Environmental Assessment
KC-46A Depot Maintenance Activation
Tinker Air Force Base, Oklahoma
Volume I

United States Air Force
72 Air Base Wing
Tinker Air Force Base, Oklahoma

March 2014

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
25 JUL 2014	**Final**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Environmental Assessment KC-46A Depot Maintenance Activation Tinker Air Force Base, Oklahoma Volume 1	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **United States Air Force 72 Air Base Wing Tinker Air Force Base, Oklahoma**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**296**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

FINDING OF NO SIGNIFICANT IMPACT
AND FINDING OF NO PRACTICABLE ALTERNATIVE
KC-46A DEPOT MAINTENANCE ACTIVATION
TINKER AIR FORCE BASE (AFB), OKLAHOMA

Pursuant to the Council on Environmental Quality regulation for implementing the procedural provisions of the National Environmental Policy Act (NEPA), Title 40 of the Code of Federal Regulations (CFR) §§ 1500-1508; Air Force Environmental Impact Analysis Process (EIAP) regulations 32 CFR § 989 and Department of Defense Directive 6050.1, the Air Force has prepared an Environmental Assessment (EA) to identify and assess the potential impacts on the natural and human environment associated with the KC-46A depot maintenance activation at Tinker AFB, Oklahoma.

Purpose of and Need for Proposed Action **(EA § 1.3, pages 1-2 to 1-3):** The KC-135 Stratotanker is an aerial refueling military aircraft that provides support to Air Force bomber, fighter, cargo and reconnaissance forces, as well as Navy, Marine Corps and allied nation aircraft (USAF 2011a). The Air Force maintains a fleet of 530 KC-135 aircraft (USAF 2007a). Currently Oklahoma City Air Logistics Complex (OC-ALC) services approximately 60 KC-135 aircraft in an average year. Due to the age of the aircraft, increases in necessary maintenance and the cost/difficulty in obtaining replacement parts, the Air Force has challenges in maintaining the KC-135 fleet (USAF 2005). Additionally this fleet has been required to fly double its planned yearly flying hours in order to meet airborne refueling requirements, which have resulted in higher than forecasted usage and sustainment costs (House Armed Services Committee 2006). In 2011, the Air Force selected the KC-46A aircraft to replace the aging KC-135 fleet and established Tinker AFB to be the installation where depot maintenance activities would occur. The purpose of this action is to establish the required facilities and logistic support needed to perform depot maintenance operations for the new refueling aircraft. The need for this action arises because facilities are not available at Tinker AFB to support the maintenance of the KC-46A fleet.

Alternatives Eliminated from Further Consideration **(EA § 2.3, pages 2-2 to 2-3):** Five sites were initially considered for locating KC-46A depot maintenance facilities at Tinker AFB: (1) the Burlington Northern Santa Fe (BNSF) Rail Yard, (2) Defense Logistics Agency (DLA) Infill, (3) the Maintenance Repair and Overhaul Technology Center (MROTC), (4) Crosswind Runway and (5) Reutilizing the existing KC-135 facilities. Alternatives eliminated from further analysis included the MROTC, Crosswind Runway and reutilizing the existing KC-135 facilities. The MROTC and Crosswind Runway locations did not meet the purpose and need mainly because of the negative impacts the KC-46A depot maintenance activities would have on current operations conducted there. In addition, the maintenance docks could not be physically connected to the runway nor was either the MROTC or the Crosswind locations within close proximity to the existing taxiways/ramp area or Building 9001/DLA facility, which would provide major depot maintenance support to the new aircraft. Reutilizing the existing KC-135 depot maintenance facilities was also not an option. First, the KC-46A is physically larger than the KC-135 in all dimensions. Significant dismantling of the KC-46A (i.e., removal of wings and tails) would be required in order to fit within the existing KC-135 aircraft bays. This would result in maintenance schedule delays. Secondly, Tinker AFB will be required to continue performing

maintenance activities on the KC-135, since a portion of this aircraft fleet will remain within the Air Force inventory. Therefore, only the BNSF Rail Yard and DLA Infill were carried forward for further environmental analysis.

Description of the Preferred Alternative **(EA § 2.4, pages 2-5 to 2-7):** Under the Preferred Alternative, KC-46A maintenance operations would be sited at the BNSF Rail Yard located south of Tinker AFB. Although this property is off-base, it is just north of Building 9001 and is immediately adjacent to Tinker AFB property, within close proximity to the runway. Required facilities include 14 aircraft bays, taxiways, aircraft parking positions, aircraft fuel/defueling positions, aircraft run up positions, a 10-meter engine test cell, a kitting facility, a software integration lab, warehouse space and support facilities such as central chiller plant, fire pump house and personal vehicle parking areas (EA Figure 2-1, page 2-8).

As part of this action, a portion of the rail lines would be removed to accommodate the new maintenance facilities. Midwest Blvd would be rerouted around the west side of the proposed site and portions of the road would be removed. Furthermore, various utility lines and small structures would be addressed as part of this project (USACE 2012) and a 1,200-foot taxiway would be constructed south of the Navy's ramp to connect the BNSF site to the Tinker runway.

The new depot maintenance mission would create a workload increase for Tinker AFB. An estimated 350 people would be required for the various construction and demolition (C&D) activities. At full depot maintenance capabilities, an estimated 1,700 personnel would be required to maintain the fleet. Approximately 50 percent of the required manpower would be reassigned personnel due to decreased workloads in other areas of the base; 35 percent would be reassigned due to budget cuts and the remaining 15 percent (approximately 255 persons) would be hired from outside the Oklahoma City area. An estimated 1.23 percent of the additional personnel necessary for depot maintenance of the KC-46A would be required in Fiscal Year 2016, with the remainder phasing in through Fiscal Year 2028.

The KC-46A fleet would consist of approximately 180 aircraft, with the first aircraft scheduled to arrive at Tinker AFB for depot maintenance beginning in 2018. Approximately 90 KC-46A aircraft per year could be serviced at full depot maintenance capabilities.

Description of Alternative 1 **(EA § 2.5, pages 2-9 to 2-11):** Alternative 1 would locate the KC-46A depot maintenance facilities on the DLA Infill, which is located on Tinker AFB property (EA Figure 2-2, page 2-12). Facility requirements would be the same as those described above under the Preferred Alternative.

This site currently houses the DLA warehouse campus, Base Civil Engineer maintenance yard and recreation vehicle storage lot. These functions would be relocated to other areas of the base and the existing structures demolished/removed. Additionally, a portion of the 507th parking area would be removed along with miscellaneous utility lines and small structures. During construction, the existing fire detention pond would be filled, all mature trees/vegetation would be cleared and the site graded/filled (~300,000 cubic feet of soil) to support construction.

Tinker AFB is proposing to relocate the demolished facilities and operations to an existing 150,000 square foot building located on the Tinker Aerospace Complex (TAC) facility. Re-location of existing Tinker AFB operations to TAC facilities was assessed in the 2008 Environmental Assessment for Tinker Aerospace Complex. A Finding of No Significant Impact was signed by Colonel Mark A Correll, 72nd Air Base Wing Commander, on 8 May 2008.

Description of the No-Action Alternative **(EA § 2.6, page 2-13):** Under this alternative depot maintenance operations for the KC-46A aircraft would not be performed at Tinker AFB. The Air Force would not be required to construct/demolish any facilities/infrastructure at Tinker AFB nor would any additional property acquisitions occur to accommodate the new mission. The No-Action Alternative is the baseline for the rest of the analyses and helps determine the level of impact the other alternatives would have on the environment.

SUMMARY OF ENVIRONMENTAL FINDINGS

Environmental analyses focused on the following areas: air space, noise, safety, air quality, land use, physical resources, water resources, biological resources, bird/wildlife-aircraft strike hazards (BASH), cultural resources, hazardous materials/waste, utilities/infrastructure, socioeconomics and environmental justice. Because bed down of the KC-46 depot maintenance is similar to other activities already conducted at Tinker AFB and existing airfield capacity can accommodate the minimal increase, there would be no impact to airspace (EA § 4.2.1, pages 4-2, 4-5). Analyses did not show any noise sensitive areas within the day-night average sound level (DNL) 65 decibels (dB) noise contour and there would be only a 2 dB increase in DNL for both the Preferred Alternative and Alternative 1; therefore, impacts to noise are minimal (EA § 4.2.2, page 4-9). There would be no impacts to aircraft/ground safety and BASH since the KC-46 operations would be similar to the KC-135, which had negligible mishap rates (EA §§ 4.2.3 and 4.2.9, pages 4-15 to 4-16 and 4-55). Approximately 240 acres would be changed from industrial/open space/undeveloped land to aircraft operations, which is permissible within a clear zone. Overall, there would be no significant impacts to land use compatibility for both alternatives (EA § 4.2.5, pages 4-24 to 4-29). There would be no impact to cultural resources with the Proposed Action. No historic properties are found within each alternative and there are no archaeological properties within Alternative 1. Two archaeological sites are present within the Preferred Alternative; however, they are not eligible for listing in the National Register of Historic Places (EA § 4.2.10, page 4-56). The amount of hazardous materials used/waste generated in maintenance operations of the KC-46A would be similar to what is currently used/generated in maintaining the KC-135 aircraft. The existing hazardous waste permits would need to be amended to include the new processes, but overall, there would be no impacts associated with implementation of either alternative (EA § 4.2.11, pages 4-57 to 4-60). There would be no impacts to utilities and infrastructure since there is sufficient capacity for the new depot maintenance activities (EA § 4.2.12, page 4-62 to 4-64). The increase in the Oklahoma City population under both alternatives represents a potential 0.1 percent. This would not affect the ability of public services, transportation or infrastructure to effectively support the community. Current housing and school capacities can accommodate the increase in population (EA § 4.2.13, pages 4-69 to 4-70). There would be no disproportionate and adverse impacts to children, minority or low-income populations since these groups are not found within/adjacent to either alternative (EA §4.2.14, page 4-71). All other findings are summarized below.

Air Quality **(EA § 4.2.4, pages 4-19 to 4-23):** There would be temporary, localized emissions during KC-46A C&D activities associated with grading, excavating, filling and equipment operations, which would quickly dissipate away from the source. Once the aircraft arrive, there would be long-term air quality impacts due to the addition of stationary combustion sources at the boiler and chiller plants, flight emissions, engine testing and the increase in public owned vehicles. Combustion of fuel under both alternatives would result in emissions of CO, VOC, NOx, SO2, PM10 and PM2.5 (EA Table 4-6, page 4-22). There would also be an increase in VOC emissions from solvent use during general cleaning/de-painting and fuel component testing. Total VOC emissions from KC-46A depot maintenance activities would be 144 tons per year. This would be a 0.091 percent increase to the overall Oklahoma County regional emissions, which would not be considered significant. The Proposed Action is located in an attainment area for all National Ambient Air Quality Standards under the Clean Air Act and conformity analysis is not required. Because Tinker is a major air source for NOx, CO and VOCs, they currently operate under a Title V Permit as well as a Prevention of Significant Deterioration (PSD) permit. These air permits would be modified to reflect changes/additions to stationary air sources required for KC-46A depot maintenance.

Approximately 89,236 metric tons of greenhouse gases (GHG) would be released annually under both alternatives, which exceed the PSD GHG rule applicability threshold. Currently there are no acceptable methodologies for quantitatively relating amounts of GHG emissions to an associated amount of climate change; therefore, the Air Force calculates these emissions in order to compare each alternative. While there is a slight increase in GHG emission related to this project, these emissions are not expected to have a significant impact to the local and regional air quality. Overall, there are no significant impacts to air quality from either alternative and mitigations are not required.

Physical Resources **(EA § 4.2.6, pages 4-29 to 4-33):** The addition of impervious cover (125 percent) would result in short-term construction-related soil erosion on site and long-term, permanent loss of vegetation and potential for soil erosion down-gradient of paved areas. Best management practices (BMPs) would be implemented to minimize both short- and long-term erosion impacts. Because the topography at the Preferred Alternative is relatively flat, there is a very low to moderately low capacity for soil erosion to be transmitted to storm water, nor would prime farmland soils be impacted since none were identified.

Impacts from soil erosion as a result of Alternative 1 would be similar to those described under the Preferred Alternative, except that under Alternative 1, there would be a 34 percent increase in impervious cover. Since Alternative 1 has a large area of highly erodible soils, BMPs chosen to reduce erosion would be optimally designed to reduce impacts. The topography would undergo major alterations as a result of construction related site grading. The intermittent stream and storm water detention pond at Alternative 1 would be removed and reconfigured.

There would be short term impacts to physical resources from both alternatives; however, no long term impacts would be expected once C&D activities are completed and landscaping/ pavement is in place. Drainage system BMPs would be installed to prevent soil loss and minimize sediment runoff at the construction site during storm events. These could include

preservation of existing vegetation to the extent practical, management/control of storm water run-on and management of disturbed soil areas. Any topsoil disturbed would be temporarily stockpiled for reuse on site where feasible. There would be no significant, long-term impacts to physical resources from KC-46A operations.

Water Resources **(EA § 4.2.7, pages 4-33 to 4-41):** There would be less than significant negative impacts to water quality under both the Preferred Alternative and Alternative 1. Surface water leaves the Preferred Alternative at the northern edge and drains into Tinker AFB's engineered marshland. This marshland serves as a filter before flowing into Beaver Pond, an Air Force designated nature preserve. Surface water from Alternative 1 discharges into several retention/detention features within Tinker AFB prior to final discharge into Crutcho Creek.

Implementation of the both alternatives would result in increased storm water generation. Both sites would require implementation of retention/detention features in order to manage the additional storm water discharge. Discharge from the detention basin(s) would be equal to or less than the existing release rate into the existing surface water. Several potential detention area(s) have been identified and would be selected during design. A Storm Water Pollution Prevention Plan would be implemented for both alternatives in order to minimize the amount of sediment released to surface water from C&D activities. In addition, existing Tinker AFB National Pollutant Discharge Elimination System permit, general permits (multi-sector, storm water discharges & Phase II small municipal discharges) would be obtained or amended, as necessary. Resulting impacts to surface water as a result of the both alternatives would be less than significant.

Floodplains do not exist within the Preferred Alternative; however, four non-jurisdictional wetlands were observed. Additionally, the Greenway wetland is located approximately one-mile downstream of the Preferred Alternative. While this wetland would not be directly impacted, increased storm water and sediment runoff from C&D activities may indirectly affect wetland quality. Best management practices would be put in place to mitigate potential negative impacts in regard to surface water. Approximately 40 acres of Alternative 1 are located within the 100-year floodplain. Based on the USACE 2013 Hydrology and Hydraulic Report, the 100-year runoff volume would increase by 9.6 acre-feet and steps would be taken to offset the additional volume. The greatest peak discharge is expected to be 1,199 cubic feet per second and would occur along East Crutcho Creek near South Air Depot Blvd. Approximately 70 acre-feet of storage would be needed as well as elevating the land in order to off-set impacts to the floodplain. This would be identified during design and require a permit to construct. Approximately 3 acres of jurisdictional wetland, an intermittent, jurisdictional stream as well as a small portion of non-jurisdictional stream (0.05 miles) are found within Alternative 1. Development of this site would result in a permanent loss of 3.15 acres of jurisdictional wetlands and 0.67 miles of jurisdictional waters. A Section 401/404 permit under the Clean Water Act would be required from the USACE prior to construction. The permit would state in detail the mitigations required to offset this loss. .

Biological Resources **(EA § 4.2.8, pages 4-41 to 4-55):** There would be minor, long-term loss of habitat under the Preferred Alternative. However, there would be no overall change to species diversity at the site. Less than an acre of forested habitat would be lost and approximately 80

acres of non-native grasses would be developed. Nine acres of the Tinker AFB Green Infrastructure (GI), an interconnected network of waterways, wetlands, woodlands, grasslands and other natural areas of base wide significance, are primarily located along the northern and western boundaries of the site. Under the Preferred Alternative, a 300-foot corridor along the western boundary of the site would remain connected to the GI near the Draper Lake area by way of natural buffers. The majority of Alternative 1 would be developed to accommodate the new mission resulting in a permanent loss of approximately 15 acres of forested habitat. The loss would result in 40% decrease in habitat diversity available on Tinker AFB. In order to offset this loss, Tinker AFB would create approximately 50 acres of grassland habitat from a former military housing area currently being demolished.

Impacts to migratory bird species from the Preferred Alternative and Alternative 1 are anticipated to be short-term and minor. Migratory birds would be discouraged from both sites with routine mowing, maintenance and woody vegetation removal prior to the breeding season (April-July). Should C&D activities occur during the breeding season, modification of the existing Tinker Depredation Permit would be required to authorize hazing of migratory birds and discourage nesting within the project area. As part of this action Tinker AFB would also conduct a pre-construction nest survey to avoid damaging birds, eggs or nests. If active breeding birds/nests are identified during this survey, a relocation permit would be required from the U.S. Fish and Wildlife Service prior to clearing/construction activities. Impacts to fish within the Crutcho Creek tributary would be minimized through use of soil erosion BMPs. There are no known federally listed threatened and endangered species within either project site. There would be potential impacts to the Texas horned lizard, a state species of concern. These impacts would be short-term as a result of construction activities and would not be expected to cause a major increase or decrease in suitable habitat for this species or result in a direct take due to pre-construction species specific surveys, catch and relocation efforts.

Other Identified Contamination **(EA §§ 3.2.11.2.3 and 4.2.11.4, pages 3-71 to 3-73, and page 4-61):** During the Phase II Environmental Baseline Survey conducted in October and November 2013 at the BNSF Rail yard, two groundwater samples detected cadmium concentrations above the Maximum Contaminant Level (MCL) established by the U.S. Environmental Protection Agency and one shallow soil sample contained arsenic. Because all the groundwater results for cadmium were within the upper tolerance limits for background levels of metals, no further investigation was performed. The reported concentration for arsenic was 24 mg/kg, which slightly exceeded the maximum background arsenic concentration of 21 mg/kg for Central Oklahoma. Because the value of 24 mg/kg is statistically similar to 21 mg/kg, it was considered within background levels and no further investigation was required. Through the Installation Development Plan, Tinker AFB will prohibit the use of groundwater at BNSF to prevent exposure to potential contamination. Additionally, a storm water detention basis will be constructed where arsenic concentrations have been reported in the soil to treat runoff and the soils will be sampled to properly characterize the waste for off-site disposal. Therefore, impacts from the Preferred Alternative would be less than significant. No contamination was identified at Alternative 1.

Mitigations

As the proponent for KC-46A depot maintenance mission, 76 AMXG is responsible for ensuring the mitigations identified above and in the EA are in place prior to taking any specific action. The 72 ABW/CE will oversee and verify mitigations are fully funded by the proponent and are in place and being carried out, as identified in this FONSI and the Mitigation and Monitoring Plan (MMP). The MMP will be developed subsequent to this FONSI and will include points of contact for oversight and completion of the mitigation as well as the anticipated timing for mitigation completion. It is expected the mitigation monitoring will generally consist of on-the-ground inspections and any subsequent actions necessary to address deficiencies discovered during the inspections. The EA refers to the use of BMPs. For this FONSI and in compliance with Air Force regulation, BMPs will be carried forward and monitored in the MMP.

Public Review

A public notice was placed in the Daily Oklahoman and the Tinker Take Off on 31 January 2014 announcing the availability of the Draft EA and Draft FONSI/FONPA for public review and comment. The documents were made available for review on the internet at http://www.tinker.af.mil/library/environment/index.asp from 31 January to 3 March 2014. The Air Force received comments from five public agencies during and after the review period. The Oklahoma State Historic Preservation Office (SHPO) requested additional details on two potentially eligible sites identified on the Preferred Alternative site. This information was provided to the SHPO and they concurred Sites 34OK146 and 34OK228 were in-eligible for inclusion in the National Register of Historic Places. The Oklahoma Department of Environmental Quality provided notice the Preferred Alternative was adjacent to a classified brownfield location. The certificate of completion requires the soils be tested for contamination before excavation and disposed of properly. The Oklahoma City Audubon Society offered suggestions for the preferred vegetation types to be used when establishing the new green infrastructure and the information was provided to Tinker AFB natural resources department for their records. The Oklahoma City Department of Public Works reminded the Air Force to comply with all regulatory floodplain requirements and floodplain development ordinance. They also noted both alternatives may require permits for construction in the floodplain.

Tribal consultation letters were mailed to the federally recognized tribes on 17 September 2013. The Air Force did not receive any responses to the consultation letters. Additional attempts to contract tribal representatives were made from 2-8 May 2014 by the Tinker AFB cultural resources staff. Appendix A includes a record of these calls and any responses from the tribes.

FINDING OF NO PRACTICABLE ALTERNATIVE

The Preferred Alternative is the Air Force's first choice since it does not impact floodplains. However, there would be a permanent loss of 0.60 acres of non-jurisdictional wetlands. These impacts would be minimized through mitigation banking or other compensatory mitigation. Due to the low habitat quality, limited acreage and mitigation measures, impacts to wetlands would be considered less than significant. Currently the Air Force does not own this property and its use is contingent upon purchase.

If the Preferred Alternative is unable to be secured by the Air Force, then Alternative 1 will become the bed down site for the KC-46A. Approximately 40 acres of the 100-year floodplain will be impacted. As a result, a portion of the floodplain would be filled and developed, resulting in the elimination of a segment of East Crutcho Creek. To minimize impacts, floodplains mitigation measures include establishing an off-site location for flood storage and diverting storm water flow through use of conveyance features. Development of Alternative 1 will also result in a permanent loss of 3.15 acres of jurisdictional wetlands and 0.67 miles of jurisdictional waters. A Section 401/404 permit under the Clean Water Act would be required from the USACE and the Air Force would be required to construct wetlands in significantly greater acreage than those lost, in order to mitigate wetland impacts.

Pursuant to Executive Orders 11988 and 11990, and considering all supporting information, I find there is no practicable alternative to constructing the KC-46A depot maintenance facility at a site which will impact either floodplains and/or wetlands, as described in the attached EA. This finding fulfills both the requirements of the referenced Executive Orders and the EIAP regulation, 32 CFR § 989.14 for a Finding of No Practicable Alternative.

FINDING OF NO SIGNIFICANT IMPACT

Based upon my review of the facts and analyses contained in the attached EA, I find the Proposed Action to bed down the KC-46A depot maintenance activities at Tinker AFB will not have a significant impact on the natural or human environment; therefore, an environmental impact statement is not required. This analysis fulfills the requirements of NEPA, the President's Council on Environmental Quality 40 C.F.R. §§ 1500-1508 and the Air Force EIAP regulations 32 C.F.R. § 989.

A MMP will be developed and implemented prior to the start of C&D activities, but no later than 90 days from the date of this FONSI.

