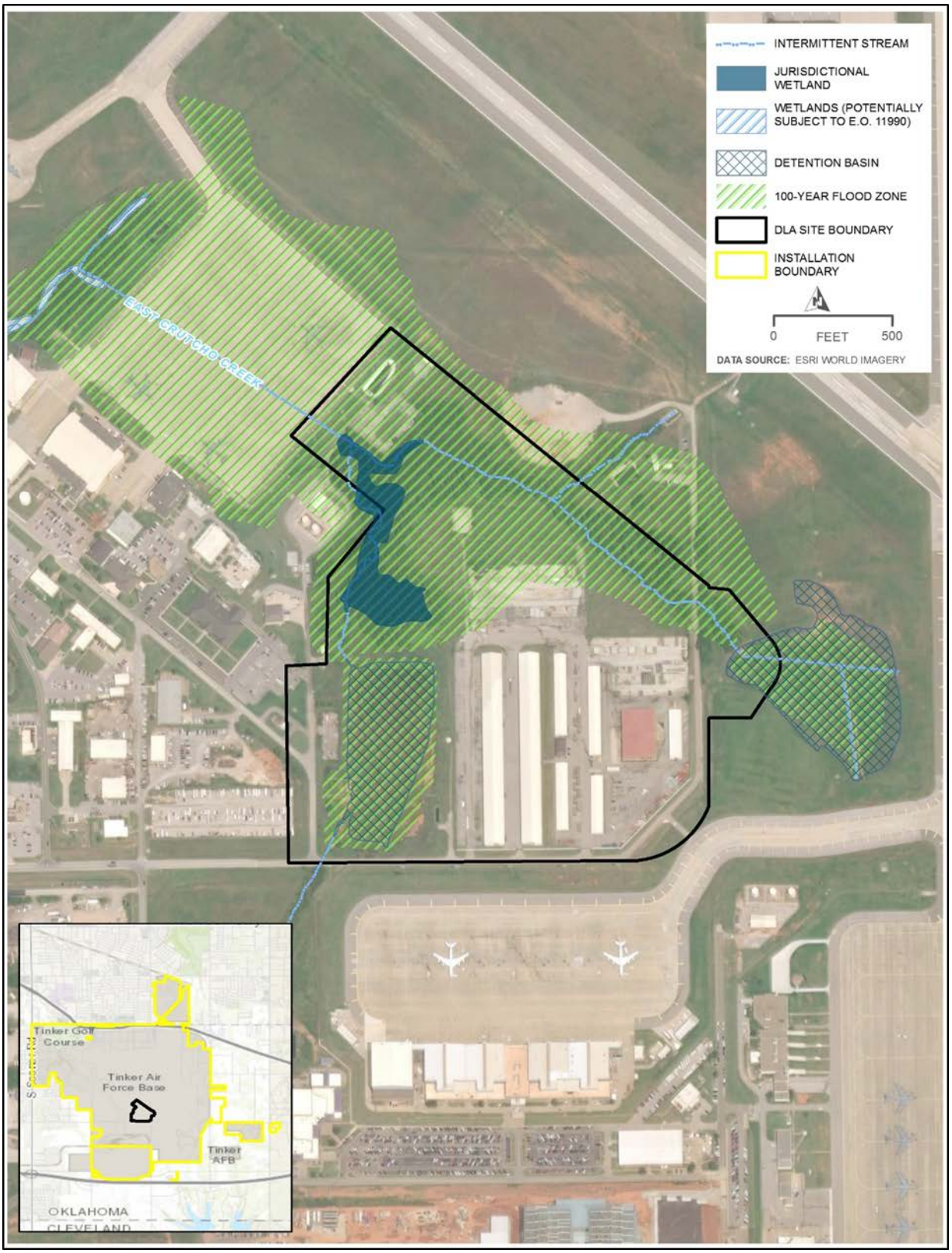


Figure 3-9. Floodplains, Surface Water, and Wetland Features on the DLA Site.

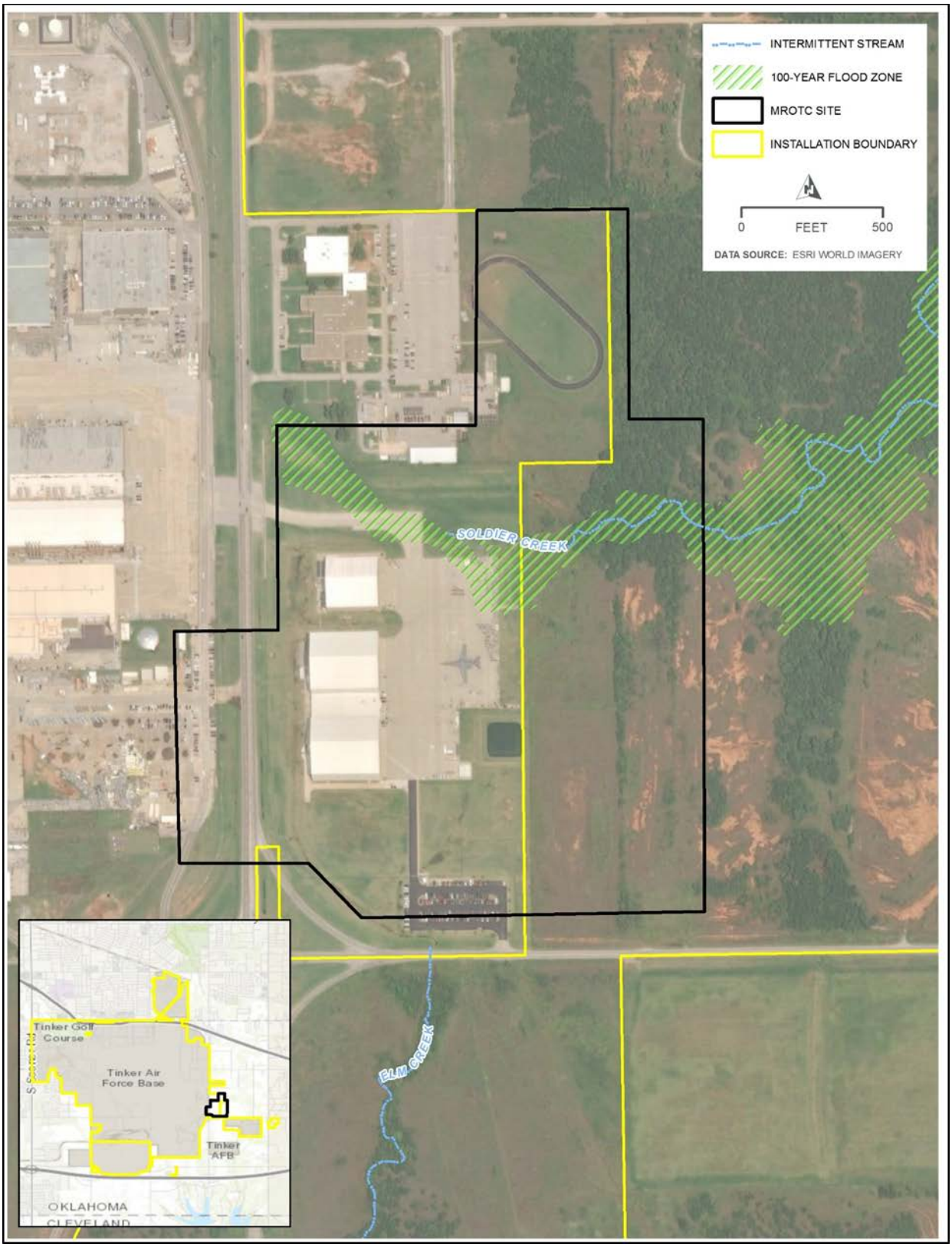


Figure 3-10. Floodplains, Surface Water, and Wetland Features on the MROTC Site.

3.10.3 Environmental Consequences

A proposed action could have significant impacts on water resources if it were to substantially affect water quality, reduce water availability, or reduce supply to existing users; endanger public health or safety by creating or worsening health or flood hazard conditions; threaten or damage unique hydrologic characteristics; overdraft groundwater basins; exceed the safe annual yield of water supply sources; or violate applicable laws or regulations that protect water resources. Evaluations must identify if the action is reasonable in scope, has suitable alternatives (where applicable), and if implementation of the action would result in a satisfactory result, with respect to the purpose and need for the action.

3.10.3.1 ALTERNATIVE 1 – DLA SITE

Stormwater and Floodplains. Short- and long-term, direct, moderately adverse impacts on drainage features are expected with the construction of the B-21 campus at the DLA site, leading to potentially significant stormwater and floodplain impacts. Development of the DLA site would result in the area being converted to 100 percent cover of impervious surfaces. Furthermore, the existing stormwater detention pond on the west side of the site would be removed and converted to impervious surface, and a small portion of the existing stormwater detention pond adjacent to the east side of the site would also be removed and converted to impervious surface. The loss of stormwater detention and the creation of new impervious surface would result in an increase in the 100-year runoff volume and would require measures to offset the additional volume to avoid significant stormwater related impacts to the surrounding area and to the Crutcho Creek Basin and along Crutcho Creek near South Air Depot Blvd (Tinker AFB 2014a). The largest increase of water surface would likely occur near the confluence of East Crutcho Creek and Crutcho Creek. Without the addition of the proposed stormwater management features, some buildings in the vicinity would potentially be impacted (Tinker AFB 2014a).