JEFFREY M. TODD
Colonel, USAF, P.E.
Command Civil Engineer
Communications, Installations and Mission Support

25 Jul 14
Date

COVER SHEET

Lead Agency: 72nd Air Base Wing, Tinker Air Force Base (AFB), Oklahoma (OK)

Proposed Action: KC-46A Depot Maintenance Activation, Tinker AFB, Oklahoma City, Oklahoma

Points of Contact: Tinker Air Force Base, Debra Bahr, 72 ABW/CEA, 7535 5th Street, Building 400, 2nd Floor, Tinker AFB OK 73145, (405) 734-4563

Report Designation: Environmental Assessment (EA)

Abstract: The 72 Air Base Wing (ABW) at Tinker AFB is proposing to establish a KC-46A depot maintenance facility at Tinker AFB. The Proposed Action includes facility construction, personnel and workload increases, and increases in testing, maintenance and flight activities to support the KC-46A operations. The KC-46A aircraft is the Replacement Tanker Aircraft for the aging KC-135 fleet. KC-46A aircraft are projected to begin arriving at Tinker AFB for maintenance beginning in 2018 and the current KC-135 depot maintenance facilities are inadequate to meet the maintenance needs for the KC-46A aircraft.

Under the No-action Alternative, the Air Force would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any additional property acquisitions occur to accommodate the new mission requirement for the KC-46A maintenance operations.

Under the Preferred Alternative, KC-46A depot maintenance would be located at the Burlington Northern Santa Fe (BNSF) Railyard. Although the BNSF Railyard property is off-base, it is immediately adjacent to Tinker AFB property. The acquisition of the 156-acre property would be required in order to establish KC-46A depot maintenance facilities at the BNSF Railyard site.

Under Alternative 1, KC-46A depot maintenance would utilize the Defense Logistics Agency (DLA) Infill. The DLA Infill is located on the current DLA warehouse campus and adjoining area. It is currently part of Tinker AFB and consists of property that is currently owned by the Air Force.

The following resources were identified for study in this EA: Airspace Management; Noise; Safety; Air Quality; Land Use; Physical Resources; Water Resources; Biological Resources; Cultural Resources; Hazardous Materials and Wastes; Utilities and Infrastructure; Socioeconomic Resources; and Environmental Justice.

PRIVACY ADVISORY NOTICE

Letters or other written comments provided may be published in the Final EA. As required by law, comments will be addressed in the Final EA and made available to the public. Any personal information provided will be kept confidential. 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 their specific comments will be disclosed. Personal home addresses and phone numbers will not be published in the Final EA.

TABLE OF CONTENTS – VOLUME I

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF FIGURES (CONTINUED)

LIST OF TABLES

APPENDICES FOUND IN VOLUME II

(No document text on this page)

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
%NF	percent compressor fan speed
%N1	percent low pressure compressor shaft speed
%RPM	percent compressor shaft speed
A/B	afterburner
ABW	Air Base Wing
ACM	asbestos containing material
AD	Anno Domini
AFB	Air Force Base
AFI	Air Force Instruction
AFMC	Air Force Materiel Command
AFMC/CC	Air Force Materiel Command Commander
AFSC	Air Force Sustainment Center
AGL	above ground level
AGSE	aerospace ground support equipment
AHRN	Automated Housing Referral Network
AICUZ	Air Installation Compatible Use Zone
AMP	Asbestos Management Plan
AOC	Area of Concern
APE	Area of Potential Effects
APZ	Accident Potential Zones
AQCR	Air Quality Control Region
ATCT	Air Traffic Control Tower
AT/FP	antiterrorism/force protection
AWACS	Airborne Warning and Control System
BASH	Bird/Wildlife Aircraft Strike Hazard
bgs	below ground surface
BMPs	best management practices
BNSF	Burlington Northern Santa Fe
Boeing	The Boeing Company
BP	before present
CAAA	Clean Air Act Amendments
CCDB	Crutcho Creek Drainage Basin
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2eq}	carbon dioxide equivalent
COC	Community of Comparison

ACRONYMS AND ABBREVIATIONS (CONTINUED)

CWA	Clean Water Act
CZ	Clear Zone
dB	Decibels
dBA	"A-weighted" decibel
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DNL	Day-Night Average Sound Level
DoD	Department of Defense
DSOR	Depot Source of Repair
EA	Environmental Assessment
EMP	electromagnetic pulse
EO	Executive Order
EPR	engine pressure ratio
ERP	Environmental Restoration Program
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
ft	feet
FY	fiscal year
GHGs	Greenhouse Gases
GI	green infrastructure
GWP	global warming potential
HAP	hazardous air pollutant
HFCs	hydrofluorocarbons
HMMP	Hazardous Materials Management Program
IBS	Integrated Battle System
IFR	instrument flight rules
IICEP	Intergovernmental and Interagency Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IWTP	Industrial Wastewater Treatment Plant
JD	Jurisdictional Determination
kts	knots
kV	kilovolt
LBP	lead based paint
lb/sf	pounds per square foot
L_{max}	Maximum Sound Level
LID	Low Impact Development
LTM	Long Term Monitoring
LSZ	Lower saturated zone

ACRONYMS AND ABBREVIATIONS (CONTINUED)

MBTA	Migratory Bird Treaty Act
MILCON	Military Construction
mg/kg	milligrams per kilogram
MROTC	Maintenance Repair and Overhaul Technology Center
MSDS	Material Safety Data Sheets
MSL	mean sea level
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEI	National Emission Inventory
NEPA	National Environmental Policy Act
NFRAP	No Further Response Action Planned
NHPA	National Historic Preservation Act
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NRHP	National Register of Historic Places
O_3	ozone
OC-ALC	Oklahoma City Air Logistics Complex
ODEQ	Oklahoma Department of Environmental Quality
ODWC	Oklahoma Department of Wildlife Conservation
OG&E	Oklahoma Gas and Electric Company
OK	Oklahoma
OO-ALC	Ogden Air Logistics Complex
OPDES	Oklahoma Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PFCs	perfluorocarbons
$PM_{2.5}$	particulate matter equal or less than 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter equal or less than 10 micrometers in aerodynamic diameter
POV	privately-owned vehicle
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PZ	Producing zone
RA-O	Remedial Action Operation
RCRA	Resource Conservation and Recovery Act
ROD/DD	Record of Decision/Decision Document
ROI	Region of Influence
RTA	Replacement Tanker Aircraft
SAR	species at risk
SCLF	single-conductor linear feet

ACRONYMS AND ABBREVIATIONS (CONTINUED)

SEL	sound exposure level
sf	square feet
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office/r
SI	semi-improved
SIP	state implementation plan
SO_x	sulfur oxides
SO_2	sulfur dioxide
SPL	Sound Pressure Level
SSOR	Strategic Source of Repair
SUA	special use airspace
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TAC	Tinker Aerospace Complex
TCE	trichloroethylene
TPH	total petroleum hydrocarbons
tpy	tons per year
TSCA	Toxic Substance Control Act
UFC	Unified Facilities Criteria
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USSOCOM	United States Special Operations Command
USZ	upper saturated zone
VFR	visual flight rules
VOCs	volatile organic compounds
WESTON	Weston Solutions, Inc.
WR-ALC	Warner Robins Air Logistics Complex

CHAPTER 1
PURPOSE OF AND NEED FOR 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 (USAF 2012a). The OC-ALC performs programmed depot maintenance on the C/KC-135, B-1B, B-52, and E-3 aircraft. Depot-level maintenance activities of the OC-ALC include the major repair, overhaul, reclamation, and rebuild of these aircraft and their subcomponent parts, as well as technical assistance and functional check flights required to maintain fleet operations. The OC-ALC also performs expanded phase 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. The mission of the OC-ALC is "Superior Maintenance for Global Aerospace Power." Tinker AFB is also home to the Air Force Sustainment Center (AFSC) headquarters, one of five specialized centers assigned to the Air Force Materiel Command (AFMC), whose mission is to sustain weapons system readiness to generate airpower for America.

1.2 BACKGROUND AND DECISION HISTORY

The KC-135 Stratotanker is an aerial refueling military aircraft that provides support to Air Force bomber, fighter, cargo, and reconnaissance forces, as well as Navy, Marine Corps, and allied nation aircraft (USAF 2011a). The Air Force maintains a fleet of 530 KC-135 aircraft (USAF 2007a), and the OC-ALC currently services approximately 60 KC-135 aircraft in an average year. The average age of the KC-135 aircraft is 44 years old (USAF 2007a) and typical maintenance problems with the aircraft include timeworn wiring, landing gear failure, engine strut corrosion, fuel tank topcoat peeling, and necessary aircraft skin replacement. Due to the age of the KC-135 aircraft, increases in necessary maintenance and the cost of replacement parts, as well as difficulty in obtaining replacement parts, have resulted in challenges in maintaining the KC-135 fleet (USAF 2005). Additionally, due to an increase in operations, the KC-135 fleet has been required to fly double its planned yearly flying hour program to meet airborne refueling requirements, and this has resulted in higher than forecasted usage and sustainment costs (House Armed Services Committee 2006). In January 2007, the Air Force issued a request for proposal to develop a Replacement Tanker Aircraft (RTA) for the aging KC-135.

In November 2007, the Air Force, through a Strategic Source of Repair (SSOR) determination, established that organic depot maintenance capability for the KC-135 replacement aircraft would be pursued at one of the installations currently performing depot maintenance work in support of the KC-135: OC-ALC, Tinker AFB; Ogden Air Logistics Complex (OO-ALC), Hill AFB; or Warner Robins (WR)-ALC, Robins AFB. The determination supported statutory requirements to limit the amount of depot work

contracted outside the government owned, government operated facilities with the government providing 50 percent of the workforce.

In February 2011, The Boeing Company (Boeing) KC-767 aircraft was selected by the Air Force to replace the KC-135 Stratotanker. This aircraft has been given the designation KC-46A. In addition to the primary refueling role, the KC-46A will also be capable of performing other assignments, such as aeromedical evacuation activities and cargo and troop transport (Boeing 2012).

The Depot Source of Repair (DSOR) decision process is used to ensure effective use of commercial and organic depot maintenance resources while meeting statutory requirements. The DSOR process is also used to ensure the required depot maintenance capability and capacity are not unnecessarily duplicated. A goal of the DSOR process is to optimize use of established depot capabilities to reduce program costs.

Of the installations performing depot maintenance work, only one installation, OC-ALC at Tinker AFB, currently provides maintenance work for the existing tanker aircraft inventory, the KC-135. The KC-46A will not replace the entire KC-135 fleet and depot maintenance will remain a requirement and activity of the OC-ALC at Tinker AFB. Selecting either Hill AFB or Robins AFB for the KC-46A depot maintenance work would duplicate the activities, increase the cost of the program, and delay activities while a duplicate workforce at the new location is trained on the maintenance work required for refueling aircraft.

On 4 November 2011, the Air Force Materiel Command Commander (AFMC/CC) approved organic repair for the RTA at OC-ALC, Tinker AFB through the issuance of a Joint Service DSOR determination memorandum. Upon receiving the DSOR determination, OC-ALC began the planning process for identifying suitable locations within the proximity of the installation to support the KC-46A mission.

1.3 PURPOSE OF AND NEED FOR PROPOSED ACTION

The KC-46A aircraft is the United States Air Force (USAF) RTA for the aging KC-135 fleet. On 4 November 2011 the AFMC/CC approved establishment of an internally managed Air Force depot level maintenance facility for the RTA at OC-ALC, Tinker AFB in a Joint Service DSOR determination memorandum. KC-46A aircraft are projected to begin arriving at Tinker AFB for maintenance beginning in 2018 and the current KC-135 depot maintenance facilities are inadequate to meet the maintenance needs for the KC-46A aircraft. The KC-46A is physically larger than the KC-135 in all dimensions, and it would be cost prohibitive to renovate the existing KC-135 facilities to meet KC-46A requirements (USAF 2012b). Additionally, concurrent maintenance of the new KC-46A and a smaller portion of the existing KC-135 aircraft fleet will need to occur.

The purpose of the project is to establish facilities and logistics support for KC-46A depot maintenance operations at Tinker AFB, Oklahoma (OK) to support approximately 180 aircraft that will be established as the USAF KC-46A aircraft fleet. The need for the

proposed action arises because facilities are not available at Tinker AFB to support maintenance of the KC-46A fleet. Tinker AFB is considering suitable locations for the activation of the KC-46A maintenance operations. Facilities required to support the KC-46A fleet include: 14 aircraft bays, taxiways, taxi lanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, privately-owned vehicle (POV) access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an information transfer node, and a Defense Logistics Agency (DLA) kitting facility (staging area for parts used during maintenance activities) (USACE 2012).

1.4 PROJECT LOCATION

Tinker AFB is located within Oklahoma City, Oklahoma. All of the alternative sites are located within the incorporated city limits of Oklahoma City and are either on Tinker AFB property, or immediately adjacent. Centered ten miles southeast of downtown, Tinker AFB is bordered to the north by Interstate 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 below shows the location of Tinker AFB and its geographic setting within Oklahoma County and Oklahoma City.

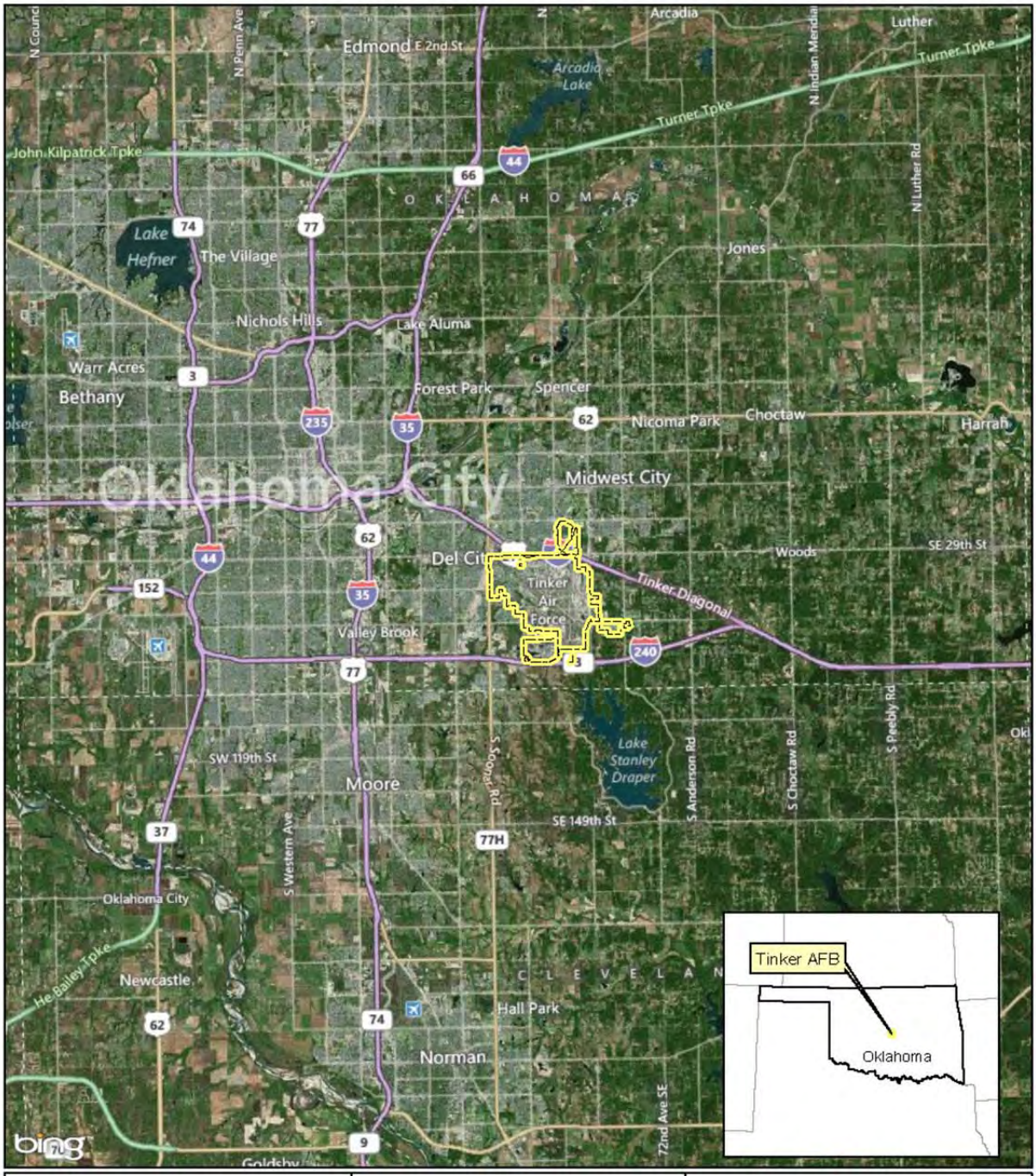


Figure 1-1

Site Map
Oklahoma City, OK

1.5 ENVIRONMENTAL ANAYLSIS PROCESS

This Environmental Assessment (EA) evaluates the potential environmental consequences of establishing KC-46A depot maintenance facilities at Tinker AFB, including facility construction, personnel increases to support KC-46A maintenance activities, as well as the effects of operational activities needed to support the KC-46A fleet. Based upon this information, Tinker AFB decision-makers, in conjunction with Air Force Materiel Command, will determine where to site the KC-46A depot maintenance facilities and how to implement the establishment of depot level maintenance facilities. The decision options are: 1) to continue with current operations (the No-action Alternative); 2) to select an alternative and prepare a Finding of No Significant Impact; or 3) to prepare an Environmental Impact Statement if the selected alternative would significantly affect the quality of the human environment. As required by the National Environmental Policy Act (NEPA), potential environmental impacts resulting from all alternatives must be identified and documented prior to selection and implementation of an alternative. Note also that since construction within a floodplain or wetland is proposed, a Finding of No Practicable Alternative would also be prepared and published with the Final EA for all alternatives, other than the No-action Alternative.

1.6 SCOPE OF THE ENVIRONMENTAL REVIEW

NEPA requires federal agencies to consider environmental consequences in their decision-making process. The President's Council on Environmental Quality (CEQ) has issued regulations to implement NEPA that include provisions for both the content and procedural aspects of the required environmental impact analysis. The Air Force NEPA process is accomplished through adherence to the procedures set forth in CEQ regulations (40 Code of Federal Regulations [CFR] Sections 1500-1508), Department of Defense (DoD) Instruction 4715.9 *Environmental Planning and Analysis,* and 32 CFR Part 989 (Environmental Impact Analysis Process), 15 July 1999, as amended (most recently in 2007). These federal regulations establish both the administrative process and substantive scope of the environmental impact evaluation. These regulations are designed to ensure that deciding authorities have a proper understanding of the potential environmental consequences of a contemplated course of action, as well as notify the public of the environmental consequences.

This EA identifies, describes, and evaluates the potential environmental impacts associated with the establishment of a KC-46A depot maintenance facility at Tinker AFB. Two site locations are considered for further analysis – the Burlington Northern Santa Fe (BNSF) Railyard and the DLA Infill. The potential environmental effects of taking no action are also described. As appropriate, the affected environment and environmental consequences of the action may be described in terms of a regional overview or a site-specific description. Fiscal year (FY) 2013 or the most current information available is used as the baseline condition.

Through Intergovernmental and Interagency Coordination for Environmental Planning (IICEP), requests have been made for information on planned actions in the surrounding community. If any concurrent actions are identified during the EA process, they will be

examined in the context of potential cumulative impacts. A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is 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 which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

1.7 APPLICABLE REGULATORY REQUIREMENTS

This EA is part of the Environmental Impact Analysis Process for the proposed project and was prepared in compliance with NEPA regulations. The following paragraphs describe the laws and regulations that apply or may apply to the Preferred Alternative and Alternative 1.

1.7.1 Interagency and Intergovernmental Coordination

Federal, state, and local agencies with jurisdiction that could be affected by the Preferred Alternative or Alternative 1 have been notified and consulted. A complete listing of the agencies consulted may be found in Chapter 6 and IICEP correspondence and responses are included in Appendix A. This coordination fulfills the Interagency Coordination Act and Executive Order (EO) 12372 *Intergovernmental Review of Federal Programs* (14 July 1982), which requires federal agencies to cooperate with and consider state and local views in implementing a federal proposal. EO 12372 is implemented by the Air Force in accordance with Air Force Instruction (AFI) 32-7060, *Interagency and Intergovernmental Coordination for Environmental Planning.*

1.7.2 Consultation

US Fish and Wildlife Service (USFWS)/Oklahoma Department of Wildlife Conservation (ODWC) Coordination

Tinker AFB has no documented Federal threatened or endangered species; therefore, formal or informal consultation with the USFWS under Section 7 of the Endangered Species Act is not required. However, due to the presence of federally-protected migratory birds, in December 2013 Tinker AFB natural resource managers initiated informal consultation with the USFWS-Southwest Region to coordinate actions to protect and conserve migratory birds. Preliminary Tinker AFB/USFWS-coordinated prescriptive and mitigative actions to accomplish this are described in this EA.

Tinker AFB also has no state-listed threatened or endangered species. However, many state species of concern (SOC) and species at risk (SAR) do occur on the base. Therefore, although not required by law, in December 2013 Tinker AFB natural resources officials coordinated with the Oklahoma Department of Wildlife Conservation (ODWC) on potential actions to protect and conserve SOCs and SARs. Tinker AFB/ODWC-coordinated prescriptive and mitigative actions to achieve this goal are described in this EA.

State Historic Preservation Office/r (SHPO) and Tribal Coordination

Cultural resources are structures, buildings, archeological sites, districts (a collection of related structures, buildings, and/or archeological sites), cemeteries, and objects. Federal regulations, primarily the National Historic Preservation Act (NHPA) of 1966 require consultation with the Oklahoma Historical Society/Oklahoma SHPO and federally-recognized tribes to determine the project's effects on cultural resources. Review and coordination of this project followed approved procedures for compliance with federal laws. Tribal consultation letters were mailed by Tinker AFB on 17 September 2013. From 2-8 May 2014, Tinker AFB cultural resources staff made additional attempts to contract tribal representatives and receive any input or concers regarding the Air Force's Proposed Action. A record of these calls and responses from tribes is included in Appendix A. The SHPO consultation letter was delivered on 18 September 2013. Copies of the Assessment of Effects to Historic Properties and Archeological Survey of a Proposed Expansion of Tinker Air Force Base were submitted to the SHPO for review on 7 October 2013 and a letter of concurrence was received 17 October 2013. These reports are included in Appendix B. On 13 February 2014, the SHPO requested additional clarification on the proposal and impacts to potentially eligible sites. Tinker AFB provided the SHPO with additional information and received confirmation of the eligibility status of historic structures on 24 March 2014. Copies of SHPO correspondence are also included in Appendix A.

1.7.3 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by the President on 11 February 1994. In the EO, the President instructed each federal agency to 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." 'Adverse' is defined by the Federal Interagency Working Group on Environmental Justice as "having a deleterious effect on human health or the environment that is significant, unacceptable, or above generally accepted norms." This EA will determine if the Preferred Alternative or Alternative 1 would result in adverse effects to low-income or minority populations.

1.7.4 Permits

Applicable permits from local, state, and federal agencies will be identified and obtained prior to construction or demolition activities associated with the Preferred Alternative and Alternative 1. The construction contractor will identify and obtain appropriate permits for construction and demolition activities. All underground utility locations would need to be identified prior to any construction activities.