Short- and long-term, direct, adverse impacts on the 100- and 500-year floodplains are expected as a result of the construction of the B-21 campus and aircraft operations activities on the DLA site. Portions of the DLA site are located within a 100-year and 500-year floodplain of Crutcho Creek. The 100-year runoff volume would increase from the B-21 campus development. Construction would require elevation of the land above the floodplain and require a permit to construct within a floodplain (Tinker AFB 2014a). The floodplain upstream in the DLA site would be filled and developed, resulting in the elimination of a portion of the East Crutcho Creek and the detention pond.

There would not be sufficient space within the DLA site to manage the approximate 70 acre feet of stormwater discharge from the DLA site that would be caused by the loss of stormwater conveyance and detention, and the increase in impervious surface (USACE 2013). In order to avoid the potentially significant impact, Tinker AFB would offset the 70 acre feet of stormwater discharge by creating new stormwater detention offsite. Proposed detention sites would be prioritized in the following order of preference (see **Figure 3-11**):

1. Proposed Detention Pond 1: Water would be piped to this site which is an existing pond. The existing outflow on the basin may have to be modified. There is an estimated 6 feet of freeboard on the pond; however, the pond would likely have to be enlarged as this

pond is slated to be the detention basin for the KC-46A campus. Calculations would need to be made to determine how much the pond would have to be enlarged, or possibly certain sides (e.g., south and west) built up to increase water storage capacity if this site were chosen to support stormwater from the DLA site.

2. Proposed Detention Pond 2: This site would have to be enlarged and dammed and outfitted with proper outflow structures and other items such as basin trickle channels to ensure this area does not hold standing water after flooding subsides. The site would be required to be designed to ensure it would not become a bird attractant.

3. Proposed Detention Pond 3: This site would require water to be piped as depicted in the EA for the KC-46A Maintenance Depot. Approximately 8 acres of this site consists of an established prairie mitigation area for the KC-46A project. Therefore, if this site were used, the prairie lost would have to be mitigated elsewhere. Site 9 on **Figure 3-11** would serve this purpose. Because moving the prairie mitigation area would be a last resort, all other detention areas, or a combination of them, and underground vaults would be considered first.

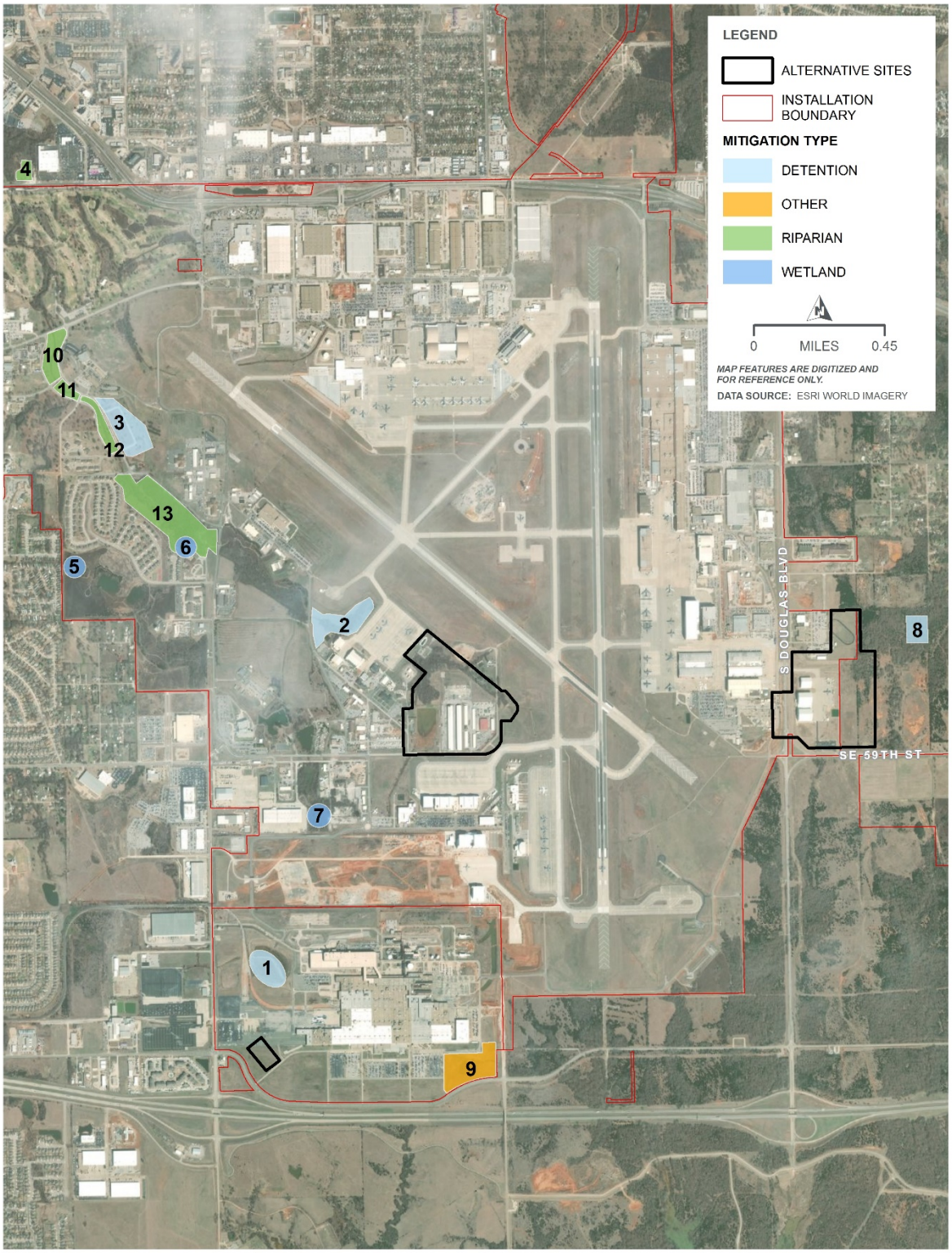


Figure 3-11. Potential Mitigation Sites

The new offsite stormwater BMPs would be consistent with those described in Annex D to the 2016 Stormwater Management Plan (SWMP) (Tinker AFB 2016d) and would be incorporated into the site design to mitigate stormwater runoff, promote ground infiltration, and reduce the potential for erosion and stormwater contamination. Stormwater would be managed in accordance with federal, state, and local requirements and the Stormwater Pollution Prevention Plan (SWPPP) and Erosion and Sediment Control Plan (ESCP).

The B-21 aircraft operations would not have an effect on drainage features. Once construction is complete, the B-21 aircraft would remain on the new and existing infrastructure on the installation.

Groundwater. Short- and long-term, negligible, direct and indirect, adverse impacts on surficial aquifers would be expected from construction of the B-21 campus on the DLA site. Short- and long-term, direct, negligible impacts on groundwater could occur from an accidental spill during construction or aircraft operation activities. Based on existing soil conditions (medium to high permeability sand and gravel), a spill or release of hazardous materials from equipment used during construction could impact groundwater quality. However, the potential for contaminant discharges from equipment to reach the groundwater table would be minimized through the use of appropriate BMPs and prompt response to discharges. All equipment would be maintained according to the manufacturer's specifications, and the potential for contamination to occur would be minimized through the implementation of a Spill Prevention Control and Countermeasure Plan.

Shallow groundwater in the Hennessey Group has been encountered at Tinker AFB at depths ranging from a few feet to approximately 70 feet. It is possible that groundwater may be encountered during construction and demolition activities associated with implementation of the action. The shallow groundwater of the Hennessey Group is not utilized for drinking water at Tinker AFB. Groundwater from the PZ of the Garber-Wellington aquifer, a source of drinking water for Tinker AFB, is not expected to be encountered during construction activities due to its depth of approximately 200 feet bgs. Due to the size of the Garber-Wellington Aquifer, negative impacts on groundwater recharge from the increased impervious cover would not be expected. Additionally, despite an increase in impervious cover to 100 percent, soils at the DLA site have a very low to moderately low capacity to transmit water; therefore; there would be a negligible change in groundwater recharge. Detention ponds associated would be designed to release stormwater at a rate equal to or less than existing current conditions.

Negligible impacts on the quantity of groundwater produced at Tinker AFB would be expected as a result of the B-21 aircraft operation activities. Potential impacts on the quality of groundwater are possible based on the use of chemicals for aircraft maintenance activities. Proper handling and use of chemicals would be needed to ensure groundwater would not be negatively impacted. Based on controls to be implemented to prevent releases of hazardous material to groundwater, impacts to groundwater below the site would be considered less than significant. Additional impacts associated with chemical use are included in **Section 3.4.3**, Hazardous Materials and Wastes.

Surface Water. Short- and long-term, direct, moderately adverse impacts on surface water could occur as a result of construction of the B-21 campus and aircraft operation at the DLA

site. Without implementation of proper controls, ground disturbing activities could result in erosion and sedimentation creating suspended sediment loads in runoff and downstream surface waters. Proper grading techniques, implementation of standard BMPs and erosion and sediment controls would minimize the transport of sediment to nearby surface waters. The demolition and construction activities would result in 100 percent impervious cover within the site. The tributaries located near the DLA site that feed into Crutcho Creek would be protected through site demolition, construction, and operations by implementing BMPs from the base SWMP as discussed above. Crutcho Creek serves as approximately half of the main drainage basin for the Base (Tinker AFB 2014a) and is a CWA Section 303(d) listed impaired waterbody. As previously discussed, Tinker AFB stormwater permits would be obtained or amended as necessary to comply with applicable ODEQ stormwater regulations.

Approximately 36 acres of GI corridor would be converted to impermeable surfaces, thereby removing a natural vegetative riparian filter across the DLA site. As a result, there could be a long-term decrease in water quality at East Crutcho Creek and Crutcho Creek.

Wetlands. Short- and long-term, moderate, adverse, direct impacts on wetlands would occur as a result of the construction and operation of the B-21 campus at the DLA site. The development of the DLA site would result in the permanent loss of 2.98 acres of jurisdictional wetlands and approximately 0.69 miles of a jurisdictional intermittent stream, for a total loss of 3.67 acres of jurisdictional wetland habitat. An additional 6 acres of non-jurisdictional wetland habitat associated with the detention ponds on site would also be lost. This loss of 9.67 acres of wetlands represents a potentially significant adverse impact on wetlands on Tinker AFB. However, should the DLA site alternative be selected, the wetland loss would be mitigated to less than significant.

For the loss of jurisdictional wetlands, permitting would be required with the USACE, Tulsa District, in compliance with Section 404/401 of the CWA. Permits would be obtained through coordination with the USACE, Tulsa District and would be compliant with all USACE general and project specific requirements.

Working with USACE, Tulsa District, Tinker AFB would place first priority on mitigating wetland losses though utilization of available mitigation banks. Specific mitigation banks and compensatory mitigation ratios would be determined during the permit process according to USACE, Tulsa District rules. If mitigation banks are not available at the time of the permitting process, Tinker AFB would prioritize wetland mitigation by creating new wetland in areas suitable for such use. Referring to **Figure 3-11**, above, three potential on-base locations (Sites 5, 6, and 7) are suitable for forested wetland mitigation. All three sites are presently forested. Site 5 is a confirmed jurisdictional stream, and Site 7 may also be a jurisdictional stream. Depending on the specific requirements for mitigation as determined through the USACE permitting process, all three sites may be required to fulfill mitigation ratios. If the permitting process through the USACE determines that a combination of these three on-base proposed mitigation sites are not adequate, then Tinker AFB would seek to find appropriate wetland mitigation sites off-base, and likely downstream along Crutcho Creek. As several potentially acceptable park and open space sites exist downstream of Tinker AFB along Crutcho Creek,

this option would require close coordination between Tinker AFB, USACE, and the local municipality where the sites are located.

Additionally, the Greenway wetland is located approximately one-mile downstream of the DLA site. While this wetland would not be directly impacted, increased stormwater and sediment runoff from construction activities may indirectly affect the wetland's quality. Therefore, BMPs would be put in place to mitigate potential negative impacts in regard to surface water.

3.10.3.2 ALTERNATIVE 2 – MROTC SITE

Stormwater and Floodplains. Short- and long-term, direct, moderate adverse impacts on stormwater are expected with the construction and operation of the B-21 campus at the MROTC site. Development would result in the increase of impervious cover to approximately 76 acres. The construction would result in an increase in the 100-year runoff volume and would require measures to offset the additional volume. Additional stormwater features would be developed within the MROTC site to manage the potential additional discharge.

BMPs like the ones provided in the 2016 SWMP (Tinker AFB 2016d) would be incorporated into the design to reduce the amount of stormwater runoff, promote ground infiltration, and reduce the potential for erosion. Stormwater would be managed in accordance with federal, state, and local requirements and the SWPPP and ESCP.

Although the proposed action would result in removal of existing stormwater features, increased impervious cover, and increased stormwater generation, no net increase in discharge rate would occur with implementation of the proposed stormwater features. In addition, the stormwater management features would be designed and constructed in accordance with Executive Order 11988. Therefore, impacts on drainage would be less than significant.

New stormwater detention would need to be created at the MROTC site to offset for the increase in impervious surface and the loss of existing detention capacity. Detention Pond 8 (**Figure 3-11**) would be located along the existing drainage at the NE corner of the MROTC campus. Post-construction runoff determinations need to be made to determine the detention pond size and capacity needed to mitigate stormwater runoff.

Short- and long-term, direct, adverse impacts on the 100- and 500-year floodplains are expected as a result of the construction and operations activities associated with the B-21 campus on the MROTC site. Approximately 5.5 acres of the MROTC site is located within a 100-year and 500-year floodplain. The 100-year runoff volume from the B-21 campus development would increase. Construction would require elevation of the land above the floodplain and require a permit to construct within a floodplain (Tinker AFB 2014a).

Groundwater. Short- and long-term, direct, negligible adverse impacts on surficial aquifers would be expected from construction of the B-21 campus on the MROTC site. Impacts on groundwater would be similar to those described for the DLA site.

Surface Water. Short- and long-term, direct, minor impacts on surface water could occur because of construction and operation B-21 campus at the MROTC site. Without implementation of proper controls, ground disturbing activities could result in erosion and sedimentation creating suspended sediment loads in runoff and downstream surface waters

including Soldier Creek and Elm Creek, which flows to Crutcho Creek. Proper grading techniques, implementation of standard BMPs and erosion and sediment controls would minimize the transport of sediment to nearby surface waters. The construction and demolition activities would result in a 76 acres of impervious cover within the site. As previously discussed, Tinker AFB stormwater permits would be obtained or amended as necessary to comply with applicable ODEQ stormwater regulations.

Hog Creek near the Alternative 2 site is a jurisdictional water of the U.S. Therefore, permitting would be required under Section 404/401 of the CWA if construction or operations activities at the MROTC site were to impact the creek. Permits, if required, would be obtained through detailed coordination with USACE Tulsa District.

The development of the MROTC site could result in the permanent loss of approximately 0.20 miles of an intermittent riparian stream. Loss of this riparian habitat would be mitigated through enhancement of similar habitat elsewhere on base as shown in **Figure 3-11**, above. Although the loss would be mitigated, this adverse impact on the riparian habitat would be considered less than significant.

3.10.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative the B-21 aircraft would not conduct depot-level maintenance operations on Tinker AFB. USAF would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any property acquisitions occur at Tinker AFB to accommodate the new mission requirement for the B-21 maintenance operations. The current existing conditions of the water resources (drainage, surface water, groundwater, wetlands, and floodplains) would remain the same.

3.11 Land Use

3.11.1 Definition of the Resource

Land use refers to real property classifications that indicate whether natural conditions or the types of human activity occurring on a land parcel. In many cases, land use descriptions are codified in master planning and local zoning laws and can be managed using a wide variety of land use planning tools (i.e., zoning, easements, subdivision regulations, deed restriction, and covenants). Land use planning ensures appropriate growth and compatible uses among adjacent property parcels; however, the meanings of various land use descriptors vary among jurisdictions. Natural conditions of property could be categorized as unimproved, undeveloped, preservation, or conservation areas. Land use planning in the Air Force is guided by AFI 32-1015, *Integrated Installation Planning*. General land use categories used at and around Tinker AFB, and their descriptions are included in **Table 3-24**.

Table 3-24. General Land Use Categories

Land Use Category	Description
Residential	Includes all types of residential activity such as single and multi-family residences and mobile homes, at a density greater than one dwelling per acre.
Commercial	Includes offices, retail, restaurants, and other commercial establishments.
Industrial	Includes manufacturing, warehousing, and other similar uses.
Public/Quasi Public	Includes publicly owned lands or land to which the public has access, which can include military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
Recreational	Includes land areas designated for recreational activity including parks, wilderness areas and reservations, conservation areas, and other areas designated for outdoor activity.
Open/Agricultural/Low Density	Includes undeveloped land, agricultural areas, and areas with residential density less than one dwelling per acre.

Source: (Tinker AFB 2006)

The foremost factor affecting a proposed action in terms of land use is its compliance with any applicable land use zoning regulations.

CZs and APZs are established at the end of each runway for land use planning and safety purposes. While these elements are related to safety, they are also used to assist decision makers and planners with appropriate siting of facilities on USAF installations. The potential for an aircraft accident within a CZ requires that land use restrictions prohibit economic use of the land. The potential for an aircraft accident is decreased in APZ I, and land use guidelines within APZ 1 restrict land uses to industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture. The potential for an accident in APZ II is less critical, however, a potential for an accident still exists. Land uses in these areas are limited to those of APZ I, low density single family housing, low-scale business services, and low-intensity commercial/retail trade.

3.11.2 Existing Conditions

Tinker AFB is in Oklahoma City, Oklahoma, which is centrally located in Oklahoma County. Additionally, portions of land within the installation boundary fall within Midwest City and unincorporated areas of Oklahoma County. The installation is approximately 9 miles southeast of the center of Oklahoma City by road and lies on level plain on both sides of the North Canadian River. Tulsa is approximately 100 miles northeast of Oklahoma City, while Lawton/Fort Sill is approximately 90 miles southwest and Enid is approximately 93 miles north. Midwest City is approximately 3 miles north of the installation and Del City is approximately 6 miles northwest of the installation.