The contractor would also ensure that a Storm Water Pollution Prevention Plan (SWPPP) was completed and approved before initiating construction activities. All identified applicable or potential permits are presented in Table 1-1, and are also discussed in more detail in the appropriate subsections of Chapters 3 and 4.

Table 1-1 Permits

Name	Description	New Permit/Renewal/Modification
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. [a]	Tinker has an existing Title V permit (No. 2009-394-TVR), which would require modification for the new mission.
Prevention of Significant Deterioration (PSD)	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 (NAAQS). [a]	Tinker is currently under a PSD permit. A new PSD permit would be required for new sources associated with the action.
Multi-Sector General Industrial Permit OKR05	Authorizes discharge of stormwater from industrial facilities, consistent with the terms of the permit.	May require modification.
General Permit OKR10 for Stormwater Discharges from Construction Activities within the State of Oklahoma	Required for construction activities disturbing one or more acre of land.	Required prior to commencement of construction activities.
General Permit OKR04, Phase II Small municipal storm sewer System discharge	This permit authorizes discharges of storm water and certain non-storm water discharges from Small Municipal Separate Storm Sewer Systems.	Modification may be required.
PDES (OK0000809 & OK0035203)	Permitting in accordance with National Pollutant Discharge Elimination System requirements.	Tinker currently has 2 permits (OK0000809 & OK0035203). Modifications would be required for additional discharges.
Section 404 Permit	Required for dredge or fill work in waters of the United States.	Would be required if Alternative 1 is selected.
Migratory Bird Depredation Permit	Use of or modification of existing Depredation Permit may be required if land clearing activities begin during the breeding season (April – July) to authorize hazing migratory birds to discourage nesting in the project area.	Using or modifying the existing permit would only be required if land clearing activities begin in the breeding season and vegetation is not maintained to discourage nesting. Surveys would be required if site clearing were to occur during the migratory bird breeding season (April – July). Permit processing would be approximately 60 days.

Table 1-1 Permits (Continued)

Name	Description	New Permit/Renewal/Modification
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.
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 (No. 0029-TAC, No. 0029-FC). Modifications would be required if discharge would exceed 1.5 Million gallons per day.

Notes:
[a] Source: USEPA 2013a

1.8 INTRODUCTION TO THE ORGANIZATION OF THE DOCUMENT

This EA is organized into seven chapters.

Chapter 1 Contains an introduction to the document, a statement of the purpose of and need for action, the project location, identification of the decision to be made, a summary of the scope of the environmental review, identification of applicable regulatory requirements, and a description of the organization of the document.

Chapter 2 Describes the history of the formulation of alternatives, identifies the selection standards for the alternatives, identifies alternatives eliminated from further consideration, provides a detailed description of the Preferred Alternative, describes Alternative 1 and the No-action Alternative, summarizes other actions announced for the project sites and the surrounding community, provides a comparison matrix of environmental effects for all alternatives, and describes measures to minimize or reduce impacts.

Chapter 3 Contains a general description of the current conditions of the resources that could potentially be affected by the Preferred Alternative and Alternative 1.

Chapter 4 Provides an analysis of the environmental consequences of the Preferred Alternative and Alternative 1.

Chapter 5 Lists preparers of this document.

Chapter 6 Lists persons and agencies consulted in the preparation of this EA.

Chapter 7 Lists source documents relevant to the preparation of this EA.

CHAPTER 2
DESCRIPTION OF THE ALTERNATIVES

2.1 HISTORY OF THE FORMULATION OF ALTERNATIVES

Several planning meetings were conducted to identify the site location and preferred master plan concept for a KC-46A depot maintenance program. During these pre-planning meetings, project stakeholders identified five available and permissible site locations for consideration for this program. Factors considered in the site identification included cost, operational synergy, available land, environmental implications, site accessibility, utilities, and supporting facilities required (USACE 2012). After these factors were considered, two viable alternatives were carried forward for analysis within this EA. These two alternatives included siting the depot maintenance facility at the BNSF Railyard (BNSF site) or the DLA Infill site. Sections 2.2 and 2.3 below further discuss selection standards that were applied to the five site locations, as well as alternatives that were eliminated from further consideration once the selection standards were applied.

2.2 SELECTION STANDARDS FOR ALTERNATIVES

Selection standards serve to assist Tinker AFB in defining the minimum standards that the alternatives must meet. They help to identify a reasonable range of alternatives to be analyzed within the EA. Selection standards in this EA were developed based on key factors such as a review of facilities maintenance operations flow to and from existing support functions located in existing facilities, new support facilities required, the ease of accessibility for vehicles and aircraft, physical requirements for the aircraft, DoD facilities criteria, and general base efficiency needs. To meet requirements, the site location for the establishment of the KC-46A Depot Maintenance facilities must:

1) Not impact mission critical facilities or operations. All existing missions must continue without interruption or risk of mission failure. Site locations with potential to impact critical and/or time sensitive missions will not be considered.

2) Be located so that all maintenance docks can be physically connected to the runway. Construction of new taxiways may be required but should be limited to no more than approximately 1,320 feet (ft) or 1/4 mile.

3) Be adjacent to or within close proximity to taxiway and ramp area. 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. No additional tow-ways should be constructed.

4) Be large enough to house the primary facilities (aircraft bays) for the KC-46A depot maintenance in a contiguous campus setting capable of supporting efficient logistical operations. The total site would require a minimum of 93 acres for the 840,000 square feet (sf) of facilities and sufficient ramp space, roadways, and vehicle parking. With likely required setbacks and buffer space, the approximate

total acreage required for the site is 120 acres. Split campus or non-contiguous campus settings decrease efficiencies and require additional time due to transportation of components. All KC-46A depot maintenance functions should be collocated to maximize efficiency of operation.

5) Be in close vicinity and accessible to the DLA facility and Building 9001. Site should limit need to move aircraft or components across airfield from existing storage and production shops within the DLA facility and Building 9001. Depot maintenance requirements necessitate close proximity to storage locations for replacement parts and production shops for repair work. DLA facilities provide storage of critical components for immediate replacement on maintained aircraft. The production and maintenance shops located with Building 9001 provide for the repair of components removed from aircraft.

6) Be accessible to the truck-access gate for deliveries. Truck-access to the base is at the 54th Street gate located on the south side of Tinker AFB. Due to narrow streets and limited turning radius within the interior of the installation, truck routes on base should be minimized to the greatest extent.

7) Be sited to ensure utility access to support all required activities. Site locations must not be in rural areas with limited utilities available. All utilities must be accessible and provide sufficient capacity for program planned.

8) Allow efficient application of force protection measures and comply with antiterrorism/force protection (AT/FP) requirements. Any land acquisition must include sufficient buffer (open) space around entire perimeter of property adjacent to public property and all new construction planned near installation boundaries must include appropriate setbacks under AT/FP rules.

9) Meet Unified Facilities Criteria (UFC) (UFC 3-260-01 – Airfield and Heliport Planning and Design and UFC 4-211-02 – Corrosion Control and Paint Finishing Hangars). Current KC-135 maintenance facilities are not suitable for KC-46A work due to the increased size of the KC-46A airframe. New facilities or modification of existing facilities are required and must meet minimum construction requirements.

2.3 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

There were five sites considered for location of the KC-46A depot maintenance facilities: the BNSF Railyard, DLA Infill, the Maintenance Repair and Overhaul Technology Center (MROTC), Crosswind Runway, and existing KC-135 facilities. Table 2-1 compares the five Alternatives to the nine selection standards presented in Section 2.2, to show why the alternatives were either carried forward for further analysis or eliminated from analysis.

Table 2-1 Screening of Alternatives

Alternatives Description	Selection Standards								
	1	2	3	4	5	6	7	8	9
BNSF Railyard	Y	Y	Y	Y	Y	Y	Y	Y	Y
DLA Infill	Y	Y	Y	Y	Y	Y	Y	Y	Y
MROTC	N	N	N	Y	N	N	N	N	Y
Crosswind Runway	N	Y	Y	Y	N	Y	Y	Y	Y
Use KC-135 Facilities	N	Y	Y	N	N	Y	Y	Y	N

Notes:
BNSF = Burlington Northern Santa Fe
DLA = Defense Logistics Agency
MROTC = Maintenance Repair and Overhaul Technology Center
A 'Y' designation means that the alternative meets the given selection standard.
An 'N' designation means that the alternative does not meet the given selection standard.

The BNSF Railyard and DLA Infill sites are the two alternatives that met all of the selection standards; therefore, these alternatives are being carried forward for analysis in this EA. A detailed description of these alternatives is presented in Section 2.4 and 2.5, respectively. Alternatives that were eliminated from further analysis include the MROTC, Crosswind Runway, and use of existing KC-135 facilities.

- **Maintenance Repair and Overhaul Technology Center Alternative** – The MROTC site is located east of Douglas Boulevard and north of SE 59th Street. It is also located east of the southern end of Runway 13/31, outside of the base boundary, and is not owned by Tinker AFB. The MROTC site is approximately 210 acres and is owned by Oklahoma Industries Authority who granted a long term lease to MROTC Development Partner which expires in 2055. Of the 213 acres, approximately 50 acres are developed and MROTC Development Partner subleased this parcel to Boeing for a period of 17 years with the term expiring in 2023. In FY13, the Air Force subleased from Boeing this same 50-acre parcel for a one year term with six options to renew. Acquisition of this site was eliminated from further consideration because of impacts to the B-1B Integrated Battle System (IBS) modification mission. The 50-acre parcel will be fully utilized by the Air Force for the next seven years to complete the required B-1B IBS modifications using the existing three hangars. Required space for the B-1B mission is not available on-base nor at any another site; therefore, it cannot be relocated. The B-1B IBS modification requires a dedicated organic depot modification line as identified by the Maintenance, Repair, and Overhaul Technology Center Acquisition Environmental Assessment prepared in 2013. Organic depot work requires Government workers to perform the work and the only space available for a dedicated modification line is by using the MROTC parcel. Cost increases and significant modification delays would result from the relocation of the B-1B IBS work from the MROTC site due to the need to relocate alternate depot work to off-base contracts or non-organic sources. This could result in violation of the *Limitation on the Performance of Depot-Level Maintenance of Material* as set forth in Title 10, United States Code (USC) Section 2466 which requires at least 50 percent of depot-level maintenance and repair be performed with organic, or Government, workers effectively limiting the

type and quantity of work that may be contracted outside the Air Force. The KC-46A mission would minimally require the construction of a new taxiway across Douglas Boulevard in excess of 3,500 ft in length to reach the runway, the acquisition of the parcel currently leased by the Air Force, and an additional 100 acres. Avoiding disruption of the B-1B mission would require purchase of property south of 59th Street to construct the taxiway increasing the distance from the runway to nearly 5,000 ft and requiring construction over a closed landfill and the acquisition of the 160 acres, excluding the existing cemetery, located to the immediate west of the MROTC developed parcel. The purchase of this property could effectively remove open public access to the cemetery. Due to the remote location, the use of the MROTC site would require an increase in security forces, firefighting, and logistics readiness squadron personnel to support maintenance operations. Additionally, this alternative was eliminated from further consideration because the MROTC site did not provide efficient application of force protection measures and comply with AT/FP requirements. Implementation of this alternative would have also impacted mission critical facilities and operations and would have resulted in physical separation of the maintenance docks from the runway. The MROTC site was also not in close proximity to supporting facilities (i.e., DLA facility, Building 9001, truck-access gates, taxiway, and ramp area).

- **Crosswind Runway Alternative –** The Crosswind Runway siting location is on the north end of runway 13/31 on Tinker AFB, with the KC-46A program located between the Air Logistics Complex ramp to the north and the 3rd Combat Communications Group complex to the south. The Crosswind Runway alternative was eliminated because it would impact mission critical facilities and operations and was not in close proximity to the DLA facility and Building 9001. The Crosswind Runway site is farther from supporting resources (e.g., Building 9001) and would require increased usage of high-density roadways to transport parts and personnel. This would decrease efficiency and impact maintenance operations. Siting the depot maintenance facilities at the Crosswind Runway site would result in single runway operations, which would impact multiple real world missions that cannot operate with a single runway, such as: Airborne Warning and Control System, 552 Air Control Wing, Strategic Communications Wing One operations, and 507th Air Refueling Wing training activities. Additionally, if Runway 18/36 needed repairs, airfield operations would be closed, causing a significant impact to programmed depot maintenance operations. Although this location would eliminate the need to construct additional taxiways, it would result in the closure of one of the runways and it is located approximatley one mile from the truck access gate.

- **KC-135 Depot Maintenance Facilities Alternative –** Use of the existing KC-135 depot maintenance facilities for the KC-46A aircraft was eliminated from further consideration because it would not meet either UFC 3-260-01 or UFC 4-211-02; mission critical facilities and operations would be impacted; it is not in close proximity to the DLA facility and Building 9001; and it is not large

enough to house the primary facilities for the KC-46A depot maintenance in a contiguous campus setting capable of supporting efficient logistical operations. The KC-135 maintenance facilities are not configured to support the increased size of the KC-46A aircraft. Utilizing KC-135 facilities would require significant dismantling of the aircraft (i.e., removal of the KC-46A wings and tails) in order to do maintenance operations within the aircraft bays. This would result in delays in maintenance, thereby impacting the ability of Tinker AFB to support approximately 90 aircraft at full depot maintenance capacity. Additionally, as discussed in Chapter 1, TAFB will be required to maintain a portion of the KC-135 maintenance mission utilizing these facilities. Therefore, these facilities will not be available for maintenance of the KC-46A.

2.4 DETAILED DESCRIPTION OF THE PREFERRED ALTERNATIVE

Under the Preferred Alternative, KC-46A maintenance operations would be sited at the BNSF Railyard located south of Tinker AFB (Figure 2-1). Although the BNSF Railyard property is currently off-base, it is just north of Building 9001 and is immediately adjacent to Tinker AFB property. Acquisition of the approximately 160-acre property would be required in order to locate the KC-46A depot maintenance at the BNSF Railyard site. This alternative would also include a new access road on Tinker AFB, just north of the BNSF Railyard property, and utility access and construction on the Tinker Aerospace Complex (TAC) facility as discussed further in Construction and Demolition Elements. The Preferred Alternative consists of three components: Construction/Demolition, Personnel Increases, and Aircraft Maintenance.

2.4.1 Construction and Demolition Elements

The existing BNSF Railyard site is a large train marshaling railyard which would have to be removed to accommodate KC-46A maintenance facilities. The BNSF site size exceeds the minimum required acreage; therefore, the entire site would not be developed for use by the KC-46A workload and not all the rail lines would be removed by this project. Additionally, Midwest Blvd would be rerouted around the west side of the proposed KC-46A program site and portions of the road would be removed from Munitions Road to the south to Mercury Road to the north. The road removal would be required for the run up ramp positions to the south on the TAC facility and for the main dock and ramp space to the north located on the BNSF Railyard site (USACE 2012). Furthermore, various utility lines and small structures would be addressed as part of this project (USACE 2012). A 1,200-ft taxiway would need to be constructed south of the Navy's ramp to connect the BNSF site to the runway. All required facilities would be constructed and operated within the BNSF rail yard site as part of the Preferred Alternative.

Current facility requirements for the KC-46A depot maintenance operations include: approximately 840,000 sf of facilities to include 14 aircraft bays, a 10-meter engine test cell (to be located on the TAC facility), a kitting facility, a software integration lab, warehouse space, support facilities such as central chiller plant and fire pump house,

taxiways, aircraft parking positions, an engine run up ramp (to be located on the TAC facility) and approximately 1,250 personal vehicle parking spots at 300 sf per spot. The minimum acreage required is 93 acres of roof and paved surface. Sufficient setbacks and fencing requirements increase the total acreage to approximately 120 acres.

2.4.2 Personnel Changes

The depot maintenance of the KC-46A maintenance operations at the OC-ALC would create a workload increase for Tinker AFB. During construction, an estimated 350 people would be required for the demolition and construction of the maintenance facilities. At full depot maintenance capabilities, an estimated additional 1,700 office and maintenance personnel would be required to maintain the KC-46A fleet, as well as continued maintenance on the KC-135 as it is being phased out. The amount of maintenance personnel working on the KC-135 fleet will be reduced as the aircrafts are phased out; therefore, it is assumed that maintenance personnel maintaining the KC-135 would transfer to maintenance of the KC-46A. Table 2-2 shows the projected increase in personnel by year.

Table 2-2 Projected Personnel Increase by Year

Fiscal Year (FY)	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
Projected personnel increase	22	91	122	83	183	168	145	70	208	100	127	212	169

Note:
FY – Fiscal Year

Personnel skill sets needed to support the KC-46A fleet include contracting, human resources, security personnel, management, and general administrative work in addition to mechanics and contractor support. It is anticipated that approximately 50 percent of the required 1,700 office and maintenance personnel would be reassigned personnel due to decreased workloads in other areas of the base and 35 percent would be personnel reassigned due to budget cuts. Therefore, it is assumed that the remaining 15 percent of the required 1,700 personnel would be hired from outside the Oklahoma City area.

An estimated 1.23 percent of the additional office and maintenance personnel necessary for depot maintenance of the KC-46A would be required in FY16, with the remainder phasing in through FY28. As of 2013, there are approximately 8,880 active duty personnel stationed at Tinker AFB and approximately an additional 16,350 civilian workers, for a total workforce of 25,230.

2.4.3 Aircraft Maintenance

The Air Force would retire 20 KC-135 aircraft by 2016, with a portion of the remaining aircraft being retired on a one-to-one drawdown with the KC-46A. The KC-46A will not replace the entire KC-135 fleet and KC-135 depot maintenance will remain a requirement and activity of the OC-ALC at Tinker AFB. The Preferred Alternative involves four

phases of construction starting in FY 2014 and continuing through FY 2028. The drawdown of the KC-135 would be synchronized to partially overlap with activation of the KC-46A; therefore, there would be maintenance occurring simultaneously on both aircraft (USAF 2012b). The KC-46A depot maintenance consists of approximately 180 aircraft, with the first aircraft to arrive at Tinker AFB beginning in 2018. See Table 2-3 for assumed draw-down schedule based on anticipated delivery schedule of KC-46A aircraft. Approximately 90 KC-46A aircraft per year could be serviced at full depot maintenance capabilities.

Table 2-3 Aircraft Draw-Down Schedule

Fiscal Year (20XX)	16	17	18	19	20	21	22	23	24	25	26	27	28	29
KC-135 aircraft (draw down/retired)*	20	14	19	15	15	15	15	15	15	15	15	15	4	0
KC-46 aircraft (build up)	7	14	19	15	15	15	15	15	15	15	15	15	4	0

Note:
* - For every 5 aircraft retired from the inventory, programmed depot maintenance is reduced by 1.

The KC-46A repair schedule is based on Maintenance Steering Group 3 recommendations, which have been developed to provide a logical framework for creating initial scheduled maintenance plans. The KC-46A depot maintenance operations would be designed to accommodate an extensive check of individual systems of the aircraft, known as C-Check inspections, periodically on a two-year cycle. The first C-Check on the KC-46A would be completed in about five to seven days; however, each biennial C-Check will take more time as the components and parts age. The longest period would be 45 days to overhaul the KC-46A. Comparatively, it takes about 127 days to overhaul a KC-135 (USAF 2012c). The shorter duration required to complete the required maintenance operations on the KC-46A will allow the depot to service more aircraft during the year.

Legend

- Tinker AFB
- Preferred Alternative Burlington Northern Santa Fe Railyard Site
- Aircraft Parking Position
- POV Parking
- Engine Run up Ramp
- Aircraft Bay
- 10 - Meter Engine Test Cell
- Central Chiller Plant/Fire Pump
- Kitting Facility
- T-9 Test Cells

N W E S

0 1,500 3,000 Feet

Imagery: ESRI, Bing Mapping Service

Figure 2-1

Preferred Alternative
Burlington Northern Santa Fe
Railyard Site
Oklahoma City, OK

2.5 DESCRIPTION OF ALTERNATIVE 1

Alternative 1 would locate the KC-46A depot maintenance facilities on the DLA Infill, which is located on the current DLA warehouse campus and adjoining area (Figure 2-2).

2.5.1 Construction and Demolition Elements

The DLA Infill is sited on Tinker AFB property that already contains existing facilities which would need to be demolished and relocated. Alternative 1 would require the removal and relocation of the existing DLA warehouse campus and the Base Civil Engineer maintenance yard. The existing Tinker RV storage lot would also require relocation. Additionally, a portion of the 507th parking area would be relocated, and miscellaneous utility lines and small structures would be removed as part of Alternative 1. The existing fire detention pond would be filled during construction of maintenance facilities.

To support construction at the DLA Infill site, mature tree stands and vegetation that cover approximately 8 percent of the site would be cleared. Due to dramatic topographic changes across the DLA Infill project site, several areas would 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.

Existing activities would be reviewed to determine actual requirements for replacement facilities. It is expected that most of the relocation would involve storage operations with approximately 15 office personnel impacted. Tinker AFB is proposing to relocate demolished facilities and operations to an existing 150,000 sf building located on the TAC facility. This facility would be reconfigured to support the DLA Infill operations. Relocation of existing Tinker AFB operations to TAC facilities was assessed in the Environmental Assessment for Tinker Aerospace Complex and a Finding of No Significant Impact was signed. Table 2-4 provides a list of buildings that would be demolished in order to locate the KC-46A depot maintenance facilities on the DLA Infill Site.

Table 2-4 Total Square Footage Associated with Alternative 1 Demolition

Structure Name	Facility Number	Year of Construction	Square Feet
Warehouse, Supply Equipment	1146	1990	7,391.00
Solid Waste Disposal Facility	1096	1987	1,000.00
Communications Receiver	1110	1953	2,124.00
Base Engineering Covered Facility	1115	1986	21,844.00
Supply Shed, Equipment	1134	1987	16,599.00
Electrical Power Station Building	1111	1953	231.00
Supply Shed, Equipment	1118	1955	64,000.00
Field Training Facility	851	1997	3,900.00
Water Pump Station	1106	1969	158.00
Miscellaneous Outdoor Pavilion	31100	--	739.76

Table 2-4 Total Square Footage Associated with Alternative 1 Demolition (Cont.)