Oklahoma City includes approximately 662 square miles of land where zoning is enforced through a city-wide zoning ordinance. General zoning categories used by the city include, but are not limited to, agricultural, residential, office, commercial, retail, and industrial. Oklahoma City designates the land containing Tinker AFB as residential and industrial. The land area adjacent to the southern portion of the installation and the MROTC site is relatively

undeveloped. The area where the existing MROTC facility is located, is zoned as residential and industrial by Oklahoma City (Oklahoma City 2020).

Midwest City, north of the installation, is primarily residential, with commercial land uses along major roadways such as I-40 and S Air Depot Boulevard. Land use planning in the city is regulated via a comprehensive plan. The city also enforces the Tinker AFB Zoning Ordinance, which regulates development within APZ I. A portion of the land within Midwest City was sold to Oklahoma County, which leases the land to Tinker AFB. The land is just north of Runway 18/36 across I-40, was cleared of all structures, and remains undeveloped (Tinker AFB 2017a, Midwest City Undated).

Del City is northwest of the installation and is a developed, moderately dense, mixed-use community. The city maintains and enforces a zoning ordinance, which includes restrictions for development within the APZ I northwest of Runway 18/36. The predominant land use is residential, although commercial land uses follow major roadways such as I-40 (Del City 2012).

Tinker AFB is federally owned and operated by USAF. The installation is divided into five planning districts (see **Figure 3-11**), which contain areas of similar land use. The Airfield Planning District covers portions of the middle, southeast, northwest, and northeast installation, and includes runways, overruns, taxiways, aircraft parking areas, airfield clear areas, aircraft operations and maintenance hangars, aircraft facilities, and aircrew training facilities. The Depot Planning District covers east and south areas of the installation and includes mainly administrative, industrial, and commercial land uses. The North Planning District is within the northern portion of the installation and also includes mainly administrative, industrial, and commercial land uses. The Crutcho Planning District in the western portion of the installation and includes housing and recreation land uses.

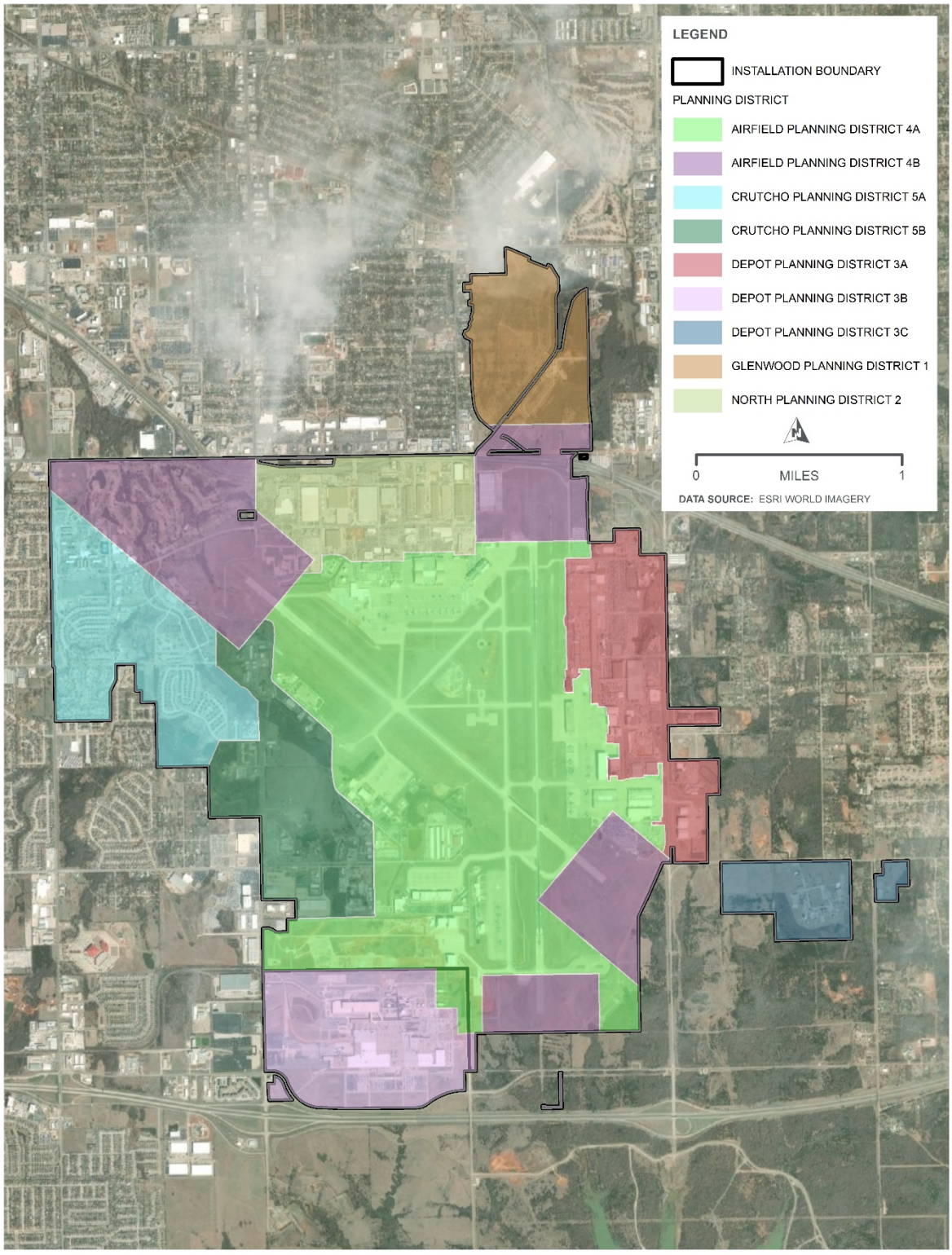


Figure 3-12. Tinker AFB Planning Districts.

The Glenwood Planning District within the CZ north of Runway 13/31 is primarily open space. Existing land uses at the installation and their associated acreage is listed in **Table 3-25**. The biggest designated land use at the installation is airfield and airfield pavements (1,543 acres), followed by open space (996 acres), and aircraft operations and maintenance (563 acres).

Table 3-25. Tinker AFB Land Use Summary

Land Use Category	Acres	Percentage of Total Land
Administrative	109	2.2
Aircraft Operations and Maintenance	563	11.2
Airfield and Airfield Pavements	1,541	30.6
Community (Commercial and Services)	103	2.0
Housing (Accompanied and Unaccompanied)	242	4.8
Industrial	464	9.2
Medical	27	0.5
Open Space	996	19.8
Outdoor Recreation	368	7.3
Water	17	0.3
Undesignated	603	11.9
Total	**5,033**	**100**

Source: (Tinker AFB 2013a)

The parcel containing the existing DLA site is 160 acres and is within the Airfield Planning District. The current land uses at and immediately adjacent to the existing DLA site include industrial, water, aircraft operations and maintenance, airfield pavement, airfield clearance, and open space. The proposed DLA warehouse site and administrative office space renovation site are in the Depot Planning District. The proposed B-21 parts warehouse renovation site is in the North Planning District. Land uses at and immediately adjacent to the proposed DLA warehouse site and existing building renovation sites are designated as industrial land use (Tinker AFB 2017a, Oklahoma County 2020).

According to Oklahoma County property records, the parcel containing the existing MROTC site is 52.98 acres and is owned by Oklahoma Industries Authority, who has granted a long-term lease to MROTC Development Partner, which expires in 2055. The site is within the Depot Planning District. MROTC Development Partner has sub-leased the 52.98 acres to Boeing, which uses the property to perform aircraft modifications. The sub-lease agreement expires in 2023. There are three hangars on the property. The southernmost hangar is used by both Boeing and Tinker AFB to perform aircraft modifications. Boeing and Tinker AFB also jointly use the apron and tow way within the leased property. The 25.63-acre parcel to the north of the existing MROTC site is owned by USAF and is designated as administrative land use. The 78.25-acre parcel just east of the existing MROTC site, which is owned by Oklahoma Industries Authority, was previously used as a dirt bike track. In total, Oklahoma Industries Authority owns and leases approximately 133 acres. Land uses adjacent to the existing MROTC site, according to Oklahoma City zoning designations, include public and institutional to the west, industrial to the north, and undeveloped and agricultural to the east and south (Tinker AFB 2013c, Oklahoma County 2020, Tinker AFB 2017a).

Incompatible land uses occur when zoning or land use criteria is not met, which can result in a public's exposure to safety hazards. Typically, incompatibility occurs when residential, commercial, or public/quasi-public land uses exist within CZs or APZs, or within noise zones that experience noise greater than 65 dB. At Tinker AFB, incompatible land uses occur beyond each end of Runways 18/36 and 13/31. There are currently 1,433 acres of incompatible land uses around Tinker AFB. This acreage is made up out of 579 acres of land within CZs and APZs and 854 acres of land within incompatible noise zones (not included in CZs and APZs) (Tinker AFB 2006).

3.11.3 Environmental Consequences

Impacts on land use would be considered significant if a proposed action resulted in noncompliance with existing land use plans or policies; preclusion of the viability of existing land use; preclusion of continued use of an area; incompatibility with adjacent land uses to the extent that public health or safety is threatened; or conflicts with airfield planning criteria established to ensure the safety and protection of human life and property.