Structure Name	Facility Number	Year of Construction	Square Feet
Security Police Operations	1128	1987	16,788.00
Air Force Communications Service Maintenance Facility	1100	1962	5,471.00
Supply Shed, Equipment	1140	1987	18,612.00
Base Engineering Maintenance Shop	1104	1992	7,376.00
Hazardous Storage	1145	1990	29,457.00
Supply Shed, Equipment	1135	1987	12,584.00
Admin Office, Non-Air Force	1139	1990	2,093.00
Supply Shed, Equipment	1119	1955	64,000.00
Exchange	1107	1996	14,230.00
Base Hazardous Storage	1143	1988	625.00
Operating Storage, Jet Fuel	21090	1998	631.79
Animal Clinic	1133	1999	2,402.00
Non-real property Facility	--	--	166.63
Reserve Forces Operational Training	1126	1984	1,800.00
Non-real property Facility			257.24
Outdoor Recreation Pavilion	41121	1993	90.00
Reserve Forces Operational Training	1085	1991	1,241.00
Fire Training Facility	1124	1997	2,200.00
Operating Storage, Jet Fuel	21091	--	631.90
Non-real property Shed	1126	--	129.29
Non-real property Facility	--	--	245.76
Hydrant Fueling Building	1091	1998	3,100.00
Depot Maintenance Facility	1105	1983	2,104.00
Base Engineer Maintenance Shop	1137	1998	8,120.00
Warehouse	1112	2006	3,500.00
Supply Shed, Equipment	1132	1992	11,999.00
Base Engineer Ground Facility	1122	1993	10,874.00
Base Hazardous Storage	1144	1988	625.00
Base Hazardous Storage	1141	1988	625.00
Base Hazardous Storage	1142	1988	625.00
		Total Square Footage	**340,590.38**

Notes:
-- = Not available

Facility requirements for the KC-46A depot maintenance operations on the DLA Infill would be the same as those described for the Preferred Alternative (Section 2.4). The DLA Infill campus would house the majority of the KC-46A program including 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, POV access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an information transfer node, and a DLA kitting facility (USACE 2012).

2.5.2 Personnel Changes

Personnel changes for Alternative 1 would be the same as those described for the Preferred Alternative.

2.5.3 Aircraft Maintenance

Aircraft maintenance activities for Alternative 1 would be the same as those described for the Preferred Alternative.

Legend

- Tinker AFB
- Alternative 1 Defense Logistics Agency Infill Site
- Aircraft Parking Positions
- POV Parking Areas
- Aircraft Bay
- Chiller Building/Fire Pump
- Kitting Facility

0 1,500 3,000 Feet

Imagery: ESRI, Bing Mapping Service

Figure 2-2

Alternative 1
Defense Logistics Agency
Infill Site
Oklahoma City, OK

2.6 DESCRIPTION OF THE NO-ACTION ALTERNATIVE

CEQ regulation 40 CFR 1502.14(d) requires the alternatives analyzed include the "No Action" alternative even if, by law, the Air Force must implement the decision. In the case of the KC-46A depot maintenance activation, the No-action Alternative will provide a baseline of the environmental conditions existing at Tinker AFB and provide a benchmark, enabling the Air Force decision maker to compare the magnitude of environmental effects between all the alternatives.

Under the No-action Alternative, the KC-46A aircraft would not be brought to Tinker AFB to support depot level maintenance operations of the aircraft. The Air Force would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any additional property acquisitions occur to accommodate the new mission requirement for the KC-46A maintenance operations.

2.7 COMPARISON OF ENVIRONMENTAL EFFECTS OF ALL ALTERNATIVES

Table 2-5 summarizes the impacts of the Preferred Alternative, Alternative 1, and the No-action Alternative. This table provides a comparison of the effects of the alternatives to assist in the decision-making process.

2.8 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The Air Force has evaluated each alternative to identify which one best complies with the mission, meets the operational goals of Tinker AFB, and accomplishes the purpose and need of the action. The BNSF Railyard site provides sufficient land to construct the required facilities with minimal demolition requirements, thereby reducing the overall cost of the program standup. The BNSF Railyard site is located between the DLA facilities where parts are stored and building 9001 where the production shops are located. The Preferred Alternative for this action is to place the KC-46A maintenance facilities and operation at the BNSF Railyard site.

2.9 MEASURES TO REDUCE IMPACTS

Analysis of environmental impacts has determined that some mitigation measures would be necessary to prevent significant adverse effects. Additionally, Best Management Practices (BMPs) are proposed to help minimize impacts. Table 2-6 presents a summary of these mitigation measures and BMPs proposed under the Preferred Alternative, Alternative 1, and the No-action Alternative.

(No document text on this page.)

Table 2-5 Summary of Environmental Impacts

Resource	Preferred Alternative BNSF Site	Alternative 1 DLA Infill	No-action Alternative
Airspace Use and Management	The anticipated annual operations would equate to 17 percent of the airfield capacity, a one percent increase when compared to the baseline. No new aircraft flight tracks would be necessary because the KC-46A aircraft would use the flight tracks used by C/KC-135 and other aircraft. The addition of KC-46A operations would not conflict with the existing airfield operations or require new air traffic control procedures. Ground control procedures would be developed for operations on the new 1,200-ft taxiway. Aircraft taxi operations on the taxiway would not interfere with other aircraft ground operations.	Impacts would be the same as the Preferred Alternative.	No impacts.
Noise	A marginal increase in exposed off-base area (acreage) would occur between the 70 and 80 dB DNL noise contour lines while exposed area between 65 and 70 dB DNL noise contour lines would decrease. The estimated increase in noise exposure would affect less than two off-base persons. Short-term increase in noise levels from construction and demolition noise. Outdoor and indoor construction noise levels at the residences near the project sites would be below baseline levels due to existing aircraft flight operations.	Similarly, impacts for the Alternative 1 would be minimal with an estimated increase in noise exposure to less than two off-base persons. The size and shape of the of 65 dB DNL noise contour would not change from baseline.	No impacts.
Safety	The levels and types of operations that KC-46A aircraft would accomplish at Tinker Air Force Base (AFB) would be consistent with those accomplished by the KC-135. Therefore, it is anticipated that the KC-135 Class A mishap rate would apply to KC-46A operations and that, over time, the KC-46A mishap rate would be comparable to that for the KC-135. The risk would be low that a KC-46A aircraft involved in an accident at or around Tinker AFB would strike a person or structure on the ground. As previously noted, the KC-46A and KC-135 aircraft design, types of operations, and aircraft operating characteristics would be very similar / nearly identical. The addition of KC-46A aircraft operations at Tinker AFB would not affect the Tinker AFB Air Installation Compatible Use Zone (AICUZ) document the noise contours remain the same as those in the AICUZ. Negligible potential for exposure to asbestos. Minor potential for exposure to lead-based paint and moderate potential for exposure to pesticides. Likely exposure to nuisance dust; however, it would be minimized by watering of the soil. Increased traffic congestion on base.	Aircraft safety impacts would be the same as the Preferred Alternative. Moderate potential for exposure to asbestos, lead-based paint, and pesticides. Likely exposure to nuisance dust; however, it would be minimized by watering of the soil. Increased traffic congestion on base.	No impacts.
Air Quality	Construction equipment exhaust, construction/demolition activity emissions (including fugitive dust) would have a minor impact on air quality. The net long term emissions from Depot operations would have minor impacts to the ambient air quality in the region.	Impacts would be the same as the Preferred Alternative except that fugitive dust emissions from Alternative 1 would be three times greater than those expected under the Preferred Alternative; however, these impacts would still be considered minor.	No impacts
Land Use	No impacts to land use compatibility with the current on- and off-base land uses. Land use restrictions associated with the Airfield Clear Zones and Accident Potential Zones and the size of these areas would not change. No impacts to Explosive Safety Quantity Distance arcs, electromagnetic pulse hazard areas, or Environmental Restoration Program sites. Existing Tinker AFB Green Infrastructure (GI) would remain intact.	Same as Preferred Alternative, except that 44 acres of GI corridor would be converted to impermeable surfaces. The GI corridor and associated vegetative and riparian areas that serve as pedestrian transportation (walking and biking paths) and natural wildlife corridors would be expected to be relocated offsite as discussed in Table 2-6.	No impacts.
Physical Resources	Geology – No adverse impacts to geology associated with construction and demolition activities. Negligible change in stormwater infiltration due to soils having a very low to moderately low capacity to transmit water. Soils – Alterations to soil composition and structure through short-term increased soil erosion from construction and demolition activities. No loss of prime farmland. Topography – Minor topographic impacts are anticipated to occur where fill is placed for building construction.	Geology and Soils – Impacts would be similar to the Preferred Alternative, except that additional fill material added to the site would likely result in a reclassification of original soil types to an Urban complex variation. Topography – Major alterations from construction-related site grading. The intermittent stream and surface pond at Alternative 1 site would be removed and the surface drainage pattern redirected.	No impacts.

Table 2-5 Summary of Environmental Impacts (Continued)

Resource	Preferred Alternative BNSF Site	Alternative 1 DLA Infill	No-action Alternative
Water Resources	Long-term impacts to location of stormwater management features and amount of stormwater to be managed (an additional 9.6 acre feet), but no increase of net stormwater discharge due to construction of additional stormwater management features. Impacts to floodplain downstream of construction would be avoided by construction and/or modification of stormwater management features. Short-term impacts to surface water quality from construction and demolition activities. Long-term impacts to surface water quality from increased stormwater runoff as a result of 124 percent increase in impervious cover. Impacts would be mitigated through implementation of a stormwater pollution prevention plan (SWPPP) and best management practices (BMPs), as detailed in Table 2-6. Permanent loss of 0.60 acres of non-jurisdictional wetland area. No loss of jurisdictional streams. Negligible change in groundwater recharge due to soils having a very low to moderately low capacity to transmit water.	Long-term impacts to location of stormwater management features and amount of stormwater to be managed (an additional 9.3 acre feet). No increase of net stormwater discharge due to construction of additional stormwater management features. Short-term impacts to surface water quality from construction and demolition activities similar to Preferred Alternative. Long-term impacts to surface water quality from increased stormwater runoff as a result of 34 percent increase of impervious cover. Impacts would be mitigated through implementation of a SWPPP and BMPs. Long-term impacts to floodplains from elevation of construction area above floodplain. Impacts to floodplain downstream of construction would be avoided by construction and/or modification of stormwater management features. Permanent loss of 3.15 acres of jurisdictional wetlands, 0.67 miles of a jurisdictional intermittent stream and 0.05 miles of non-jurisdictional intermittent stream would be significant, but mitigable with implementation of wetlands mitigation (detailed in Table 2-6). Negligible change in groundwater recharge due to soils having a very low to moderately low capacity to transmit water.	No impacts.
Biological Resources	Minor, long-term loss of habitat, though no change in species diversity. Less than an acre of forested habitat would be lost, and approximately 80 acres of native/non-native mix grasses would be developed. Though no change to federally-listed species, could result in a loss of up to 40 Texas horned lizards. Existing Tinker AFB GI would remain intact. A Migratory Bird Treaty Act violation would be avoided by conducting a pre-construction survey if clearing occurs during breeding season. If clearing would occur during the breeding season, modification of the existing Depredation Permit would be required to authorize hazing of migratory birds and discourage nesting in the project area .If pre-construction surveys indicate active nesting, a relocation permit would be required from the USFWS by the contractor prior to any construction or clearing activities.	Minor, long-term impacts related to loss of habitat, though minor decrease of species diversity (fish, mammals, and herpetofauna). Approximately 5 acres of non-native grasses and approximately 15 acres of forested habitat would be lost. A loss of 44 acres of edge GI would occur on base. Though no change to federally-listed species, Alternative 1 could result in a loss of up to 22 Texas horned lizards. A Migratory Bird Treaty Act violation would be avoided by conducting a pre-construction survey if clearing occurs during breeding season. If pre-construction surveys indicate active nesting, a relocation permit would be required from the USFWS by the contractor prior to any construction or clearing activities.	No impacts.
Bird/Wildlife Aircraft Strike Hazard	The addition of KC-46A operations at Tinker AFB would not be expected to change the bird-aircraft strike rates experienced under the baseline. KC-46A aircrews would follow the guidance in the Tinker AFB Bird/Wildlife Strike Hazard (BASH) Plan to minimize the potential for bird-aircraft strikes. It is unlikely that any of these bird/wildlife-aircraft strike incidents would involve injury either to aircrews or to the public, or damage to property. There could be fewer birds around the airfield due to the reduction in habitat and, therefore, the potential for fewer bird-aircraft strikes. If necessary, the Tinker AFB BASH Plan would be modified to manage birds at and near features such as storm water detention basins that would be constructed.	Impacts would be the same as the Preferred Alternative.	No impacts.
Cultural Resources	Damage to / destruction of two National Register of Historic Places-ineligible archaeological sites (34OK146, 34OK228). The Preferred Alternative will have No Effect on Historic Properties.	The alternative would have No Adverse Effect on Historic Properties on Tinker AFB.	No impacts.
Hazardous Materials and Wastes	Negligible potential for exposure to asbestos. Minor potential for exposure to lead-based paint and moderate potential for exposure to pesticides. Potential to encounter contaminated soils related to historic or current BNSF operations. May be a slight decrease in amount of Hazardous Material used and Hazardous Wastes generated when KC-46A are phased in. Negligible potential for exposure to cadmium in groundwater.	Moderate potential for exposure to asbestos, lead-based paint, and pesticides. Minor potential to impact Environmental Restoration Program Site LF012 during modification of the stormwater features.	No impacts.
Utilities and Infrastructure	Long-term increase in wastewater, industrial wastewater, and solid waste generation. Long-term (10 year) increase in traffic congestion at relocated Gott Gate. Upgrades to existing industrial wastewater treatment plant would accommodate long-term increase in industrial wastewater generation.	Impacts would be similar to the Preferred Alternative.	No impacts.

Table 2-5 Summary of Environmental Impacts (Continued)

Resource	Preferred Alternative BNSF Site	Alternative 1 DLA Infill	No-action Alternative
Socioeconomics	Long-term increase in population, which creates an increased demand on housing and education. Short-term, positive impact to local economy from construction and demolition related purchases, and long-term, positive impact to the local economy from the increase in population.	Impacts would be the same as the Preferred Alternative.	No impacts.
Environmental Justice	No adverse impacts to the resource area; therefore, there would be no disproportionate and adverse impacts to minority populations.	Impacts would be the same as the Preferred Alternative.	No impacts.

Notes:
AFB = Air Force Base
AICUZ = Air Installation Compatible Use Zone
BASH = Bird/Wildlife Aircraft Strike Hazard
dB = decibel
dBA = "A-weighted" decibel
DNL = Day Night Average Sound Level
GI = Green Infrastructure

Table 2-6 Summary of Measures to Reduce Impacts

Resource	Measures to Minimize or Reduce Impacts and Best Management Practices (BMPs)
Airspace Use and Management	No mitigation or BMPs are proposed.
Noise	No mitigation or BMPs are proposed for noise from aircraft operations. BMPs to reduce construction-associated noise include equipping noise-generating heavy equipment with the manufacturer's standard noise control devices, properly maintaining all equipment, limiting construction hours to between 0700 and 1900 hours, and reducing occupational exposure by requiring workers to wear appropriate hearing protection.
Safety	No mitigation measures or BMPs are proposed for aircraft safety. No mitigation is proposed for ground, traffic, or construction safety. BMPs for these three resources include personal protective equipment, signage, communication, and increase infrastructure capabilities to accommodate influx of personnel. Trained personnel would be available for removal of more serious hazards such as asbestos and lead. Disturbed soils would be watered to reduce fugitive dust
Air Quality	No mitigation measures are recommended. BMPs for construction activities could include watering to reduce fugitive dust, erosion measures, the use of low sulfur and bio-diesel fuel in construction/transport vehicles.
Land Use	Any newly constructed facilities within the Airfield Clear Zones can only be permissible facilities allowed under Unified Facilities Criteria 3-260-1. Green Infrastructure (GI) habitat would be maintained and preserved wherever possible. Approximately 65 acres of native grassland and riparian woodland habitat would be created from a former military housing area that would be demolished. This would be expected to mitigate for loss of GI corridor and associated natural environments. Additionally, a 300 foot wide GI corridor would be preserved on the western side of the BNSF Railyard property.
Physical Resources	Geology - No mitigation measures or BMPs are proposed. Soils – No mitigation measures are proposed. BMPs would be implemented in site-specific Storm Water Pollution Prevention Plan (SWPPP). Drainage system BMPs would be installed to prevent soil loss and minimize sediment runoff during storm events occurring when construction is underway. Temporary soil stabilization and sediment controls would be implemented, including preservation of existing vegetation to the extent practical, management and control of storm water run-on/areas of concentrated flows, and management of disturbed soil areas. Fugitive dust would be minimized by watering of soil, and areas where existing buildings are removed would be re-vegetated to prevent erosion, when not reconstructed. Topsoil would be stockpiled on site for reuse on Tinker AFB, where feasible. Topography – No mitigation measures are proposed. Due to the elimination of the stormwater detention basin and upstream drainage area within Alternative 1, engineering design would control stormwater flow. BMPs including soil stabilization and runoff control would be implemented.
Water Resources	Erosion control plans may be implemented to reduce soil and sediment from entering surface waters. A SWPPP would also be implemented to reduce total suspended solids in downstream surface water bodies. Applicable permits would be obtained and/or amended, as necessary. Mitigation for wetland losses could include mitigation banking or other compensatory mitigation determined during the Section 404 Clean Water Act permitting process. It is anticipated that mitigation may be purchased at EXCell Mitigation Center Lincoln County, OK, or a similar facility at a 6:1 ratio with USACE approval.
Biological Resources	Approximately 50 acres of high quality grassland habitat would be created from a former military housing area that would be demolished. This would be expected to mitigate for loss of GI corridor and associated natural environments used by wildlife and species at risk. GI habitat would be maintained and preserved wherever possible. Additionally a 300 foot wide GI corridor would be preserved on the western side of the BNSF Railyard property. Additionally, migratory birds would be discouraged from the site with routine mowing, maintenance, and woody vegetation removal prior to the breeding season. Conduct surveys for potential protected species and migratory bird nests before beginning project activities (if clearing activities are conducted during the breeding season). Should construction occur during the breeding season the existing depredation permit may be updated to allow hazing to discourage nesting. To minimize potential loss of Texas horned lizards, Tinker AFB would conduct species-specific surveys to capture and relocate (as detailed in Section 4.0) Texas horned lizards identified within the project area. Use BMPs such as silt fences to prevent erosion of soil into wetland and surface water areas.
Bird/Wildlife Aircraft Strike Hazard	No mitigation measures or BMPs are proposed.
Cultural Resources	No mitigation measures or BMPs are proposed.

Table 2-6 Summary of Measures to Reduce Impacts (Continued)

Resource	Measures to Minimize or Reduce Impacts and Best Management Practices (BMPs)
Hazardous Materials and Wastes	No mitigation measures are proposed. BMPs include waste characterization of any soils removed from the site and notifying Tinker Air Force Base Hazardous Materials and/or Hazardous Waste Program personnel if potential contamination is identified in soil at Burlington Northern Santa Fe (BNSF) site. Prohibit use of groundwater at the BNSF site without further testing for cadmium contamination.
Utilities and Infrastructure	No mitigation measures or BMPs are proposed.
Socioeconomics	No mitigation measures or BMPs are proposed.
Environmental Justice	No mitigation measures or BMPs are proposed.

Notes:
BMP = Best Management Practice
BNSF = Burlington Northern Santa Fe
GI = green infrastructure
SWPPP = Storm Water Pollution Prevention Plan

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INSTALLATION LOCATION, HISTORY, AND CURRENT MISSION

Tinker AFB is located in Oklahoma County, approximately ten miles southeast of downtown Oklahoma City, Oklahoma. Midwest City to the north and Del City to the northwest are incorporated areas immediately surrounding Tinker AFB.

Tinker AFB is headquarters for the OC-ALC, which is composed of more than 9,400 military and civilian professionals who perform maintenance, repair, and overhaul for the Air Force's fleet of E-3, C/KC-135, B-52, B-1, C-130, and the Navy's E-6, as well as a wide range of aircraft engines and component parts (USAF 2012d). Tinker AFB is also home to the AFSC headquarters, one of five specialized centers assigned to the AFMC, whose mission is to sustain weapons system readiness to generate airpower for America.

Tinker Field was established in 1941 as a maintenance and supply depot, and immediately following World War II, expanded to include Douglas Aircraft assembly plant. At this time, Tinker Field was renamed as the Oklahoma City Air Material Area. From the 1950s to the 1980s, Tinker AFB continued to support additional aircraft and weapons. In 1974, the depot was renamed Oklahoma City Air Logistics Center. In 1991, two Navy E-6 squadrons were added to maintain a flying/communications link between the White House and ballistic missile submarines around the world. Tinker AFB also provided front line support to the forces engaged in Operation Desert Shield and Desert Storm in the early 1990s, and the more recent Operation Enduring Freedom, Operation Iraqi Freedom, and the Global War on Terrorism (USAF 2007b).

3.2 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.2.1 Airspace Use and Management

3.2.1.1 Definition of Resource

The Federal Aviation Administration (FAA) is responsible for overall management of airspace and has established different airspace designations to protect aircraft while operating to or from an airport, transiting enroute between airports, or operating within "special use" areas identified for defense-related purposes. Rules of flight and air traffic control procedures were established to govern how aircraft must operate within each type of designated airspace. The Federal Aviation Regulations apply to both civil and military aircraft operations unless the FAA grants the military service an exemption or a regulation specifically excludes military operations. All aircraft operate under either instrument flight rules (IFR) or visual flight rules (VFR). The FAA established special use airspace (SUA) to meet the needs of military aviation. Military training routes, along with military operations areas and restricted airspace, are examples of SUA.

Airspace management involves the direction, control, and handling of flight operations in the volume of air that overlies the geopolitical borders of the United States (US) and its territories. Airspace is a resource managed by the FAA, with established policies, designations, and flight rules to protect aircraft in the airfield and en route; in SUA identified for military and other governmental activities; and in other military training airspace. Appendix C contains additional information regarding the National Airspace System, controlled airspace, uncontrolled airspace, and Air Force low-altitude flying restrictions.

3.2.1.2 Existing Conditions

The airspace within an approximate 40-mile radius of Oklahoma City and up to 5,300 ft above mean sea level (MSL) is controlled by the Oklahoma City Terminal Radar Approach Control, which provides radar vectoring, sequencing, and separation service for VFR and IFR aircraft operating within the airspace as well as into and out of Tinker AFB. Airspace allocated to the Tinker AFB Air Traffic Control Tower (ATCT) extends outward to a point five miles north-northwest of the airfield and maintains a five-mile radius clockwise to a point southwest of the airfield. The ATCT airspace boundary from the southwest to north-northwest points is an irregularly straight line. The ATCT-allocated airspace extends upward to 2,500 ft above MSL.

There are five public airports within an approximate 10-mile radius of Tinker AFB. Eight low-altitude federal airways pass through an approximate 10-mile radius of the base. There is no special use airspace or military training routes within a 10-mile radius of Tinker AFB.

The airfield consists of two primary instrument runways (13/31 and 18/36). Runway 13/31 is oriented northwest/southeast and measures 10,000 ft long and 200 ft wide. Runway 18/36 is 11,101 ft long and 200 ft wide. Airfield elevation is 1,291 ft above MSL. The Tinker AFB ATCT operates 24 hours a day. Thirteen (13) instrument approach procedures are available for arrivals to Tinker AFB. Aircraft traffic pattern altitude is approximately 1,700 ft above ground level (AGL) and patterns can be flown at about 2,200 ft AGL upon request.

Table 3-1 summarizes aircraft operations at Tinker AFB. Figure 3-1 depicts the baseline aircraft ground tracks.

Table 3-1 Current Baseline Annual Operations

Unit	Aircraft	Modeled As (if different)	No. of Flying Days per Year	Departure			Arrival			VFR Patterns			IFR Patterns			Totals		
				Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
507th ARW (AFRC)	KC-135R		260	400	-	400	360	40	400	432	48	480	1,008	112	1,120	2,200	200	2,400
552nd (ACC)	E-3A			1,500	-	1,500	1,350	150	1,500	4,050	450	4,500	4,050	450	4,500	10,950	1,050	12,000
NAVY 522ACC	E-6	KC-135R		600	-	600	540	60	600	4,082	454	4,536	875	97	972	6,097	611	6,708
Tinker Aircraft Totals				2,500	-	2,500	2,250	250	2,500	8,564	952	9,516	5,933	659	6,592	19,247	1,861	21,108
10 FLTS DEPOT MAINTENANCE	B-1		260	52	-	52	52	-	52	134	-	134	135	-	135	373	-	373
	B-52H			87	-	87	87	-	87	542	-	542	360	-	360	1,076	-	1,076
	E-3A			24	-	24	24	-	24	152	-	152	100	-	100	300	-	300
	KC-135A/B/R	KC-135R		213	-	213	213	-	213	1,326	-	1,326	884	-	884	2,636	-	2,636
10 FLTS DEPOT total				376	-	376	376	-	376	2,154	-	2,154	1,479	-	1,479	4,385	-	4,385
Transient	A-10A		365	12	-	12	12	-	12	30		30	18		18	72	-	72
	B-1			3	-	3	3	-	3			-			-	6	-	6
	B-52H			7	-	7	7	-	7			-			-	14	-	14
	C-12, C-26, DH-6, E-9, PC-12	C-12		47	-	47	47	-	47			-			-	94	-	94
	C-130, AC-130, MV-22	C-130H&N&P		56	-	56	56	-	56	134		134	90		90	336	-	336
	A320; B-737, -747, -757, -767; C-17, C-32, C-40, C-9; DC-10, E-8, KC-767	C-17		53	-	53	53	-	53	-	-	-	-	-	-	106	-	106
	C-20, C-35, C-37, C38, C-560, C-680, E-6, F-2000, FA-20, G-159, G-5, T-39, UC-35	C-20		44	-	44	44	-	44	128		128	84		84	300	-	300
	BE-36, C-21A	C-21A		19	-	19	19	-	19			-			-	38	-	38
	C-5A, KC-10	C-5A		7	-	7	7	-	7			-			-	14	-	14
	C-2, E-2C	E-2C		13	-	13	13	-	13			-			-	26	-	26
	E-3A			18	-	18	18	-	18	42		42	28		28	106	-	106
	F-15	F-15A		46	-	46	46	-	46	110		110	74		74	276	-	276
	F-16	F-16C		49	-	49	49	-	49	118		118	78		78	294	-	294
	A-4, A-6, A-JET, AV-8, C-146, F-18, F-21, F-4, F-5, GR-4, S-3, T-1, T-45	F-18A/C		163	-	163	163	-	163	374		374	248		248	948	-	948
	F-22			18	-	18	18	-	18	42		42	30		30	108	-	108
	C-172, C-182, H-3, KODIAK, P-28A, T-44, T-6	GASEPF		29	-	29	29	-	29	-	-	-	-		-	58	-	58

Table 3-1 Current Baseline Annual Operations (Continued)

Unit	Aircraft	Modeled As (if different)	No. of Flying Days per Year	Departure			Arrival			VFR Patterns			IFR Patterns			Totals		
				Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Transient (Continued)	C-135	KC-135R	365	87	-	87	87	-	87	208	-	208	140	-	140	522	-	522
	AH-1, UH-1, UH-60, CH-47, H-46, H-53, S-64	UH-60		73	-	73	73	-	73	-	-	-	-		-	146	-	146
	T-38A	T-38A		258	-	258	258	-	258	620	-	620	414	-	414	1,550	-	1,550
Transient Totals				1,002	-	1,002	1,002	-	1,002	1,806	-	1,806	1,204	-	1,204	5,014	-	5,014
Grand Totals				**3,878**	**-**	**3,878**	**3,628**	**250**	**3,878**	**12,524**	**952**	**13,476**	**8,616**	**659**	**9,275**	**28,646**	**1,861**	**30,507**

Notes:
(1) Total operations (30,507) exclude VFR Itinerant, Special Use, and Overflight Tower Counts.
(2) Departure and arrival totals from Traffic Count Summary for FY2013; if departures and arrivals did not balance then the lower was increased to match.
(3) Based (507th, 552nd, Navy E-6) sorties from squadron interviews; closed patterns operations estimated by patterns per sortie
(4) Transient departures and arrivals from FY2012 Transient Alert counts (FY2013 not available at time of analysis).
(5) Transient aircraft that conduct pattern operations modeled at a rate of 2 pattern circuits per sortie (60 percent VFR/40 percent IFR).
(6) 10 FLTS departure and arrival operations not directly obtainable so the previous 2006 study operations were scaled to match Traffic Count total departures and arrivals.
(7) 10 FLTS pattern operations scaled from previous 2006 study to match remaining unaccounted pattern operations

Air Force Manual 32-1084, *Facility Requirements*, contains guidance for determining the type, size, and number of facilities a base needs to support its mission. Chapter 2 of the handbook contains information for determining airfield requirements such as the number, width, and weight bearing capacity of runways, as well as guidance for aircraft parking aprons. The handbook's airfield requirements planning process includes information for calculating the practical hourly capacity and practical annual capacity for the airfield. Based on information in the handbook, it is estimated that the Tinker AFB airfield has an annual capacity of 190,000 operations and IFR and VFR hourly capacities of approximately 47 and 52 airfield operations, respectively. The baseline annual 30,507 operations equate to about 16 percent of the annual airfield capacity. Based on a 24-hour day, the average hourly operations would be about 3 operations, or 6 percent of the IFR hourly capacity or 6 percent of the VFR hourly capacity.

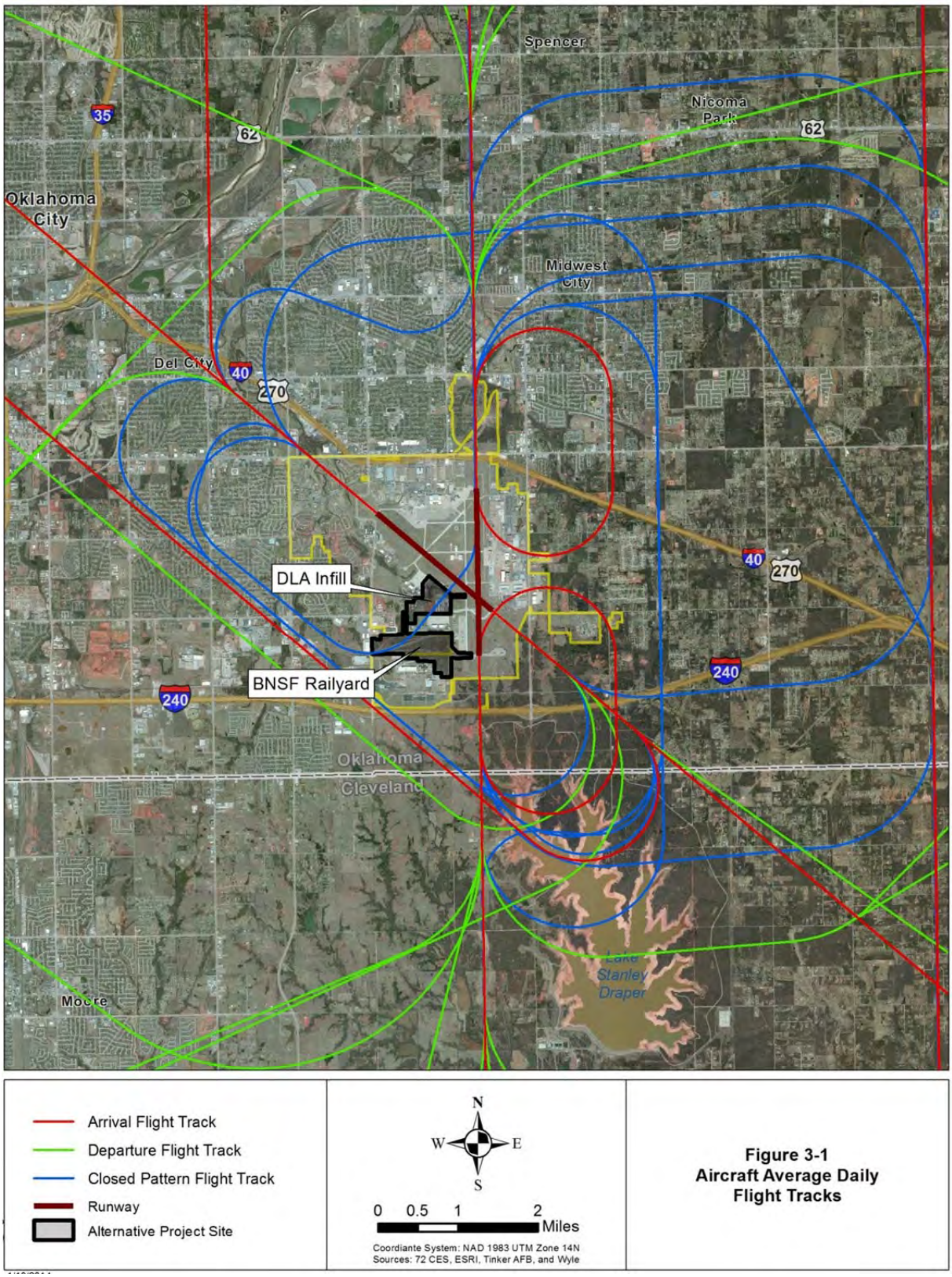


Figure 3-1
Aircraft Average Daily Flight Tracks

3.2.2 Noise

3.2.2.1 Definition of Resource

Noise is unwanted sound that may annoy people by interfering with ordinary daily activities, such as communication or sleep. A person's reaction to noise varies according to the duration, type, and characteristics of the source, distance between the source and receiver, receiver's sensitivity, background noise level, and time of day.

Sound is a series of vibrations (energy) transmitted through a medium that are perceived by a receiver. Sound varies in intensity and frequency. It is measured by accounting for the energy level represented by the amplitude (volume) and frequency (pitch) of those vibrations and comparing that to a baseline standard. Sound pressure level (SPL) described in decibels (dB) is used to quantify sound intensity. The decibel is the accepted standard unit for describing levels of sound. Decibels are expressed in logarithmic units to account for the variations in amplitude. On the dB scale, an increase of three dB represents a doubling of sound energy. A difference on the order of 10 dB represents a subjective doubling of loudness. Therefore, an event that generates 60 dB of sound is perceived as twice as loud as one that generates 50 dB.

The Day-Night Average Sound Level (DNL) is a description of ambient noise exposure over an extended period of time. DNL is the metric recognized by the US government for measuring noise and its impacts on humans. It describes a receiver's cumulative noise exposure from all events occurring during a 24-hour period; events occurring between 10:00 p.m. and 7:00 a.m. ("environmental night") are increased by 10 dB to account for greater nighttime sensitivity to noise events. The SPL represented by a given decibel value is usually adjusted to make it more relevant to sound that the human ear hears especially well; for example, an "A-weighted" decibel (dBA) was developed to measure sound similar to the way the human hearing system responds. It is derived from emphasizing mid-range frequencies to which the human ear responds especially well and de-emphasizing the lower and higher range frequencies. The adjustments in amplitude, established by the American National Standards Institute (ANSI 1983), are applied to the frequency content of the sound.

The Maximum Sound Level (L_{max}) is the maximum value of all the A-Weighted Sound Levels that occur during a noise event. The limitation of this metric for noise (annoyance) analysis is that maximum sound level without a context of duration or time of day does not adequately address annoyance. For example, most would agree that a short-duration siren blast (~110 dB) that occurs once per day around 1:00 p.m. is less annoying than a 95 dB L_{max} event (a jackhammer in a construction site) that lasts for 6 hours, every day and occurs at 11:00 p.m. Although the highest dBA level measured during an event (*i.e.*, maximum sound level, L_{max}) is the most easily understood descriptor for a noise event, alone it provides little information. Specifically, it provides no information concerning either the duration of the event or the amount of sound energy. Thus, sound exposure level (SEL), which is a measure of the acoustic energy of the noise event and accounts for both intensity and duration, is used for single event noise analysis.

The potential for permanent hearing loss arises from direct exposure to noise on a regular, continuing long-term basis to levels about 80 dBA DNL. Hearing loss is not expected in people exposed to 75 dBA DNL or less for eight hours per day, as long as noise exposure over the remaining 16 hours per day is low enough to not substantially contribute to the 24-hour average (USEPA 1974).

3.2.2.1.1 Noise-sensitive Receptors

A noise-sensitive receptor is commonly defined as the occupants of any facility where a state of quietness is a basis for use such as a residence, hospital, or church. The noise-sensitive receptors associated with the Preferred Alternative and Alternatives are all located outside of the 65 dB DNL noise contour (USAF 2006).

Burlington Northern Santa Fe Railyard Site

Potential noise-sensitive receptors to the proposed project at the BNSF Railyard site are various residences; the closest of which is located approximately 3,280 ft northwest of the site. The areas surrounding the BNSF Railyard site have Industrial and Commercial land uses; therefore, they would not be considered noise-sensitive receptors.

Defense Logistics Agency Infill Site

The DLA Infill campus is located near the southwest side of the flight line, with the closest noise-sensitive receptor being various residences located approximately 3,630 ft northeast of the site.

3.2.2.2 Aircraft Noise Existing Conditions

Aircraft operations noise modeling for this EA was accomplished by using NOISEMAP program, Version 7.2. Data describing flight tracks and flight profile use, power settings, ground run-up information by type of aircraft/engine, and meteorological variables are assembled and processed for input into NOISEMAP. The model uses this information to calculate DNL values at points on a regularly spaced grid surrounding the airfield. A plotting program generates contour lines connecting points of equal DNL values in a manner similar to elevation contours shown on topographic maps. Contours are typically generated as five dB intervals. The contours produced by NOISEMAP are used in the averaged noise analysis sections in this EA.

The primary source of noise in the vicinity of Tinker AFB is airfield operations. Baseline noise conditions are based on the average busy airfield operations shown on Table 3-1 which were revalidated for FY13 operations. Under the baseline condition, 112 average busy day airfield operations occur at Tinker AFB. Figure 3-1 shows the baseline condition aircraft ground tracks and Figure 3-2 depicts the noise exposure area for the baseline with comparison to the 2006 Air Installation Compatible Use Zone (AICUZ) 65 dB DNL noise planning contour.

3.2.2.2.1 Single Event Noise

Table 3-2 lists SEL associated with the typical aircraft operations at Tinker AFB at the indicated flight profiles and power settings.

3.2.2.2.2 Averaged Noise

Table 3-3 lists the numbers of acres and population within the baseline 65 dB DNL noise contour line.

Table 3-2 Baseline Noise Exposure

DNL	Acreage			Population Off-Base
	On-Base	Off-Base	Total	
65-69	719	2,891	3,610	5,032
70-74	760	963	1,723	2,104
75-79	716	391	1,107	216
80-84	380	63	443	0
85+	356	0	356	0
Total	**2,931**	**4,309**	**7,239**	**7,352**

DNL – Day-Night Average Sound Level
Note: Bodies of water were excluded from computation.

Under current conditions, off-base persons are exposed to noise levels of 65 dB DNL and greater. These 7,350 persons would equate to about four percent of the estimated 163,390 persons who live off-base and within the approximate 5-mile radius area associated with airfield airspace environment. This area within the approximate 5-mile radius includes the airspace allocated to the air traffic control tower and is the area in which closed patterns and maneuvering associated with takeoffs and landings is accomplished.

3.2.2.3 Construction Noise Existing Conditions

Noise associated with activities at Tinker AFB is characteristic of that associated with most Air Force installations with a flying mission, with the major source of noise being attributed to aircraft operations.

Noise on Air Force installations is managed through the AICUZ program. The AICUZ program seeks to identify and promote compatible land uses in and around Air Force installations. The most recent Tinker AFB AICUZ document was released in 2006; however, updated noise modeling of baseline conditions was conducted in 2013.

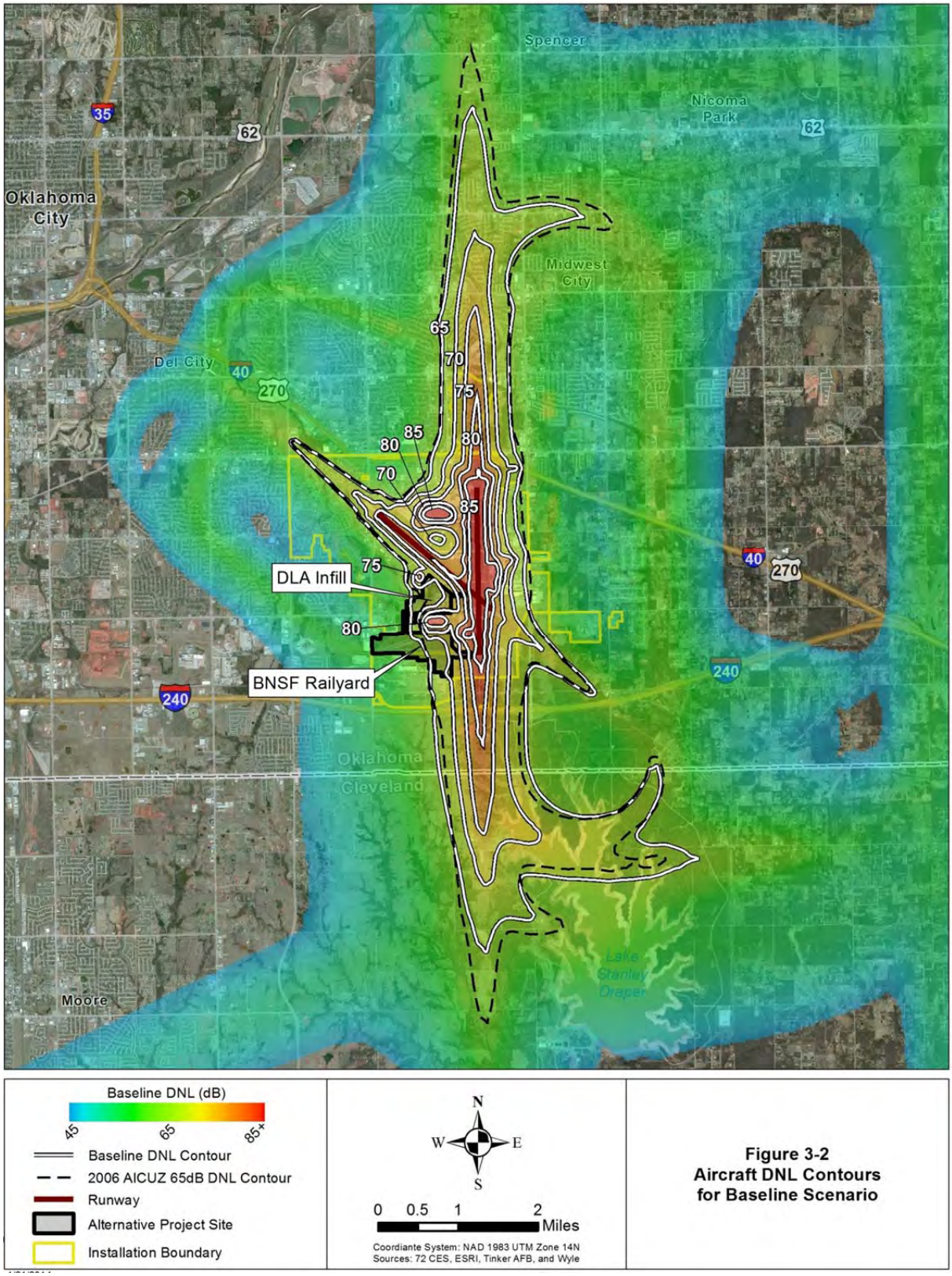


Figure 3-2
Aircraft DNL Contours for Baseline Scenario

Table 3-3 SEL and L_{max} Comparison for Tinker AFB Aircraft

Condition	KC-135R				E-3A				E-6 (1)				B-1 (2)				B-52H				KC-46			
	SEL (dBA)	**L_{max} (dBA)**	*Power (%NF)*	*Speed (kts)*	**SEL (dBA)**	**L_{max} (dBA)**	*Power (EPR)*	*Speed (kts)*	**SEL (dBA)**	**L_{max} (dBA)**	*Power (%NF)*	*Speed (kts)*	**SEL (dBA)**	**L_{max} (dBA)**	*Power (%RPM)*	*Speed (kts)*	**SEL (dBA)**	**L_{max} (dBA)**	*Power (EPR)*	*Speed (kts)*	**SEL (dBA)**	**L_{max} (dBA)**	*Power (%N1)*	*Speed (kts)*
Takeoff (1000 ft AGL)(3)	**92**	**86**	*85%*	*220*	**109**	**101**	*1.9*	*180*	**93**	**87**	*90%*	*275*	**123**	**118**	*97.5% A/B*	*300*	**111**	**104**	*1.55*	*180*	**95**	**87**	*92%*	*200*
Arrival (non-break, thru 1000 ft AGL, gear down(3))	**95**	**86**	*80%*	*145*	**106**	**99**	*1.5*	*155*	**90**	**83**	*65%*	*150*	**105**	**97**	*90%*	*160*	**105**	**97**	*1.15*	*150*	**84**	**74**	*55%*	*140*
VFR Pattern (downwind leg, 3000 ft MSL, 1700 ft AGL gear down)	**88**	**79**	*75%*	*180*	**98**	**91**	*1.4*	*165*	**85**	**77**	*65%*	*170*	**98**	**91**	*90%*	*200*	**102**	**95**	*1.3*	*180*	**83**	**72**	*70%*	*180*
Radar Pattern (downwind leg, 3000 ft MSL, 1700 ft AGL gear up)	**88**	**80**	*82%*	*180*	**93**	**90**	*1.15*	*200*	**83**	**77**	*65%*	*200*	**91**	**84**	*88%*	*250*	**100**	**91**	*1.3*	*200*	**79**	**73**	*60%*	*200*

Weather: 63 degrees Fahrenheit, 61percent Relative Humidity
%RPM = percent compressor shaft speed
%NF = percent compressor fan speed
%N1 = percent low pressure compressor shaft speed
A/B = afterburner
AGL = Above Ground Level
dBA = "A-weighted" decibel
EPR = engine pressure ratio
kts = knots
L_{max} = Maximum (instantaneous) Sound Level
MSL = mean sea level
SEL = Sound Exposure Level
Notes:
(1) No sufficient noise data available for the E-6 so the KC-135R is used as a surrogate because both share the same engine; speeds and power settings modeled are specific to the E-6
(2) The B-1 reduces power from Afterburner to Military power at 90 percent once reaching 1200 ft AGL
(3) Takeoff and Arrivals sound levels estimate using level flight using the speeds and power settings corresponding to each aircraft's configuration while passing through 1000 ft AGL

(No document text on this page)

3.2.3 Safety

3.2.3.1 Definition of Resource

A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The elements of an accident-prone environment include the presence of unnecessary hazards and an exposed population at risk of encountering the hazards. Numerous approaches are available to manage the operational environment in order to improve safety; these 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).