3.11.3.1 ALTERNATIVE 1 – DLA SITE

Short-term, negligible, adverse impacts on land use may occur within areas that would be temporarily required for demolition, construction, and renovation staging areas under Alternative 1. This would include land required to perform various construction activities such as area needed for construction access, areas needed to facilitate grading, or areas used for laydown and storage areas. Occupation of areas or facilities adjacent to construction, demolition, and renovation sites would be limited to the duration of construction and coordinated with users prior to the disruption. Land uses at and around the existing DLA facility, proposed DLA warehouse site, administrative office space renovation site, and B-21 parts warehouse renovation site include industrial, open space, and airfield land uses. Therefore, construction at the DLA site, and potential use of adjacent areas for construction staging, would not result in noncompliance with existing land uses. No construction is proposed within any CZ or APZ and therefore, Alternative 1 would not conflict with airfield planning criteria.

Minor to moderate, adverse long-term impacts on existing natural resource related land uses would occur from the implementation of Alternative 1, including the loss of wetlands, stormwater infrastructure, and green infrastructure. If implemented, these impacts would be mitigated as discussed in **Section 3.2**, Biological Resources, and **Section 3.10**, Water. Because all land proposed for demolition, construction, and renovation activities under this Alternative is owned and maintained by USAF, no leases or other property agreements would be required.

3.11.3.2 ALTERNATIVE 2 – MROTC SITE

Short-term, negligible, adverse impacts on land use may occur within areas that would be temporarily required for construction and renovation staging areas under Alternative 2. Temporary impacts from construction and renovation activities would be the same as those described for Alternative 1. Land uses at and around the existing MROTC site, administrative office space renovation site, and B-21 parts warehouse renovation site include industrial, institutional, undeveloped, and agricultural land uses. Therefore, construction at the MROTC site, and potential use of adjacent areas for construction staging, would not result in

noncompliance with existing land uses. No construction is proposed within any CZ or APZ and therefore, the Proposed Action would not conflict with airfield planning criteria.

Long-term, negligible, adverse impacts on land use would occur from construction of the B-21 maintenance depot at the existing MROTC site. Implementation of Alternative 2 would require the commencement of a long-term lease or other real property interest in the portion of the proposed site that is owned by Oklahoma Industries Authority, east of the existing MROTC site. Additionally, a portion of the 25.63-acre parcel north of the existing MROTC site would be acquired via long-term lease or other agreement from USAF. The current land uses at the properties that would be leased include administrative, agricultural, and institutional. Conducting B-21 maintenance at the MROTC site would not change from current uses. Therefore, B-21 maintenance operations would be consistent with existing and planned development in the vicinity. Land uses would remain the same as those described in **Section 3.11.2**, however, portions of land that are currently undeveloped would become developed.

3.11.3.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the B-21 aircraft would not be brought to Tinker AFB for depot-level maintenance operations and no property acquisitions would occur at the installation to accommodate the new mission requirement for B-21 maintenance. Therefore, no impacts on land use at the installation or in the surrounding area would occur.

4. Cumulative Impacts

The CEQ regulations for implementing NEPA require that the cumulative impacts of a proposed action be assessed (40 CFR §§ 1500–1508). CEQ defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR § 1508.7). Cumulative impacts are most likely to arise when a relationship exists between a proposed action and other actions expected to occur in a similar location or during a similar time period. Actions overlapping with, or in proximity to, a proposed action would be expected to have more potential for a relationship than more geographically-separated actions.

CEQ's guidance for considering cumulative impacts states that NEPA documents "should compare the cumulative effects or multiple actions with appropriate national, regional, state, or community goals to determine whether the total effect is significant." The first step in assessing cumulative impacts involves identifying and defining the scope of other actions and their interrelationship with a proposed action or alternatives. The scope must consider other projects that coincide with the location and timeline of a proposed action and other actions.

This section briefly summarizes past, present, and reasonably foreseeable future projects within the same general geographic and temporal scope as the Proposed Action. The geographic scope of the analysis varies by resource area. For example, the geographic scope of the cumulative impacts on infrastructure, geological resources, and safety is narrow and focused on the location of the resource. The geographic scope of air quality and socioeconomics is broader and considers more county- or region-wide activities.

The past, present, and reasonably foreseeable future projects, identified below, make up the cumulative impact scenario for the Proposed Action. The Proposed Action's impacts on the individual resource areas analyzed in **Sections 3.1** through **3.11** are added to the cumulative impact scenario to determine the cumulative impacts of the Proposed Action. In accordance with CEQ guidance, the impacts of past actions are considered in aggregate as appropriate for each resource area without delving into the historical details of individual past actions.

4.1 Projects Considered for Potential Cumulative Impacts

This section provides decision makers with the cumulative impacts of the Proposed Action at Tinker AFB by determining the incremental contribution of the Proposed Action together with past, present, and reasonably foreseeable future actions. **Sections 4.1.1 and 4.1.2** summarize past, present, and reasonably foreseeable future actions within the region that could interact with implementation of the Proposed Action at Tinker AFB. The sections briefly describe each action, and presents the proponent and the timeframe (e.g., past, present/ongoing, future) of the action.

4.1.1 Past Actions

Past actions are those actions that occurred within the geographic scope of cumulative impacts that have shaped the current environmental conditions of the project area. No substantial projects have been completed within the recent past that warrant consideration regarding cumulative impacts. Most construction to establish airfield pavements, interior roads, and installation infrastructure were completed approximately 80 years ago. The installation infrastructure has expanded since that time to accommodate changes in the installation's mission and fluctuations in population. Facility improvements and demolition actions continue, as needed, to maintain space-use efficiency and optimized operations. Therefore, the impacts of past actions are now considered part of the existing environment and are incorporated in the description of the affected environment in **Section 3**.

4.1.2 Present and Reasonably Foreseeable Future Actions

4.1.2.1 ON-INSTALLATION PROJECTS

Tinker AFB regularly takes into consideration the long-term needs of the installation and identifies projects that would help maintain efficient and optimized installation operations. **Table 4-1** summarizes present and reasonably foreseeable actions on Tinker AFB; this table briefly describes each identified action and the timeframe for each action. As shown in **Table 4-1**, all present and reasonably foreseeable on-installation cumulative projects include construction and ground disturbance at Tinker AFB. Because the Proposed Action also includes construction and ground disturbance at Tinker AFB, it is expected that these on-installation cumulative projects would have similar types of resource impacts as the Proposed Action. Therefore, cumulative impacts from the on-installation cumulative projects, combined with the Proposed Action, are anticipated on all resource areas which would experience impacts from the Proposed Action. These potential cumulative impacts are described further in Sections **4.2.1** through **4.2.11**.

4.1.2.2 OFF-INSTALLATION PROJECTS

One past, present, and reasonably foreseeable action within the Tinker AFB region was identified within the same general geographic and temporal scope as the Proposed Action.

Oklahoma City and Oklahoma Industries Authority Road Closure Project. Oklahoma City, in partnership with the Oklahoma Industries Authority, is proposing a permanent closure of Douglas Boulevard and a portion of SE 59th St. Douglas Boulevard would be closed, at a minimum, from the southeast perimeter of the installation to the Liberator gate, and SE 59th Street would be closed between the Marauder and Hope gates. It is anticipated that this project could include construction and ground disturbance to successfully detour local traffic around the closures. The Oklahoma Industries Authority is a non-profit organization intending to spearhead economic development in Oklahoma City, and the road closures would alter the existing Tinker AFB boundaries to create synergies between infrastructure proposed on Douglas Boulevard and the main facilities located along the flight line of Tinker AFB. The timeframe for the road closure project is unknown, but it is assumed that at least a portion of this project could occur concurrently with the Proposed Action. Because the road closure project could include construction and ground disturbance adjacent to Tinker AFB and the Alternative 2 MROTC site,

it has the potential to generate cumulative impacts similar to those generated by the Proposed Action, and to also generate impacts on resource areas where the geographic scope of impacts is broader than the Proposed Action project area, such as air quality and socioeconomics (see **Sections 4.2.1** through **4.2.11**).

Oklahoma Department of Transportation (DOT) I-40 Bridge Replacement Project. The Oklahoma DOT is proposing to replace bridges along I-40 between I-35 and Sooner Road. The six new bridges are planned at Crutcho Creek, Southeast 15th Street, and Sooner Road along east and westbound I-40. The bridges would be widened from three lanes to four. The project could begin in early summer 2020 and would take approximately 30 months to complete (News9 2020). This present and reasonably foreseeable off-installation cumulative project has the potential to generate cumulative impacts with the Proposed Action on resource areas where the geographic scope of impacts is broader than the Proposed Action project area, such as air quality and socioeconomics (see **Sections 4.2.1** through **4.2.11**).