The USAF categorizes incidents that occur while on the job as one of five classes. These classifications begin with the most severe and conclude with general mishaps that are used to help identify prevention methods. Within the fifth classification of incidents the Air Force also has identified three other sub classifications. The USAF classification according to the Department of the Air Forces Standard No. A2, Mishap Investigation and Reporting (USAF 2010a) are as follows:

- Class A – Total cost of $2,000,000 or more for property damage, or a permanent total disability or fatality. Property damage includes all government equipment, vehicles, or munitions.

- Class B – Total cost of $500,000 or more but less than $2,000,000 for property damage. Permanent partial disability or hospitalization of three or more people.

- Class C – Total cost of $50,000 or more but less than $500,000 for property damage. Minor injury, minor occupational illness. An injury resulting in a lost workday case, or an occupational illness that causes loss of time from work at any time. An occupational injury or illness resulting in permanent change of job.

- Class D – Any non-fatal injury or occupational illness that does not meet the definition of lost workdays (lost time). These are cases where, because of injury or occupational illness, the employee only works partial days, has restricted duties, or is transferred to another job, lost consciousness, required medical treatment greater than first aid, or incurred a significant injury or illness diagnosed by a physician or other health care professional.

- Class E Events – These occurrences do not meet reportable mishap classification criteria, but are deemed important to investigate/report for mishap prevention. Class E reports provide an expeditious way to disseminate valuable mishap prevention information. These events also include the following:

    - Property Damage Events – Mishaps that do not have an injury or illness and the direct cost totals $2,000 or more but less than $50,000.

- High Accident Potential Events – Any hazardous occurrence that has a high potential for becoming a mishap.

The primary safety categories discussed in this analysis include Aircraft, Ground, Traffic, and Construction Safety.

3.2.3.2 Existing Conditions

3.2.3.2.1 Aircraft Safety

Areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and countless hours of training, past history makes it clear that accidents are going to occur.

Class A mishaps are the most serious of aircraft-related accidents and represent the category of mishap most likely to result in a crash. Table 3-4 lists the 5-year Class A mishap rates for the KC-135 aircraft. The table reflects the Air Force-wide data for all phases of flight of all missions and sorties for each aircraft type.

Table 3-4 Year Class A KC-135 Aircraft Mishap Information

Aircraft	5-Year Class A Mishap Rate
KC-135	0.2

Source: USAF 2012e

Note: The mishap rate is an annual average based on the total number of Class A mishaps and 100,000 flying hours.

The risk of people on the ground being killed or injured by aircraft accidents is miniscule. However, an aircraft accident is a high-consequence event, and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead it approaches this safety issue from a land-use-planning perspective through its AICUZ program which is discussed further in Section 3.2.5.2.1, Restricted Land Use. Designation of safety zones around the airfield and restriction of incompatible land uses reduces the public's exposure to safety hazards.

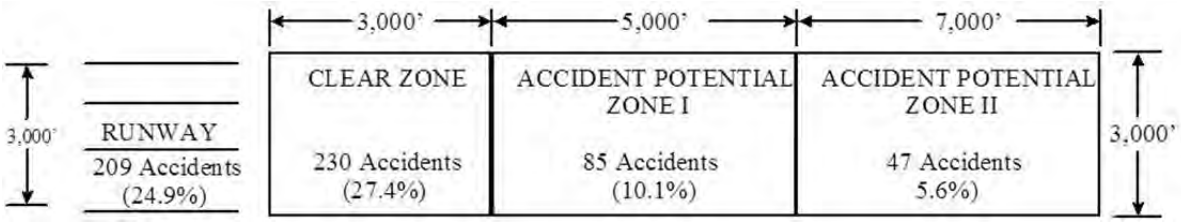
Clear Zones (CZ) and Accident Potential Zones (APZs) were developed from analysis of over 800 major Air Force accidents that occurred within 10 miles of an Air Force installation between 1968 and 1995. The study found that 61 percent of the accidents were related to landing operations and 39 percent occurred during takeoff. Fighter and trainer aircraft accounted for 80 percent of the accidents, with large aircraft and helicopters accounting for the remaining 20 percent. Figure 3-3 depicts the three safety zones and summarizes the location of the accidents within a 10-nautical mile radius of an airfield.

The following paragraphs define the CZ and APZs.

- Clear Zone Surface – The CZ width is 3,000 ft (1,500 ft to either side of runway centerline) and extends outward 3,000 ft. Some obstructions may occur within the CZ if permitted under AICUZ land use guidelines, or if appropriate authorities waive airfield planning guidance. Of the three zones (*i.e.*, CZ, APZ I, and APZ II), the CZ is the area with the greatest potential for an accident (see Figure 3-1).

- Accident Potential Zone Surfaces – APZ I begins at the outer end of the CZ and is 5,000 ft long and 3,000 ft wide. APZ II begins at the outer end of APZ I and is 7,000 ft long and 3,000 ft wide. APZ I has less accident potential than the CZ and APZ II has less potential than APZ I.

Figure 3-3 Air Force-Wide Aircraft Accident Data (838 Accidents - 1968-1995)



3.2.3.2.2 Ground 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 potential health and safety hazards include biological risks (insects, snakes or small wild animals), rough terrain, and climatic conditions including heat and cold stress and the potential for severe storms including tornadoes. Potential created health and safety hazards include occupational noise exposure, ground traffic (i.e., driving to and from the work site), general injuries while working with hand or power tools as well as atypical injuries due to job specific hazards while working with and in support of large aircraft such as the KC-135 and KC-46As. Historical data for Tinker AFB shows that there were 825 mishaps in calendar year 2012. This includes zero Class A mishaps, 1 Class B mishap, 86 Class C mishaps, 298 Class D mishaps, 80 Class E mishaps, 281 first aid mishaps, and 79 incidents of minor property damage (i.e., less than $2,000) (USAF 2013a).

Additional considerations for ground safety are required at Tinker AFB because of the proximity of work and construction to the flightline. Increased awareness for task specific vehicles and personnel make for an even greater need for situational awareness. Ground safety also encompasses the need for security clearances in the work zones and Air Force anti-terrorism program standards (AFI 10-245) must be followed at all times during the duration of the project, including entry control point locations and access.

Traffic Safety

The Air Force maintains a Traffic Safety Program with the goal of preventing or reducing the frequency and severity of mishaps involving Air Force personnel, equipment and operations. This Program is established through AFB 91-207. Logistical coordination of resources and infrastructure are key to maintain traffic safety. Current traffic patterns at Tinker AFB provide adequate space for the current installation population to navigate the facility efficiently. It is impossible to remove all possibilities for a traffic incident; however, current conditions are such that the traffic hazards are not a significant issue on Tinker AFB. The most recent data regarding traffic safety shows that there were 163 traffic incidents on Tinker AFB in FY 2012. Of these incidents 96 percent (158 incidents) resulted in property damage and two percent (four incidents) resulted in a disabling injury (USAF 2012f).

Construction Safety

Construction site safety is largely a matter of adherence to regulatory requirements imposed for the benefit of employees, and implementation of operational practices that reduce risk of illness, injury, death, and property damage. The health and safety of construction contractors at Tinker AFB are safeguarded by Occupational Safety and Health Administration (OSHA) regulations. These standards specify the amount and type of training required for industrial workers, the use of protective equipment and clothing, engineering controls, and maximum exposure limits for workplace stressors. Construction related hazards that are typical for construction activities include biological hazards, slips trips and falls, use of hand and power tools, repetitive motion injuries, proper lifting and material handling, heavy equipment, heat or/and cold stress, noise exposure, proper PPE, and using the proper tool for the job. Additionally, contractors must maintain cleanliness at the construction site to avoid construction debris which can be blown around.

3.2.4 Air Quality

3.2.4.1 Definition of Resource

The US Environmental Protection Agency (USEPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) under the Clean Air Act Amendments of 1990 (CAAA). The CAAA also set emission limits for certain air pollutants from specific sources, set new source performance standards based on best demonstrated technologies, and established national emission standards for hazardous air pollutants.

The CAAA specifies two sets of standards – primary and secondary – for each regulated air pollutant. Primary standards define levels of air quality necessary to protect public health, including the health of sensitive populations such as people with asthma, children, and the elderly. Secondary standards define levels of air quality necessary to protect against decreased visibility and damage to animals, crops, vegetation, and buildings. Federal air quality standards are currently established for six pollutants (known as criteria

pollutants), including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur oxides (SO_x, commonly measured as sulfur dioxide – SO_2), lead, particulate matter equal to or less than 10 micrometers in aerodynamic diameter (PM_{10}) and particulate matter equal to or less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$). Although O_3 is considered a criteria pollutant and is measurable in the atmosphere, it is often not considered as a pollutant when reporting emissions from specific sources, because O_3 is not typically emitted directly from most emissions sources. Ozone is formed in the atmosphere from its precursors – nitrogen oxides (NO_x) and volatile organic compounds (VOCs) – that are directly emitted from various sources. Thus, emissions of NO_x and VOCs are commonly reported instead of O_3.

The NAAQS for the six criteria pollutants are shown in Table 3-5.

The USEPA classifies the air quality within an Air Quality Control Region (AQCR) according to whether the region meets federal primary and secondary air quality standards. An AQCR or portion of an AQCR may be classified as attainment, non-attainment, or unclassified with regard to the air quality standards for each of the criteria pollutants. "Attainment" describes a condition in which standards for one or more of the six pollutants are being met in an area. The area is considered an attainment area for only those criteria pollutants for which the NAAQS are being met. "Nonattainment" describes a condition in which standards for one or more of the six pollutants are not being met in an area. "Unclassified" indicates that air quality in the area cannot be classified and the area is treated as attainment. An area may have all three classifications for different criteria pollutants.

The CAAA requires federal actions to conform to any applicable state implementation plan (SIP). USEPA has promulgated regulations implementing this requirement (USEPA 2003). A SIP must be developed to achieve the NAAQS in non-attainment areas (i.e., areas not currently attaining the NAAQS for any pollutant) or to maintain attainment of the NAAQS in maintenance areas (i.e., areas that were non-attainment areas but are currently attaining that NAAQS). General conformity refers to federal actions other than those conducted according to specified transportation plans (which are subject to the Transportation Conformity Rule). Therefore, the General Conformity rule applies only to non-transportation actions in non-attainment or maintenance areas. Such actions must perform a determination of conformity with the SIP if the emissions resulting from the action exceed applicability thresholds specified for each pollutant and classification of nonattainment. Both direct emissions from the action itself and indirect emissions that may occur at a different time or place but are an anticipated consequence of the action must be considered. The Transportation Conformity Rule does not apply to this project.

Table 3-5 National Ambient Air Quality Standards

Pollutant	Standard Value	Standard Type
CO		
1-hr average	35 ppm	Primary
8-hr average	9 ppm	Primary
NO_2		
1-hr average	100 ppb[a]	Primary
Annual average	53 ppb	Primary and Secondary
O_3		
8-hr average[b]	0.075 ppm	Primary and Secondary
Lead		
Rolling		
3 month Average	0.15 µg/m^3	Primary
Quarterly average	1.5 µg/m^3	
PM_{10}		
24-hr average[c]	150 µg/m^3	Primary and Secondary
$PM_{2.5}$		
24-hr average[d]	35 µg/m^3	Primary and Secondary
Annual average[e]	12 µg/m^3	Secondary
SO_2		
1-hr average	75 ppb[f]	Primary
3-hr average	0.5 ppm	Secondary

Notes:
CO=carbon monoxide
µg/m^3=micrograms per cubic meter
NO_2=nitrogen dioxide
O_3=ozone
SO_2=sulfur dioxide
$PM_{2.5}$=particulate matter equal or less than 2.5 micrometers in diameter
PM_{10}= particulate matter equal or less than 10 micrometers in diameter
ppb = parts per billion
ppm = parts per million
[a] The 98th Percentile, averaged over 3 years.
[b] To attain the 8-hour ozone standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm.
[c] The 24-hour standard for PM_{10} is not exceeded more than once per year on average over 3 years.
[d] The $PM_{2.5}$ 24-hour standard is based on the 3-year average 98th percentile of 24-hour concentrations at each population-oriented monitor.
[e] The $PM_{2.5}$ annual standard is based on 3-year average of weighted annual mean concentration from single or multiple community monitors.
[f] The 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

3.2.4.2 Existing Conditions

Tinker AFB is an existing major source with permitted emissions of NO_x, CO, and VOCs exceeding 250 tons per year. Tinker AFB currently operates under Title V Permit No. 2009-394-TVR. Emissions from the maintenance of aircraft, specifically the use of solvents; depainting (i.e., paint stripping); surface coating; jet engine testing (in test cells); inspection and repair of fuel cells and tanks; fuel combustion in boilers, heaters and emergency generators; and evaporation of VOCs from fuel storage and handling are

included in Title V permitting. Emissions from aircraft operations both in flight and on the ground are not included in Title V permitting. Also excluded from Title V permitting are operations of the associated aerospace ground support equipment (AGSE) and mobile sources that support aircraft operation. Table 3-6 presents the Tinker AFB 2012 actual air emissions from stationary sources. Table 3-7 presents the Tinker AFB 2009 mobile source air emission inventory.

Table 3-6 Tinker AFB 2012 Actual Air Emissions from Stationary Sources

Pollutant	Actual Emissions (tpy)
Carbon Monoxide	119
Nitrogen Oxides	156
PM_{10}	13.1
$PM_{2.5}$	9.5
Sulfur Oxides	10.9
VOC	254
Total all HAPs	47.3

Source: Tinker AFB 2012
Notes:
HAP = hazardous air pollutant
$PM_{2.5}$=particulate matter equal or less than 2.5 micrometers in diameter
PM_{10}= particulate matter equal or less than 10 micrometers in diameter
tpy = tons per year
VOC = volatile organic compounds

Table 3-7 Tinker AFB 2009 Actual Air Emissions from Mobile Sources

Pollutant	Actual Emissions (tpy)
Carbon Monoxide	3,409
Nitrogen Oxides	721
PM10	116
PM2.5	112
Sulfur Oxides	53.3
VOC	639
Ammonia	19.4
Total all HAPs	32.5

Source: Tinker AFB 2010
HAP = hazardous air pollutant
PM2.5=particulate matter equal or less than 2.5 micrometers in diameter
PM10= particulate matter equal or less than 10 micrometers in diameter
tpy = tons per year
VOC = volatile organic compounds

3.2.4.2.1 Regional Air Quality

Tinker AFB is located in Oklahoma County. Oklahoma County is within the AQCR 184, in the State of Oklahoma. AQCR 184 consists of the following: Canadian County, Cleveland County, Grady County, Lincoln County, Logan County, Kingfisher County, McClain County, Oklahoma County, and Pottawatomie County. The entire AQCR 184 is

currently USEPA designated as an attainment area for all criteria pollutants. Therefore, Tinker AFB is not subject to the General Conformity regulations (40 CFR Parts 6, 51 and 93).

3.2.4.3 Greenhouse Gases

There are six primary Greenhouse Gases (GHGs) of concern: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The emissions of each GHG are measured based on their global warming potential (GWP), the universal unit of measurement to express how much a given mass of greenhouse gas is estimated to contribute to climate change. Table 3-8 lists the GWP (USEPA 2013) of the six primary GHGs.

Table 3-8 Global Warming of GHGs

Gas	Chemical Formula	GWP[a]
Carbon dioxide	CO_2	1
Methane	CH_4	21
Nitrous oxide	N_2O	310
Hydrofluorocarbons	HFCs	various
Perfluorocarbons	PFCs	various
Sulfur hexafluoride	SF_6	23,900

Notes:
GHGs = Greenhouse Gases
GWP – Global Warming Potential
[a] Source: USEPA 2013

Only three of the GHGs, are considered in the emissions from current operations on the BNSF Railyard site and DLA Infill site. These three GHSs (CO_2, CH_4, and N_2O) represent the majority of carbon dioxide equivalents (CO_{2eq}) associated with current operations. The other GHGs were not considered in the potential emissions from the Preferred Alternative as they are presumed to be not emitted: HFCs are most commonly used in refrigeration and air conditioning systems; PFCs and SF_6 are predominantly emitted from various industrial processes including aluminum smelting, semiconductor manufacturing, electric power transmission and distribution, and magnesium casting, none of which are part of the Preferred Alternative.

Direct emissions of CO_2, CH_4 and N_2O occur naturally to the atmosphere but human activities have increased global GHG atmospheric concentrations. The 2011, total US GHG emissions were 6,702,300,000 metric tons of CO_{2eq} (USEPA 2013b). US total GHG emissions have risen 8.4 percent from 1990 to 2011 (USEPA 2013b).

Tinker AFB is subject to the annual reporting requirements of CO_{2eq} from stationary source fuel combustion, as required by 40 CFR Part 98 - Mandatory Greenhouse Gas Reporting.

3.2.5 Land Use

3.2.5.1 Definition of Resource

Land use describes the activities that take place in a particular area and generally refers to human modification of land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources. It is important as a means to determine if there is sufficient area for proposed activities and to identify any potential conflicts with local land-use plans. This section of the EA describes the on- and off-base land-use resources that could potentially be affected by the Preferred Alternative and alternatives.

3.2.5.2 Existing Conditions

The Tinker AFB property is federally-owned and operated by the United States Air Force. Currently, land uses on Tinker AFB include Administrative, Aircraft Operations and Maintenance, Airfield, Community (Commercial), Community (Services), Housing, Industrial, Medical, Agricultural, Open Space, Outdoor Recreation and Water. Industrial Community (Services) (off-base on BNSF Railyard property), and Open Space are the predominant land uses in the areas associated with the Preferred Alternative and Alternative 1. Small scattered portions of the alternatives areas include Aircraft Operations and Maintenance, Airfield, and Community (Commercial). Currently the BNSF site is used for railyard operations and the DLA Infill site is used for industrial storage with approximately 15 Air Force personnel providing site management. Figure 3-4 shows the existing land uses on Tinker AFB.

Figure 3-5 shows the existing land uses for areas surrounding Tinker AFB. Due to its relatively undeveloped state, the adjacent Oklahoma City land area has the greatest potential to positively or negatively impact Tinker AFB. For planning purposes, the Oklahoma City Planning Department has divided the city into six sectors. The portion of Oklahoma City that adjoins Tinker AFB is the Southeast Sector. It is considered one of the city's areas of highest suburban growth and acreage development. Although Oklahoma City as a whole is comprised of urban, suburban, and rural community areas, the Southeast Sector is predominantly suburban and rural. The western one-third of the sector is suburban and the eastern two-thirds is mostly rural, including fairly large areas of undeveloped land (City of Oklahoma City 2007).

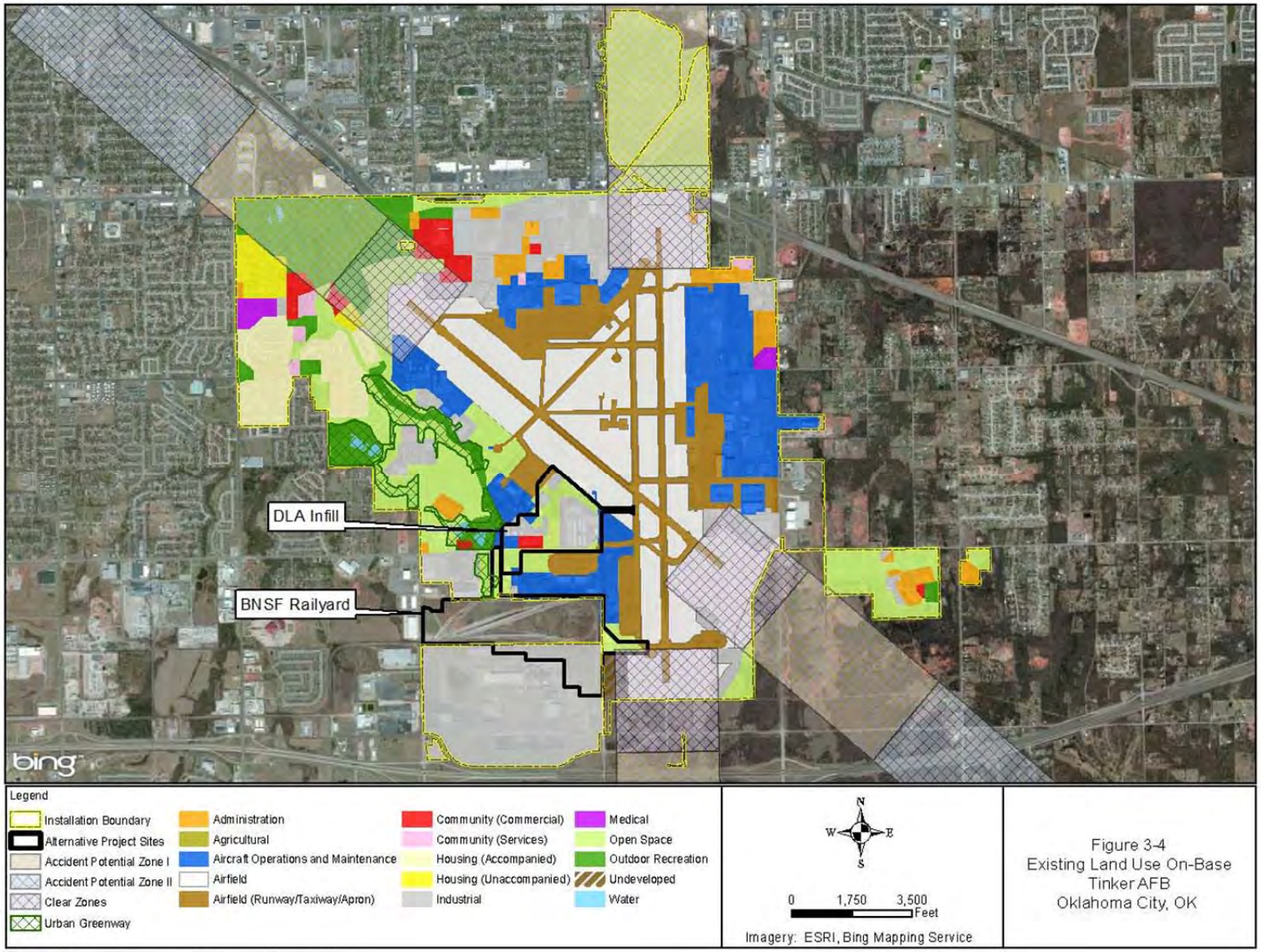


Figure 3-4
Existing Land Use On-Base
Tinker AFB
Oklahoma City, OK

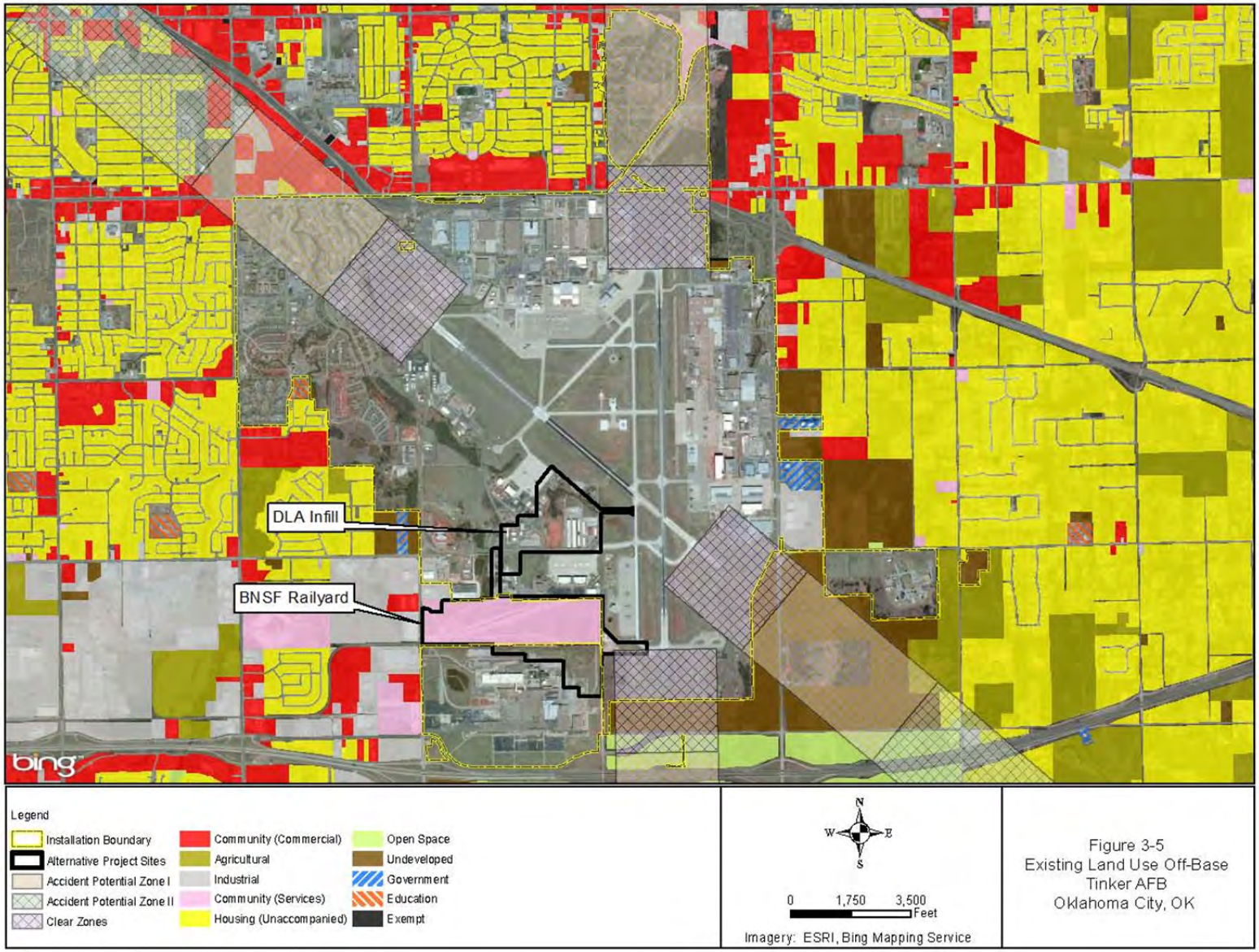


Figure 3-5
Existing Land Use Off-Base
Tinker AFB
Oklahoma City, OK

Within the Southeast Sector Plan, land immediately east of Tinker has been designated as industrial for future Tinker AFB expansion and industrial development. There are limited areas within the Southeast Sector near Tinker that could support new commercial, industrial, and higher density residential development. Land south of Tinker—Lake Stanley Draper (approximately 3,000 acres) and adjoining West Elm Creek Reservoir preserve—has been designated as an Environmental Conservation Area. This area is owned by the Oklahoma City Water Trust (City of Oklahoma City 2007) and is surrounded by a significant amount of undeveloped land to the east and suburban development to the south and west. The conservation area is located approximately one mile south of Tinker AFB and totals over 10,000 acres (USAF 2012g).

3.2.5.2.1 Restricted Land Uses

Existing land-use patterns on Tinker AFB are a result of the installation's development since World War II. Facility development and supporting infrastructure have evolved over time as missions and requirements have changed or expanded. As a result, some areas on Tinker may be restricted due to airfield operations or location within an AICUZ. Tinker AFB's most recent AICUZ document was published in 2006. AICUZs include APZs and CZs which are described more fully in Section 3.2.3.2.1, Aircraft Safety. CZs are located at the end of runways, are areas with an increased potential for aircraft accidents, and are kept clear of facilities and obstructions to flight as required by Air Force Manual 32-1123(I). APZs are located beyond and adjacent to CZs and are areas with a potential for aircraft accidents to occur.

Airfield clearance criteria have affected development patterns at Tinker AFB, as several facilities were constructed in the airfield CZs prior to adoption of more stringent clearance criteria (USAF 2008). A total of 3.57 acres (1.78 percent) of the area of the Preferred Alternative would be located within a CZ; however, the only construction proposed for this area is a taxiway, which is permissible within a CZ. Figure 3-4 shows the airfield CZs and APZs on the installation in relation to the locations of the Preferred Alternative and Alternative 1 (DLA Infill).

A limiting factor for land use is Explosive Safety Quantity Distance (ESQD) arcs. These arcs are used to identify the minimum allowable distance between a potential explosion and the inhabitants of nearby buildings, communities, private and public property, and Tinker AFB personnel. There are no ESQD arcs located within the area of Preferred Alternative.

Electromagnetic Pulse (EMP) hazard areas can be a limiting factor for land use as well. These areas are used to test different aircraft components with EMPs. There are no EMP hazard areas located within the area of Preferred Alternative.

Constraints on land use may result from Environmental Restoration Program (ERP) sites. ERP sites are areas that are in the process of being remediated of contamination. As a result, additional costs during construction may be incurred for containment or remediation. There are no ERP sites located within the area of the Preferred Alternative.

There are two sites located within the area of Alternative 1. A detailed discussion of ERP sites is included in Section 3.2.11.2.2.

In addition to the aforementioned, preservation and protection of natural resources may pose constraints to development. Nine acres of green infrastructure (GI) area are located within the Preferred Alternative and 44 acres of GI area are located within the Alternative 1. The GI areas include riparian woodland and flood storage land uses. Green infrastructure is further discussed in Section 3.2.8.2.2 Vegetation Communities.

3.2.6 Physical Resources

3.2.6.1 Definition of the Resource

An area's geological resources typically consist of surface and subsurface materials and their inherent properties. Principal factors influencing the ability of geological resources to support structural development are seismic properties (i.e., potential for subsurface shifting, faulting, or crustal disturbance), topography, and soil stability.

Seismic properties indicate the potential for earthquake activity in an area. Those regions of the country that have subsurface shifting, faulting, or crustal disturbance are more likely to be affected by earthquake activity.

Topography is defined as the relative positions and elevations of the natural or human-made features of an area that describe the configuration of its surface. An area's topography is influenced by many factors, including human activity, seismic activity of the underlying geological material, climatic conditions, and erosion. Information about an area's topography typically encompasses surface elevations, slope, and physiographic features (i.e., mountains, ravines, or depressions).

The term "soil" generally refers to unconsolidated materials lying over bedrock or other parent material. Soils play a critical role in both the natural and human environment. Soil depth, structure, elasticity, strength, shrink-swell potential, and erodibility determine a soil's ability to support man-made structures and facilities. Soils are typically described in terms of their series or association, slope, physical characteristics, and relative compatibility or constraints with respect to particular construction activities and 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.

3.2.6.2 Existing Conditions

3.2.6.2.1 Geology

The uppermost geologic bedrock formation at the Preferred Alternative site (BNSF Railyard) is the Hennessey Formation, comprised of silty claystones and clayshales, with intervals of sandstones and siltstones, according to the 2008 *Geologic Map Compilation*

of the Oklahoma City Metro Area, Central Oklahoma, Oklahoma Geological Survey (USGS 2008). The Hennessey Formation claystones are described as generally silty, with fissile lamination, and typically unstratified. The siltstones may be indurated, sandy, and laminated and the sandstones are reported as friable, silty, in lenticular intervals, with cross-bedding and ripple marks indicative of a shallow tidal depositional environment. Siltstone and sandstone beds are generally no thicker than 3 ft. (USGS 2008)

According to the *Geologic Map Compilation of the Oklahoma City Metro Area*, at the Alternative 1-DLA Infill site, the Hennessey Formation is reported to be the uppermost geologic bedrock formation (USGS 2008). Details of the Hennessey Formation are provided in the description of the Preferred Alternative above.

3.2.6.2.2 Topography

According to the *Choctaw Quadrangle, Oklahoma*, United States Geological Survey (USGS), the topography of the BNSF Railyard site is relatively flat, ranging in elevation from approximately 1260 ft along the western portion to 1270 ft above MSL along the eastern portion (USGS 2000). Raised surfaces at the site are typically manmade features (rail lines) and rise one to three ft above the adjacent land surface. A lower drainage area is present in the northwest area of the site where storm water temporarily collects and subsequently drains into the site soils. Very shallow manmade drainage ditches are present along portions of the site's gravel roads. A drainage stream has been managed at the site and now flows through culvert piping subgrade from south to north across the site.

The topography of the Alternative 1 – DLA Infill site lies at an elevation from 1235 ft MSL at its lowest point to 1270 ft MSL at its highest. The slope generally runs from north to south. An intermittent stream drainage pattern and surface pond is indicated on the 1995 USGS topographical map. The pond is dammed on the north end, indicating a manmade or altered feature. The ground surface has been altered by base construction activities.

3.2.6.2.3 Soils

The Oklahoma County Soil Survey maps show several separate soil units mapped across the Preferred Alternative site (USDA 2013). In a small northwest area of the site and a strip extending north to south bisecting the site, the USDA classifies the soil type as the Kirkland-Urban complex. Kirkland-Urban land complex is altered by development and mapped in the central portion of the site. The Kirkland-Urban complex is described as silty loam and silty clay derived from clayey alluvium over clayey residuum weathered from calcareous shale. The Kirkland-Urban complex is well drained with very low to moderately low capacity to transmit water. This is the most erodible soil type within the Preferred Alternative project site. In a small area along the northern boundary, the Norge soil unit is mapped. The Norge is described as silt loam and silty clay loam derived from loamy alluvium and is well drained with moderately high capacity to transmit water. Norge series soils are the least erodible soil type within the Preferred Alternative project site. The Norge-Urban land complex is Norge soils altered by development and is

mapped in the central portion of the site. These soils are silty loams and silty clays. The Renthin soil unit is located in the eastern portion of the site and is described as silty loam, silty clay loam, and silty clay derived from a parent material of clayey and silty residuum weathered from shale. It is well drained and is classified as having a very low to moderately low capacity to transmit water. Most of the site is mapped with the Renthin-Urban land complex, covering the western, eastern, and northern portions of the site. The Renthin-Urban land complex is Renthin soil altered by development. Due to the clayey nature of the soils in the region, stormwater infiltration is not typically feasible. The Urban land complex soil unit describes an area that has been altered by development; it is mapped on the southern, eastern, and northern boundaries of the site (USDA 2013). The total area and percent coverage of these soils is presented in Table 3-9. According to the Oklahoma County Soil Survey Prime Farmland Table, none of the soil types mapped across the Preferred Alternative site are listed as prime farmland soils.

Table 3-9 Preferred Alternative Construction Area Soil Unit Coverage

Soil Unit	Total Area (acres)	Percent of Soil Unit in Total Area
Kirkland-Urban land complex	29.93	12.5
Norge silt loam	1.99	0.8
Norge-Urban land complex	1.32	0.5
Renthin silty clay loam	10.49	4.4
Renthin-Urban land complex	175.97	73.6
Urban land	19.51	8.2
Total	**239.21**	**100.00**

As indicated on the USDA Soil Survey map, the Alternative 1 - DLA Infill site is mapped with Ashport silty loam in the north central portion of the 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 (USDA 2013). 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 total area and percent coverage of the DLA Infill area soils are presented in Table 3-10. 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.

According to the Oklahoma County Soil Survey Prime Farmland Table, none of the soil types mapped across the Alternative 1 – DLA Infill site are listed as prime farmland soils, with the exception of Lawrie Loam, 0 to 1 percent slopes, rarely flooded soils (LawA). LawA soils occur on about 3.29 acres in the central portion of the DLA Infill area, where a creek, a drainage ditch, and roads are observed. However, according to Oklahoma County Soil Survey, urban or built-up areas of the listed soils are not considered prime farmland.

Table 3-10 Alternative 1 Construction Area Soil Unit Coverage

Soil Unit	Total Area (acres)	Percent of Soil Unit in Total Area
Ashport silty loam	15.32	17.67
Grainola-Ashport complex	1.14	1.32
Grainola-Urban-Ironmound land	0.22	0.26
Latrass loam	0.03	0.04
Lawrie loam, 0 to 1% slopes, rarely flooded	3.29	3.80
Lawrie-Urban land complex	3.15	3.64
Renthin silty clay loam	0.97	1.12
Renthin-Urban land	3.85	4.45
Urban land	54.16	62.46
Water	4.55	5.25
Total	**86.70**	**100.00**

3.2.7 Water Resources

3.2.7.1 Definition of Resource

Water resources include groundwater features, such as aquifers; surface water features, including, watersheds, rivers, lakes, wetlands, and streams; and floodplains.

3.2.7.2 Existing Conditions

3.2.7.2.1 Drainage

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 Oklahoma Department of Environmental Quality (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).

Stormwater generated on the BNSF Railyard property is managed through eight stormwater drainage features located throughout the property. Stormwater collects at each feature, flows into two, 8-foot diameter drainage culverts, and then leaves BNSF at two points at the northern property boundary. According to Tinker AFB, the western culvert drains north onto Tinker AFB to an engineered marshland that serves as a filter before flowing to Beaver Pond. The eastern culvert on the eastern portion of BNSF drains north into another underground culvert that flows to Upper Crutcho Creek East Tributary (USAF 2012h). The BNSF property does not currently have a stormwater permit.

3.2.7.2.2 Floodplains

Approximately 40 acres of the DLA Infill property are located within the 100-year floodplain. This increases to 41 acres with inclusion of the 500-year floodplain. The BNSF Railyard property is not located within a 100-year or 500-year floodplain. Floodplains and surface water features are shown on Figure 3-6.

3.2.7.2.3 Surface Water

Tinker AFB and surrounding properties are located within the Lower North Canadian Watershed. Surface water features in the vicinity of the project areas include Crutcho Creek, Soldier Creek, Kuhlman Creek, Elm Creek, and Hog Creek. Crutcho Creek, located on the western portion of Tinker AFB, receives stormwater runoff from Tinker AFB. Crutcho Creek generally flows to the northwest and discharges into the North Canadian River, approximately six miles north of Tinker AFB. Kuhlman Creek is a tributary of Crutcho Creek and originates in the northern portion of Tinker AFB. Soldier Creek originates at Southeast 59th St and flows approximately six miles northward before discharging to Crutcho Creek. Elm Creek is located south of Tinker AFB and discharges into Lake Stanley Draper. Additionally, several constructed retention and detention features exist within Tinker AFB. Stormwater is further discussed in Section 3.2.7.2.1, Drainage. Surface water features are shown on Figure 3-6.

3.2.7.2.4 Wetlands

US Army Corps of Engineers (USACE) regulates "Waters of the US," wetlands, and special aquatic sites under Section 404 of the Clean Water Act (CWA) and Section 10 of

the Rivers and Harbors Act. There are 42 identified wetland areas on Tinker AFB, covering approximately 38 acres of land. In 2003, a study was conducted to evaluate the health and quality of these wetland areas (USAF 2012g). Only two wetlands (Greenway and Prairie Ponds) were classified as being high quality wetlands based on the Ohio Rapid Assessment Method for Wetlands and the EPA's Rapid Bioassessment Protocol. While neither of these ponds falls within the BNSF Railyard or DLA Infill sites, the Greenway wetland is located approximately one-mile downstream from the DLA Infill site.

WESTON conducted a wetland and waterbody delineation study on the BNSF Railyard property in November 2012. Four wetlands were observed on the BNSF Railyard property and were determined to be palustrine, emergent, persistent, temporarily flooded (PEM1A) wetlands covering a total of 0.60 acres. None of the wetlands were determined to be jurisdictional. Two waterbodies were also identified on the BNSF Railyard property: 420 ft (0.08 miles) of an unnamed ditch that was determined not to be jurisdictional and 88 ft (0.01 miles) of an unnamed tributary of Crutcho Creek that was determined to be jurisdictional. A portion of an intermittent stream identified as jurisdictional (0.01 miles) originates on the north side of the BNSF Railyard site. Figure 3-7 shows the location of the wetlands and waterbodies delineated by WESTON on the BNSF Railyard property. Further details regarding the wetland and waterbody delineation can be found in the Wetland and Waterbody Delineation Report in Appendix D. Table 3-11 shows the amount of jurisdictional and non-jurisdictional wetlands and waterbodies located within each alternative project site.

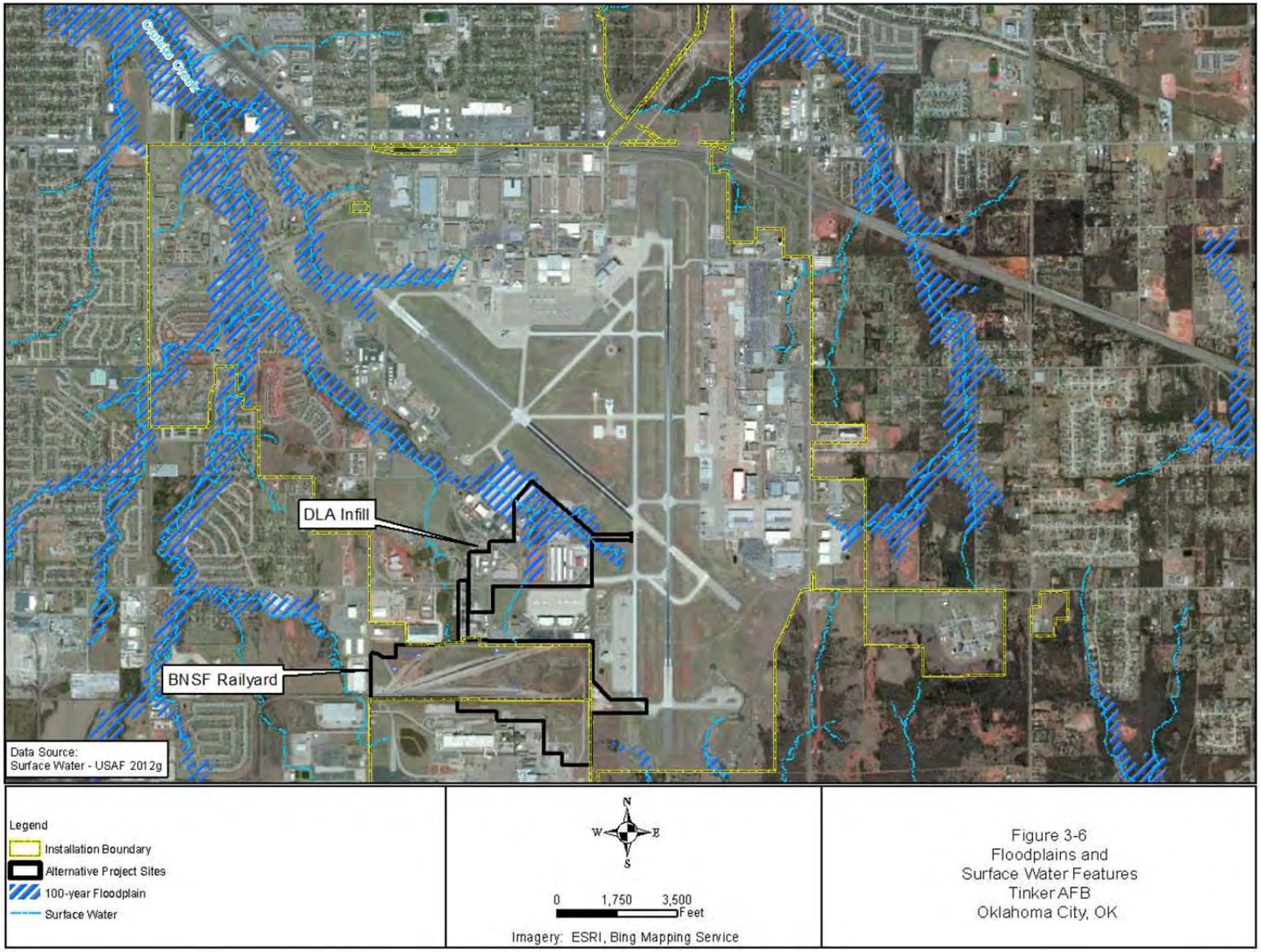

Crutcho Creek
DLA Infill
BNSF Railyard
Data Source:
Surface Water - USAF 2012g
Legend
Installation Boundary
Alternative Project Sites
100-year Floodplain
Surface Water
N
W
E
S
0 1,750 3,500
Feet
Imagery: ESRI, Bing Mapping Service
Figure 3-6
Floodplains and
Surface Water Features
Tinker AFB
Oklahoma City, OK

Table 3-11 Wetlands and Waterbodies on the Alternative Project Sites

Type	Wetlands (Acres)/Waterbody Size (Linear Miles)	
	BNSF Railyard[a]	**DLA Infill[b]**
Jurisdictional[c]		
Wetlands	--	3.15 acres
Waterbodies	0.01 miles	0.67 miles
Non-Jurisdictional		
Wetlands	0.60 acres	--
Waterbodies	0.08 miles	0.05 miles

Notes:
BNSF = Burlington Northern Santa Fe
DLA = Defense Logistics Agency
[a]Based on WESTON 2012 site visit
[b] Based on Tinker Air Force Base Integrated Natural Resources Management Plan (USAF 2012g) and review of aerial photos (Google Inc. 2013)
[c] Only wetlands on the DLA property have received a Jurisdictional Determination (JD) from the USACE. The date of the JD is unknown. Wetlands on the BNSF Railyard site have not been assessed by the USACE.

The westernmost portion of the proposed DLA Infill project area has an area of jurisdictional waters of the US identified as an intermittent stream that is 3,544 ft (0.67 miles) in length and a 3.15 acres jurisdictional freshwater forested wetland falling within its boundaries. A portion of a non-jurisdictional stream culverted under the taxiway on the DLA Infill site measures 311.5 ft (0.05 miles) in length. Figure 3-8 shows the location of the wetlands and waterbodies on the DLA Infill project site.