Table 4-1. Present and Reasonably Foreseeable Actions at Tinker AFB

Action	Timeframe	Description
Construct/Repair Perimeter Fence South Fence from Sooner Road to Gott Gate	Present	Install concrete fencing, replace the existing chain link fence, relocate the existing fence, and install cable reinforcement, as needed, along the Tinker AFB southern perimeter. Install a gravel perimeter road from the pedestrian bridge to Air Depot and relocate and replace the pedestrian bridge. Replacing the existing concrete sidewalk with an asphalt walking trail from the school to Cook Avenue.
E-3G Mission and Flight Simulator Training Facility	Present	Construct a new 51,000 square foot facility for the 552 Air Control Wing mission and flight simulators.
Modify Eaker Gate	Present	Realign paved base access from Eaker Gate along F Avenue to Arnold Street to include new turning lanes, a block fence, drainage, curbs and gutters, and sidewalks. Install a final denial barrier system to meet anti-terrorism/force protection requirements.
KC-46A 3-Bay Depot Maintenance Hangar	Present	Construct a high bay depot maintenance hangar for the KC-46A aircraft. The facility consists of three hangar docks sized to enclose the aircraft with required clearances.
Commercial Vehicle Visitor Control Facility	Reasonably Foreseeable	Construct a commercial vehicle gate house, containment features, and associated pavements west of Building 9201.
Depot Jet Engine Test Cell	Reasonably Foreseeable	Construct a depot jet engine test cell for large engine testing. Would include a jet engine test cell, buildup area, and a control room, totaling approximately 38,500 square feet. The facility would be designed to accommodate the infrastructure and operating systems needed to handle all USAF engine types in the projected workload.
Repair and Replace Taxiway ECHO Pavement	Reasonably Foreseeable	Full depth removal and replacement of the Taxiway Echo keel and non-keel pavement (shoulders) between Taxiway Golf and Navy Ramp
Small Arms Firing Range	Reasonably Foreseeable	Construct a fully contained approximately 35,25 square foot small arms range with 28 firing positions and associated Combat Arms Training and Maintenance facility. Would consist of an enclosed space firing area, classroom, simulator room, weapons cleaning, weapons storage, administration area, and support spaces.
Depot Aircraft Corrosion Control Facility	Reasonably Foreseeable	Construct and install a two-bay corrosion control facility for coating removal/application.
Airborne Warning And Control System Flying Squadron Operations Facility	Reasonably Foreseeable	Construct an approximately 70,000 square foot collocated Airborne Warning And Control System Flying Squadron Operations with adequate administrative and functional space in support of crew position functional flights.

4.2 Cumulative Impacts Analysis

The analysis in **Sections 4.2.1** through **4.2.11** examines the cumulative impacts on the environment that would result from the incremental impacts of Alternative 1 and Alternative 2, in addition to other past, present, and reasonably foreseeable future actions. This analysis assesses the potential for an overlap of impacts with respect to project schedules or affected areas. This section presents a qualitative analysis of the cumulative impacts.

4.2.1 Air Quality

4.2.1.1 ALTERNATIVE 1 – DLA SITE

Short- and long-term minor, cumulative, adverse impacts would be expected under Alternative 1, present and reasonably foreseeable future actions ("cumulative projects") on the installation, and the off-installation cumulative projects. Assuming that all projects are implemented at the same time, short-term, moderate, adverse cumulative impacts would be expected from the use of heavy equipment and generation of fugitive dust during construction and demolition activities under Alternative 1, construction and ground disturbance as part of on-installation cumulative projects, and construction to support the off-installation cumulative projects. However, cumulative impacts on air quality from construction activities would not occur should the Proposed Action and cumulative off-base construction projects be implemented at different times. Similarly, should some, but not all, of the cumulative projects overlap in time, short-term, minor, adverse cumulative effect might be expected.

Long-term cumulative impacts would be expected from increases in aircraft operations, ground support equipment, aircraft maintenance, new personnel, and heating of proposed buildings under Alternative 1; and heating of new proposed buildings as part of the on-installation cumulative projects, at Tinker AFB. Alternative 1 would not create emissions greater than the *de minimis* threshold values, or lead to a violation of any federal, state, or local air regulation*,* and activities of this limited size and nature would not appreciably contribute to adverse cumulative impacts on air quality.

4.2.1.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on air quality from Alternative 2 and cumulative projects would be similar to those anticipated under Alternative 1. As described under Alternative 1, estimated emissions generated by Alternative 2 would not create emissions greater than the *de minimis* threshold values, or lead to a violation of any federal, state, or local air regulation*,* and activities of this limited size and nature would not appreciably contribute to adverse cumulative impacts on air quality.

4.2.2 Biological Resources

4.2.2.1 ALTERNATIVE 1 – DLA SITE

Short- and long-term moderate, cumulative, adverse impacts would be expected on biological resources. Construction, demolition, and renovation under Alternative 1, construction proposed for on-installation cumulative projects, and construction associated with the road closure cumulative project would result in short- and long-term cumulative impacts from permanent

removal of otherwise undisturbed vegetation, an increase in impervious surfaces, and an increased risk of spreading of noxious weeds and other invasive species.

Removing vegetation and operating heavy equipment under Alternative 1, on-installation cumulative projects that include construction, and the road closure cumulative project could cause a cumulative loss of habitat for various wildlife on and adjacent to the installation. Smaller species that are less mobile or have smaller home ranges may be permanently displaced or killed during ground disturbing activities associated with construction to support Alternative 1, on-installation cumulative projects, and the road closure cumulative project. These disturbances are expected to be minor and it is assumed that wildlife would gradually acclimate and use open space in adjacent areas during and following completion of Alternative 1, on-installation cumulative project, and road closure cumulative project construction. Because there is comparable habitat in the vicinity of Tinker AFB and adjacent to the road closure cumulative project , and because Alternative 1 and cumulative projects would not remove all habitat on or adjacent to Tinker AFB, it is expected that only individuals would be affected, and construction not have a cumulative impact on local or regional wildlife populations. Therefore, Alternative 1, when combined with on-installation cumulative projects and the road closure cumulative project, would not result in a significant cumulative impact on biological resources.

Cumulative impacts on biological resources from Alternative 1 and the bridge replacement cumulative project are not expected due to the geographic separation between the Alternative 1 and the bridge replacement cumulative project.

4.2.2.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on biological resources from Alternative 2, on-installation cumulative projects, and the road closure cumulative project would be similar to, but potentially greater than, those anticipated under Alternative 1. Removing vegetation and operating heavy equipment under Alternative 2, on-installation cumulative projects that include construction, and the road closure cumulative project could cause loss of habitat for wildlife species. Because that road closure cumulative project is adjacent to the MROTC site and habitat disturbance could occur in both locations, there could be a greater displacement of individuals than anticipated under Alternative 1. However, there is habitat in the vicinity of Tinker AFB and the MROTC site that is comparable to the habitat on Tinker AFB and within the MROTC site. Additionally, Alternative 2 and on-installation cumulative projects would not remove all habitat on or adjacent to Tinker AFB; therefore, it is expected that only individuals would be affected and construction not have a cumulative impact on local or regional wildlife populations. Therefore, Alternative 2, when combined with on-installation cumulative projects and the road closure cumulative project, would not result in a significant cumulative impact on biological resources.

Cumulative impacts on biological resources from Alternative 2 and the bridge replacement cumulative project are not expected due to the geographic separation between the Alternative 2 and the bridge replacement project.

4.2.3 Geology and Soils

4.2.3.1 ALTERNATIVE 1 – DLA SITE

Short- and long-term negligible to minor, cumulative, adverse impacts would be expected on geology and soils. Ground-disturbing activities during construction of Alternative 1, on-installation cumulative projects, and the road closure cumulative project would expose soils and cumulatively increase their susceptibility to water and wind erosion, and could result in soil compaction. Additionally, clearing of vegetation and an increase in impervious surfaces to support facility construction under Alternative 1 and on-installation cumulative projects, and potentially if needed to support the road closure cumulative project, would cumulatively increase erosion and sedimentation potential. However, construction activities associated with Alternative 1 and each on-installation cumulative project would be conducted in accordance with an erosion and sediment control plan to contain soil and runoff on-site, and reduce the potential for adverse cumulative impacts associated with erosion and sedimentation and transport of sediments in runoff. It is anticipated that Oklahoma City would also follow erosion and sediment control measures to contain any soil and runoff from the adjacent road closure cumulative project. Once construction of Alternative 1 and each on-installation cumulative project is complete, Tinker AFB would consider implementation of stormwater controls for each project that would minimize the potential for long-term cumulative impacts associated with erosion and sediment generation during future storm events. Alternative 1, when combined with on-installation cumulative projects and the road closure cumulative project, would not result in significant cumulative impacts on geology and soils.

Cumulative impacts on geology and soils from Alternative 1 and the bridge replacement cumulative project are not expected due to the geographic separation between the Alternative 1 and the bridge replacement cumulative project.

4.2.3.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on geology and soils from Alternative 2 and on-installation cumulative projects would be similar to those anticipated under Alternative 1. Ground-disturbing activities during construction of Alternative 2, on-installation cumulative projects, and the road closure cumulative project would cumulatively increase the potential for erosion and soil compaction. However, BMPs would be implemented for Alternative 2 as described in **Section 3.3.3**, and it is anticipated that Tinker AFB and Oklahoma City would implement similar BMPs for their respective cumulative projects, which would minimize cumulative impacts. Therefore, Alternative 2, when combined with on-installation cumulative projects and the road closure cumulative project, would not result in a significant cumulative impact on geology and soils.

Cumulative impacts on geology and soils from Alternative 2 and the bridge replacement cumulative project are not expected due to the geographic separation between the Alternative 2 and the bridge replacement cumulative project.

4.2.4 Hazardous Materials and Wastes

4.2.4.1 ALTERNATIVE 1 – DLA SITE

Short-term minor, cumulative, adverse impacts would be expected on hazardous materials and wastes. Alternative 1 and on- and off- installation cumulative projects would result in a

cumulative, short-term, temporary increase in the use of hazardous materials and petroleum products, and generation of waste, during construction of these projects. BMPs outlined in **Section 3.4.3** for Alternative 1, including proper vehicle maintenance, proper procurement of hazardous materials, and proper disposal of hazardous wastes would minimize cumulative impacts if implemented for all on- and off- installation projects. Because the proponents for Alternative 1 and on- and off-installation cumulative projects are either federal or state agencies, it is assumed that all federal and state regulations, including implementation of BMPs, would be followed regarding hazardous material and waste management during Alterative 1 and on- and off-installation project construction. Therefore, Alternative 1, when combined with cumulative projects, would not result in a significant cumulative impact on hazardous materials and wastes.

4.2.4.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on hazardous materials and wastes from Alternative 2 and cumulative projects would be similar to, but less than, those anticipated under Alternative 1 because Alternative 2 does not include demolition. Alternative 2 and cumulative projects would result in a cumulative, short-term, temporary increase in the use of hazardous materials and petroleum products and generation of waste during construction of these projects. However, it is anticipated that all federal and state regulations, including implementation of BMPs, would be followed regarding hazardous material and waste management during Alterative 2 and on- and off-installation project construction Therefore, Alternative 2, when combined with cumulative projects, would not result in a significant cumulative impact on hazardous materials and wastes.

4.2.5 Health and Safety

4.2.5.1 ALTERNATIVE 1 – DLA SITE

Short-term negligible to minor, cumulative, adverse impacts would be expected on health and safety. Alternative 1 and on- and off- installation cumulative projects would result in short-term, minor, adverse cumulative impacts. Short-term cumulative impacts on health and safety could result during construction and demolition activities associated with Alternative 1 and on- and off-installation projects. Cumulative impacts could occur from the exposure of workers to the inherent safety hazards associated with construction such as slips, trips, and falls; exposure to hot, cold, and wet conditions; biological hazards; and fire, mechanical, vision, noise, and respiratory hazards. Cumulative safety impacts on contractors and construction workers would be dependent on activity levels, activity types, and length of the construction period for Alternative 1 and cumulative projects. Compliance with OSHA standards and use of appropriate PPE during construction of Alternative 1 and all cumulative projects would minimize health and safety risks. Alternative 1, when combined with cumulative projects, would not result in a significant cumulative impact on health and safety.

4.2.5.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on health and safety from Alternative 2 and cumulative projects would be similar to those anticipated under Alternative 1. Alternative 2 and cumulative projects would result in cumulative impacts on the health and safety of construction personnel. Compliance with OSHA standards and use of appropriate PPE during construction of Alternative 2 and all cumulative projects would minimize health and safety risks. Therefore, Alternative 2, when

combined with cumulative projects, would not result in a significant cumulative impact on health and safety.

4.2.6 Infrastructure and Utilities

4.2.6.1 ALTERNATIVE 1 – DLA SITE

Short- and long-term negligible to minor, cumulative, adverse impacts would be expected on infrastructure and utilities. Short-term cumulative impacts could include service interruptions experienced when extending or rerouting existing utility lines to the Alternative 1 and on-installation cumulative project areas. Construction associated with Alternative 1 and on- and off-installation cumulative projects would also require minimal amounts of water, primarily for dust suppression, and temporarily increase solid waste generation. Implementation of BMPs outlined in **Section 3.6.3** for Alternative 1 and on- and off-installation cumulative projects, and diverting materials that could be recycled or reused from landfills to the greatest extent possible, would reduce cumulative impacts. Long-term cumulative impacts could occur from Alternative 1 and on-installation cumulative projects due to the increased demand on utilities from new facilities and increased personnel. However, Alternative 1, when combined with cumulative projects, would not be expected to result in a significant cumulative impact on infrastructure and utilities.

Localized, short-term cumulative transportation impacts would be expected from an increase in construction vehicles accessing Tinker AFB, and areas adjacent to Tinker AFB, to support Alternative 1, on-installation cumulative projects and the road closure cumulative project, combined with lane closures from the road closure and bridge replacement cumulative projects. Proposed on-installation cumulative projects include gate improvements, which if completed prior to Alternative 1 and reasonably foreseeable on-installation cumulative project construction, could reduce the potential for cumulative impacts on the installation transportation network and gate congestion from Alternative 1 and on-installation cumulative project construction traffic. Alternative 1, when combined with cumulative projects, would not result in a significant cumulative impact on transportation.

4.2.6.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on infrastructure and utilities from Alternative 2 and cumulative projects would be similar to, but potentially greater than, those anticipated under Alternative 1. Alternative 2 and cumulative projects would result in cumulative impacts from utility service interruptions, water use for dust suppression, solid waste generation, traffic from construction vehicles, and lane closures. Cumulative impacts from Alternative 2 and cumulative projects could be greater than those from Alternative 1 because of the proximity of the Alternative 2 MROTC site and the road closure cumulative project. These project sites are adjacent to one another which could temporarily increase localized congestion from construction vehicles and local traffic from the road closure. Proposed on-installation cumulative projects include gate improvements, which if completed prior to Alternative 2 and reasonably foreseeable on-installation cumulative project construction, could reduce the potential for cumulative impacts on the installation transportation network and gate congestion from Alternative 2 and on-installation cumulative project construction traffic. However, Alternative 2, when combined with cumulative projects, would not result in a significant cumulative impact on infrastructure and utilities, or transportation.

4.2.7 Noise

4.2.7.1 ALTERNATIVE 1 – DLA SITE

Short-term minor, cumulative, adverse impacts would be expected on noise from construction activities associated with Alternative 1, and on- and off-installation cumulative projects. Given the sporadic nature of construction activities, that Alternative 1 and on- and off- installation cumulative project construction would likely occur in varying locations and at different times, distance to noise-sensitive areas nearby Tinker AFB, and the existing noise environment on Tinker AFB, these cumulative impacts on noise would be minor. Therefore, Alternative 1 when combined with other cumulative projects, would not result in significant cumulative impacts on sensitive noise receptors or the noise environment at Tinker AFB or regionally.

4.2.7.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on noise from Alternative 2 and on- and off-installation cumulative projects would be similar to those anticipated under Alternative 1. Alternative 2 and on- and off-installation cumulative projects would result in cumulative impacts from construction noise. However, cumulative impacts would be minor. Therefore, Alternative 2, when combined with cumulative projects, would not result in a significant cumulative impact on infrastructure and utilities.

4.2.8 Socioeconomics and Environmental Justice

4.2.8.1 ALTERNATIVE 1 – DLA SITE

Short-term, negligible to minor, adverse and beneficial cumulative impacts would be expected on socioeconomics. Alternative 1, when combined with on- and off- installation cumulative projects, would result in short-term, beneficial cumulative impacts on the region's economy through the purchase of construction materials and providing employment for construction personnel during project activities. An increase of construction workers on the installation to support Alternative 1 and on-installation cumulative project construction would a have a short-term negligible adverse cumulative impact on the installation population. Alternative 1, when combined with cumulative projects, would not result in a significant cumulative impact on socioeconomics.

Short-term, negligible, cumulative adverse impacts on minority, low-income, and children populations could occur from construction noise and air emissions under Alternative 1 and on-installation projects, when considered with construction noise and air emissions that would be generated by off-installation projects. However, because an environmental justice community has not been identified within the ROI for Alternative 1, construction projects would be temporary and intermittent, and construction would likely occur in varying locations and at different times, disproportionately high and adverse cumulative impacts on minority, low-income, or child populations would not be expected.

4.2.8.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on socioeconomics from Alternative 2 and on- and off- installation cumulative projects would be similar to those anticipated under Alternative 1. Alternative 2 and cumulative projects would result in beneficial and adverse cumulative impacts on the region's

economy and socioeconomic environment. Alternative 2, when combined with cumulative projects, would not result in a significant cumulative impact on socioeconomics.

As described for Alternative 1, disproportionately high and adverse cumulative impacts on minority, low-income, or children populations would not be expected from Alternative 2 when combined with cumulative projects. Construction activities under Alternative 1 would result in a short-term increase in noise levels and air emissions, and when combined with on- and off-installation cumulative projects which could also increase noise levels and air emissions, could have cumulative impacts on Census Tract 1074.03, an environmental justice community. However, noise levels and air emissions would attenuate with distance and would not be concentrated within Census Tract 1074.03. While environmental justice populations could experience cumulative impacts from the Alternative 2 and on- and off-installation cumulative projects, it is not anticipated that these cumulative impacts would be disproportionately high, or disproportionately adverse, and significant cumulative impacts are not anticipated.

4.2.9 Cultural Resources

4.2.9.1 ALTERNATIVE 1 – DLA SITE

No adverse impacts on cultural resources would be anticipated from implementation of the Alternative 1. Therefore, Alternative 1, when combined with cumulative projects, would not contribute to cumulative impacts on cultural resources.

4.2.9.2 ALTERNATIVE 2 – MROTC SITE

No adverse impacts on cultural resources would be anticipated from implementation of the Alternative 2. Therefore, Alternative 2, when combined with cumulative projects, would not contribute to cumulative impacts on cultural resources.

4.2.10 Water Resources

4.2.10.1 ALTERNATIVE 1 – DLA SITE

Alternative 1 and on- and off-installation cumulative projects would result in short- and long-term negligible to moderate adverse cumulative impacts on local and regional water resources, including Crutcho Creek. Crutcho Creek runs through the Alternative 1 project area, and is included in the bridge replacement cumulative project area.

Cumulative impacts on water resources from ground-disturbing activities associated with Alternative 1 and on- and off- installation cumulative projects would be short-term during construction. Construction activities for Alternative 1 and cumulative projects could involve removing vegetation, which could cumulatively increase sedimentation and decrease infiltration and groundwater recharge. The tributaries located near the Alternative 1 site feed into Crutcho Creek, and would likely experience an increase in sediment from the Alternative 1 construction and demolition, on-installation cumulative project construction that would be adjacent to surface waters that also feed Crutcho Creek, and the bridge replacement project construction. To minimize cumulative erosion and sedimentation, grading and clearing for Alternative 1 and on-installation projects would be managed by Tinker AFB and occur only as needed and only within approved construction corridors. It is assumed that construction of Alternative 1, and all on- and off- installation cumulative projects would include adherence to construction site-specific

SWPPPs, and BMPs for equipment use and emergency equipment repair, such as containment of fuels and other potentially hazardous materials, secondary containment, and keeping spill kits on site, which would reduce the potential for adverse cumulative impacts.

Long-term cumulative impacts would be expected on water resources from an increase in impervious surfaces associated with Alternative 1 and on- and off-installation cumulative projects, which would result in a cumulative increase in the 100-year runoff volume and would require measures for each project to offset the additional volume. Detention ponds for Alternative 1 and on-installation cumulative projects would be designed in coordination with Tinker AFB to release stormwater at a rate equal to or less than existing current conditions. Tinker AFB stormwater permits would be obtained or amended as necessary for Alternative 1 and on-installation cumulative projects to comply with applicable ODEQ stormwater regulations. Therefore, degraded water quality due to increased erosion and sedimentation is unlikely. Alternative 1, when combined with other cumulative projects, would not be expected to result in a significant cumulative impact on water resources.

4.2.10.2 ALTERNATIVE 2 – MROTC SITE

Cumulative impacts on local and regional water resources from Alternative 2 and on- and off-installation cumulative projects would be similar to, but less than, those anticipated under Alternative 1. Alternative 2 would have no impacts on Crutcho Creek and therefore, no cumulative impacts are anticipated on this watershed. Cumulative impacts could be anticipated on water resources from Alternative 2 and on-installation cumulative projects from increased erosion, sedimentation, potential for spills, and increased impervious surfaces. However, it is assumed that construction of Alternative 2, and all on- and off- installation cumulative projects would include adherence to construction site-specific SWPPPs, and BMPs for equipment use and emergency equipment repair, such as containment of fuels and other potentially hazardous materials, secondary containment, and keeping spill kits on site, which would reduce the potential for adverse cumulative impacts..

4.2.11 Land Use

4.2.11.1 ALTERNATIVE 1 – DLA SITE

Short-term, negligible, cumulative, adverse impacts would be expected on land use. Cumulative impacts on installation land use could occur within areas that would be needed for construction access, to facilitate grading, or areas used for laydown and storage areas, in support of construction for Alternative 1, on-installation cumulative projects. Occupation of areas or facilities adjacent to construction, demolition, and renovation sites for Alternative 1 and on-installation cumulative projects would be limited by Tinker AFB to the duration of construction and coordinated with users prior to the disruption. Therefore, Alternative 1, when combined with cumulative projects, would not result in a significant cumulative impact on land use.

Cumulative impacts on land use from Alternative 1 and the off-installation cumulative project are not expected due to the geographic separation between the Alternative 1 and the off-installation project.

4.2.11.2 ALTERNATIVE 2 – MROTC SITE

Short-term cumulative impacts on land use from Alternative 2 and on-installation cumulative projects would be similar to those anticipated under Alternative 1. Cumulative impacts on land use on installation could occur within areas that would be needed to support of construction for both Alternative 2 and on-installation cumulative projects.

Short-term adverse and long-term beneficial cumulative impacts on land use would be expected from Alternative 2 and the road closure cumulative project. Due to the close proximity of these two projects, similar areas could be needed for construction access, to facilitate grading, or to be used for laydown and storage areas. Occupation of areas or facilities adjacent to construction sites for Alternative 2 and the road closure cumulative project would be limited to the duration of construction and Tinker AFB would coordinate with Oklahoma City on the construction and laydown areas for these two projects to minimize impacts. Long-term beneficial cumulative impacts on land use would be expected from the synergies generated by the development of the MROTC site and the road closure cumulative project. While long-term impacts on land use would be expected from the MROTC site lease under Alternative 2, long-term cumulative impacts are not anticipated because the on-installation cumulative projects likely would not require long-term changes to land use designations or off-installation leases. Therefore, Alternative 2, when combined with cumulative projects, would not result in a significant cumulative impacts on land use at or near Tinker AFB.

Cumulative impacts on land use from Alternative 2 and the bridge replacement cumulative project are not expected due to the geographic separation between Alternative 2 and the bridge replacement cumulative project.

4.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from the Alternative 1 and Alternative 2. None of these impacts would be significant.

Energy. Alternative 1 and Alternative 2 would require the use of fossil fuels, a non-renewable natural resource, during construction (i.e., oil, fuel), facility operation (i.e., natural gas), and aircraft operation (i.e., fuel). The use of non-renewable resources is an unavoidable occurrence, although not considered significant.

Geological Resources. Construction activities associated with Alternative 1 and Alternative 2 would result in temporary soil disturbance; however, implementation of BMPs and erosion- and sedimentation-control measures would limit environmental impacts. Although soil disturbance would be unavoidable, the impact on geological resources would be negligible.

Hazardous Materials and Wastes. The use and generation of hazardous materials and wastes during construction and aircraft maintenance activities would be unavoidable; however, the materials and wastes would be handled in accordance with federal, state, and local policies and would not be expected to result in significant impacts.

4.4 Compatibility of Proposed Action with the Objectives of Federal, Regional, State, and Local Land Use Plans, Policies, and Controls

Alternative 1 and Alternative 2 would occur on lands that are, or are becoming, government-owned, and within airspace for which proposed activities are currently authorized. The nature of activities for Alternative 1 and 2 would be consistent with the historical use of Tinker AFB and would be conducted in compliance with current federal, regional, state, and local land use policies and controls.

4.5 Relationship between Short-Term Uses of the Human Environment and Maintenance and Enhancement of Long-Term Productivity

The relationship between short-term uses and enhancement of long-term productivity from implementation of Alternative 1 and Alternative 2 is evaluated from the standpoint of short-term effects and long-term effects. Short-term uses of the biophysical components of the human environment include direct construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period of less than 5 years. Long-term uses of the human environment include those impacts occurring over a period of more than 5 years, including permanent resource loss.

Alternative 1 and Alternative 2 would not require short-term resource uses that would result in long-term productivity compromises. The negative effects of short-term operational changes during construction would be minor when compared to the positive benefits from increased aircraft maintenance capabilities. Additionally, short-term uses of the environment from aircraft operations would result in noise and air emissions. Noise and air emissions generated would not be expected to result in long-term, adverse impacts on noise-sensitive receptors or wildlife. The nature of activities for Alternative 1 and Alternative 2 would not differ from historic use of the area.

Therefore, implementation of the Alternative 1 or Alternative 2 would not result in significant impacts on sensitive resources. As a result, it is not anticipated that Alternative 1 or Alternative 2 would result in any environmental impacts that would permanently narrow the range of beneficial uses of the environment or pose long-term risks to health, safety, or the general welfare of the public.

4.6 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the impacts that the use of these resources would have on future generations. Irreversible impacts primarily result from using or destroying a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). The irreversible and irretrievable commitment of resources that would result from the Alternative 1 and Alternative 2 involve the consumption of material resources used for construction, energy resources,

biological resources, and human labor resources. The use of these resources is considered to be permanent.

Material Resources. Material resources used for Alternative 1 or Alternative 2 would potentially include concrete and various construction materials and supplies. The materials that would be consumed are not in short supply, would not limit other unrelated construction activities, and would not be considered significant.

Energy Resources. Energy resources used for Alternative 1 or Alternative 2 would be irretrievably lost. This includes petroleum-based products (e.g., gasoline and diesel). During construction and aircraft maintenance activities, gasoline and diesel would be used to operate vehicles and construction equipment. Additionally, the use of fuel for aircraft operations and vegetation maintenance equipment would be irreversible. Consumption of these energy resources would not place a significant demand on their availability in the region; therefore, less than significant impacts would be expected.

Biological Resources. Alternative 1 and Alternative 2 would result in a loss of vegetation and wildlife habitat. Direct effects on vegetation from vegetation removal and crushing and indirect effects from soil compaction would occur. Minimal loss of wildlife would occur because of Alternative 1 or Alternative 2; however, this would not constitute a significant adverse impact on biological resources.

Human Resources. The use of human resources for construction and aircraft maintenance activities is considered an irretrievable loss only in that it would preclude such personnel from engaging in other work activities. However, the use of human resources for Alternative 1 or Alternative 2 represents employment opportunities and is considered beneficial.

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