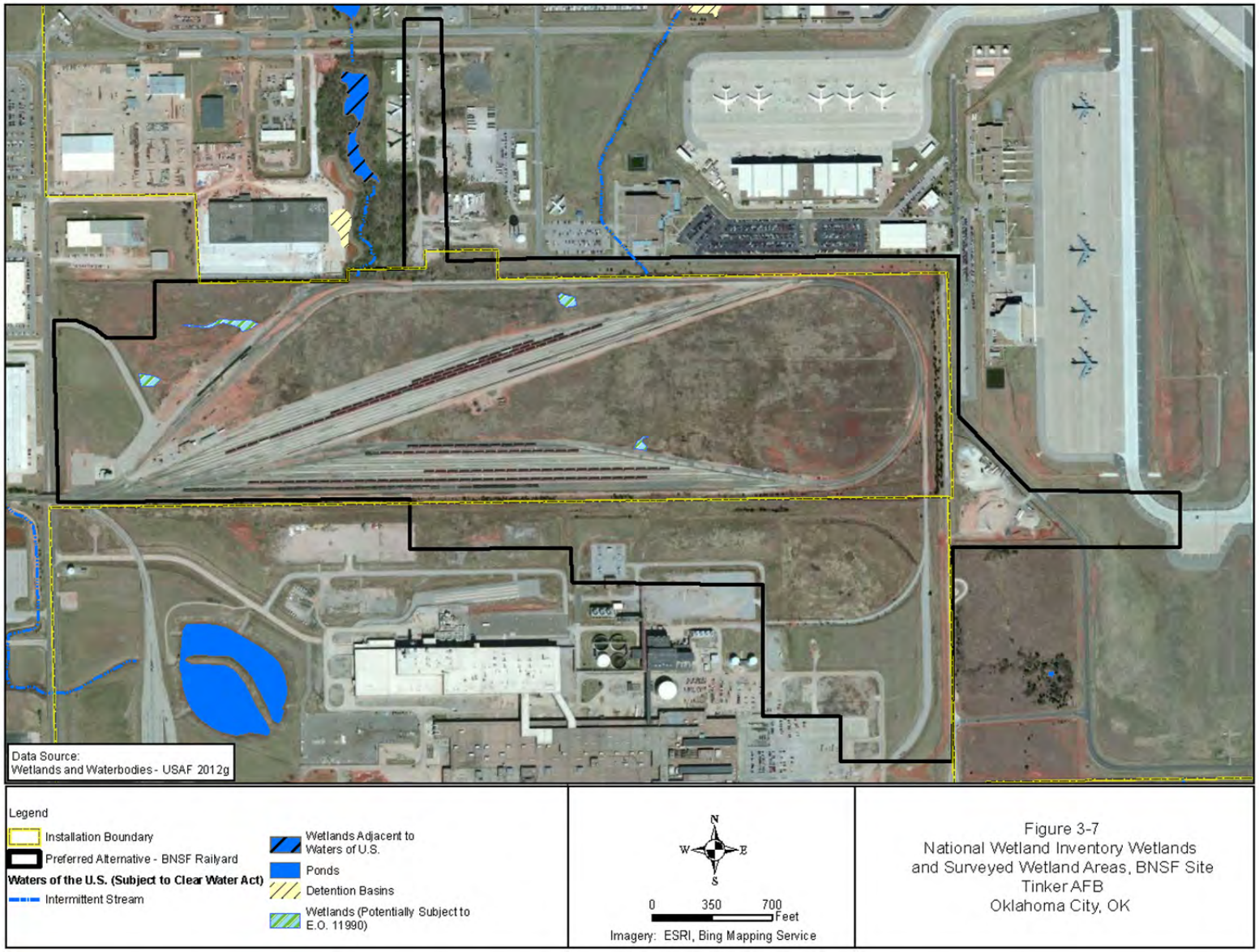


Figure 3-7
National Wetland Inventory Wetlands and Surveyed Wetland Areas, BNSF Site
Tinker AFB
Oklahoma City, OK

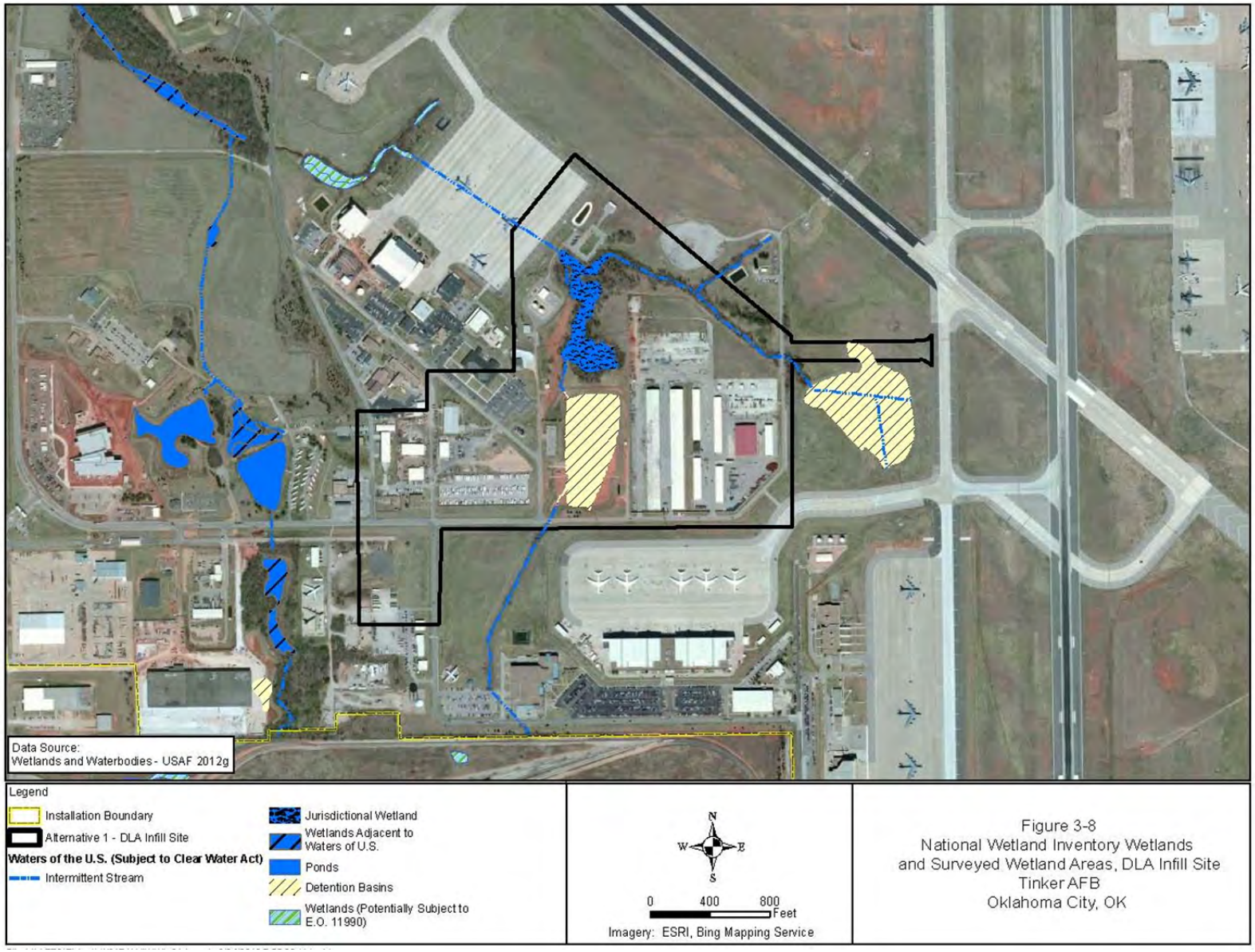


Figure 3-8
National Wetland Inventory Wetlands
and Surveyed Wetland Areas, DLA Infill Site
Tinker AFB
Oklahoma City, OK

3.2.7.2.5 Groundwater

Tinker AFB and surrounding properties are positioned above the Central Oklahoma Aquifer recharge zone. The Central Oklahoma Aquifer, also known as the Garber-Wellington Aquifer, underlies all or portions of eight counties, including Oklahoma County, and spans approximately 2,900 square miles. 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. These formations are often collectively referred to as the "Garber-Wellington" Aquifer, which has a maximum thickness of approximately 1,000 ft.

Four groundwater-bearing units are located in the area: the Hennessey water bearing zone, upper saturated zone (USZ), lower saturated zone (LSZ), and producing zone (PZ). 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 ft (USACE 2012). Groundwater in the upper 200 ft of this aquifer is typically unconfined while groundwater at greater depths is partly confined or confined (USGS 2013).

The PZ is the zone that 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 ft (USAF 2007b). Based on a review of Tinker AFB cross-section maps, the groundwater "Production Zone" of the Garber-Wellington begins at a depth of approximately 200 ft below ground surface (bgs).

3.2.8 Biological Resources

3.2.8.1 Definition of Resource

The BNSF Railyard and DLA Infill sites support a variety of habitat types and wildlife species. As discussed in greater detail below, while most of these areas are at least partially developed if not almost fully developed, some suitable habitat for wildlife species still exists though no known threatened or endangered (T&E) species exist on the Tinker AFB property. Of particular concern are areas that are known species of concern and SAR. Likewise, Tinker AFB natural resource personnel monitor and maintain a comprehensive SAR management program. Furthermore, Tinker AFB supports and manages a network of GI to serve, in part, as wildlife corridors inside of Tinker AFB which connect it to other undeveloped green spaces outside of base property. These are all discussed below under Existing Conditions.

3.2.8.2 Existing Conditions

3.2.8.2.1 Ecoregion

Tinker AFB falls within the Central Great Plains Ecoregion of Oklahoma (Level III Ecoregion), as defined by the USEPA (Oklahoma Forestry Service 2013). The Central

Great Plains Ecoregion is characterized by rolling grassland prairies and oak savanna habitats. Much of the natural habitat converted into cropland and rangeland with woody vegetation encroaching into the remaining grassland areas (USAF 2012g). Remaining areas of pristine prairie habitat are rare and isolated. 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*), greenbriar (*Smilax bona-nox*), roughleaf dogwood (*Cornus drummondii*), and buttonbush (*Cephalanthus occidentalis*). Precipitation levels in this ecoregion increases eastward, ranging from 22 to 38 inches annually (Oklahoma Office of the Secretary of Environment 2012).

3.2.8.2.2 Vegetation Communities

Tinker AFB and the surrounding areas, located in a suburban area outside of Oklahoma City, are heavily urbanized with little unimproved green space. As classified within the preliminary Tinker AFB Integrated Natural Resources Management Plan (INRMP), the airfield and adjacent areas of Tinker AFB is covered mostly by fescue and other non-native grasses. The majority of areas outside of the airfield are classified as "improved turf." Other common vegetation community types are mixed native prairie, old world bluestem non-native grassland, and mixed native shrubland (USAF 2012g). The proposed DLA Infill site on Tinker AFB is composed mostly of paved or developed land but has areas of improved turf and mixed non-native vegetation with a small stand of sugarberry mixed forest, floodplain mixed forest, and a pond on the western portion (USAF 2012g).

The BNSF Railyard site was surveyed by Weston Solutions, Inc. (WESTON) in November 2012. The BNSF Railyard property is dominated by perennial ryegrass (*Lolium perenne*), little bluestem, and threeflower melicgrass (*Melica nitens*) in the upland areas, and cedar elm (*Ulmus crassifolia*) in the upland wooded areas. Wetland areas on the BNSF Railyard property is dominated by woollyleaf bur ragweed (*Ambrosia grayi*). Cottonwood trees (*Populus deltoides*) were observed in ephemeral stream and drainage areas. Under the vegetation community classification scheme presented in the Tinker AFB INRMP, the BNSF Railyard site is dominated by the fescue and non-native semi-improved (SI) grassland (40.7 percent).

Vegetation community types found on the Preferred Alternative and Alternative 1 sites are described in Table 3-12. Figure 3-7 shows the identified vegetation communities on Tinker AFB and the proposed project areas. A high resolution map of the vegetative communities on Tinker AFB can be found in Appendix N of the preliminary draft of the Tinker INRMP (not included in this EA).

Table 3-12 Summary of Vegetation Communities

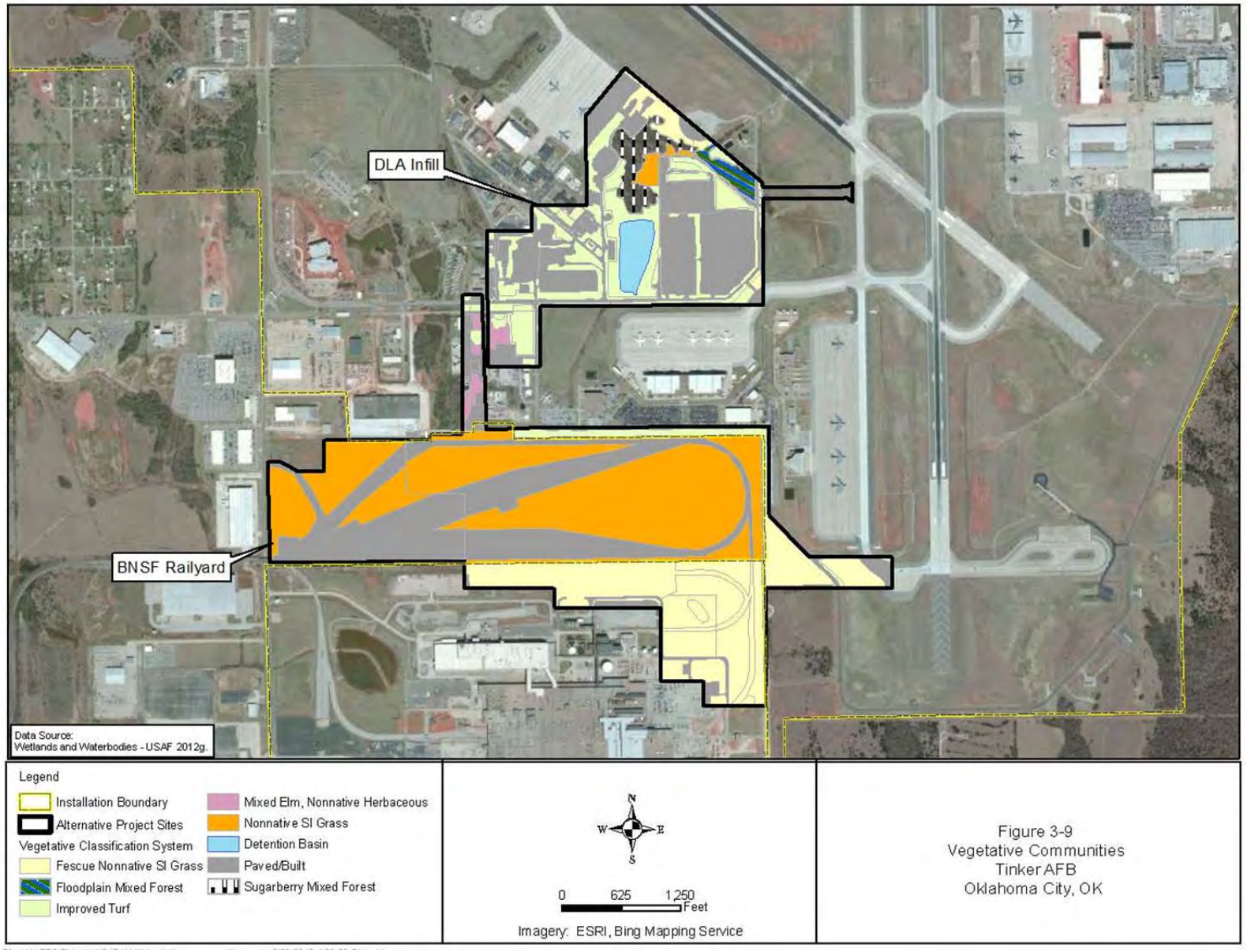
Vegetation Communities	Project Area			
	BNSF Railyard[a]		DLA Infill[b]	
	Area (Acres)	Percent Cover	Area (Acres)	Percent Cover
Fescue Nonnative Semi-improved (SI) Grass	59.1	24.7%	4.8	4%
Floodplain Mixed Forest	0.0	0%	2.9	3%
Improved Turf	6.72	2.8%	35.8	31%
Mixed Elm, Nonnative Herbaceous	1.96	0.8%	1.2	1%
Mixed Native/Nonnative Prairie	0.0	0%	0.4	0%
Nonnative SI Grass	97.31	40.7%	1.9	2%
Open Water	0.0	0%	5.2[c]	5%
Paved/Built	73.64	30.8%	54.3	47%
Red Cedar, Native Herbaceous	0.0	0%	0.0	0%
Sugarberry Mixed Forest	0.49	0.2%	8.2	7%
Total	**239.21**	**100%**	**114.6**	**100%**

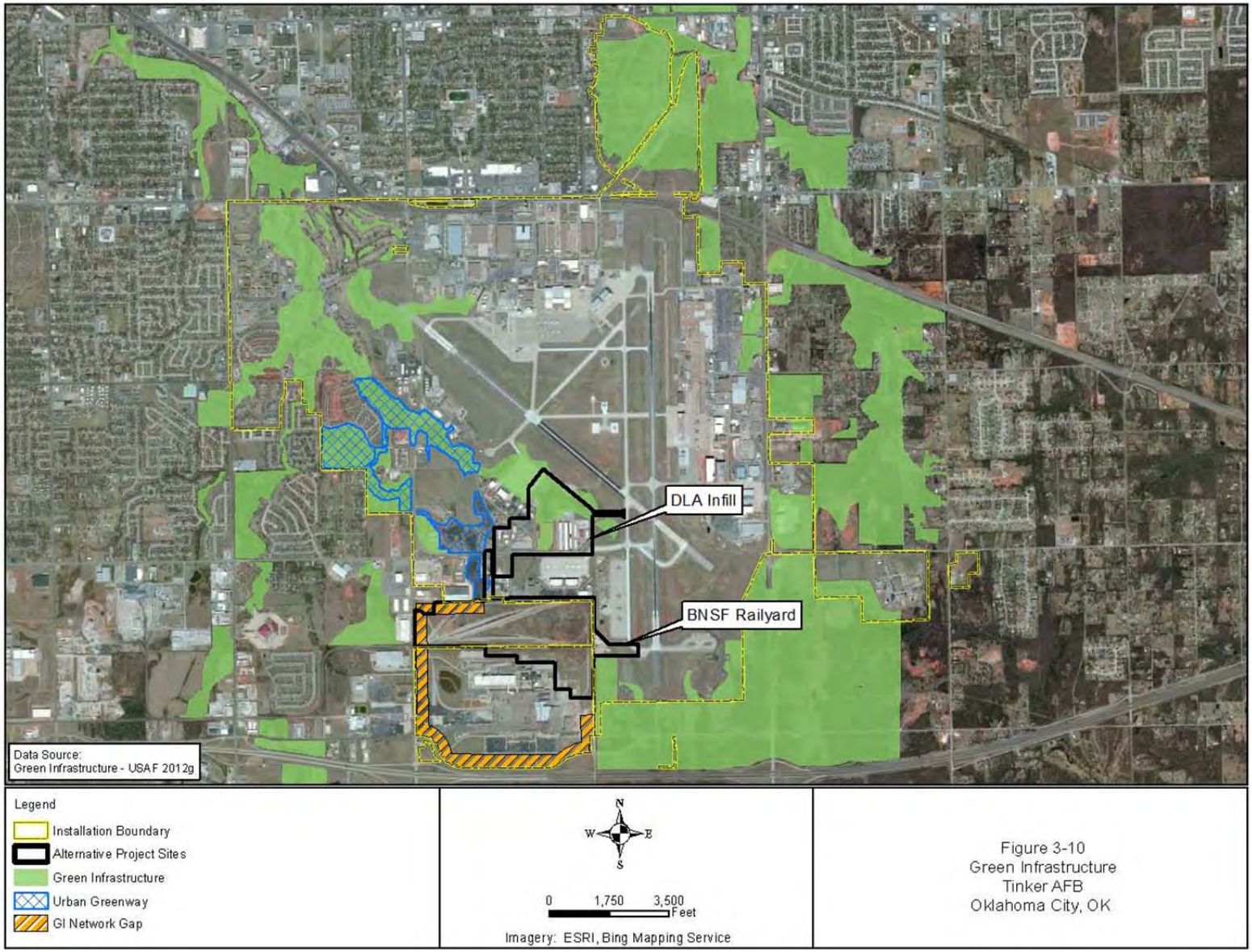
Notes:
AFB = Air Force Base
BNSF = Burlington Northern Santa Fe
DLA = Defense Logistics Agency
INRMP = Integrated Natural Resources Management Plan
SI = Semi-improved
[a] Acreages based on WESTON 2012 site visit
[b] Acreages based on Tinker AFB INRMP (USAF 2012g) and review of aerial photos (Google Inc. 2013)
[c] Open water acreage is based on the Tinker AFB INRMP (USAF 2012g); however this acreage includes a stormwater retention pond that was reengineered in 2011 to drain after rain events, and is now kept dry.

Green Infrastructure

To promote and support many of their missions, Tinker AFB has created a 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" (USAF 2012g). 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. Currently Tinker's GI areas cover 1033 acres of Tinker AFB, or 21 percent of the total base land area (USAF 2012g). Of the two project areas, the DLA Infill site has the most GI area with 44 acres. The BNSF Railyard site has nine acres of area identified as a GI corridor, or an area that

connects areas of the GI. Figure 3-10 shows the current green infrastructure on Tinker AFB.


DLA Infill
BNSF Railyard
Data Source:
Wetlands and Waterbodies - USAF 2012g.
Legend
Installation Boundary
Alternative Project Sites
Vegetative Classification System
Fescue Nonnative SI Grass
Floodplain Mixed Forest
Improved Turf
Mixed Elm, Nonnative Herbaceous
Nonnative SI Grass
Detention Basin
Paved/Built
Sugarberry Mixed Forest
N
W
E
S
0
625
1,250
Feet
Imagery: ESRI, Bing Mapping Service
Figure 3-9
Vegetative Communities
Tinker AFB
Oklahoma City, OK


DLA Infill
BNSF Railyard
Data Source:
Green Infrastructure - USAF 2012g
Legend
Installation Boundary
Alternative Project Sites
Green Infrastructure
Urban Greenway
GI Network Gap
N
W
E
S
0
1,750
3,500
Feet
Imagery: ESRI, Bing Mapping Service
Figure 3-10
Green Infrastructure
Tinker AFB
Oklahoma City, OK

3.2.8.2.3 Wildlife

The wildlife topics discussed in this section are consistent with the preliminary draft of the Tinker AFB INRMP (USAF 2012g). Though the information provided in the INRMP is specific to Tinker AFB, generalizations between the base and the potential project areas that fall at least partially off-site (BNSF Railyard) can be made due to their close proximity to one another, similarities in vegetation types found on each property, and the general mobility of wildlife.

Birds

There are over 400 species of birds known to occur in the state of Oklahoma, 209 of which have been observed on Tinker AFB (USAF 2012g). Seasonal species richness of the Tinker area is greatest in the spring, followed by the summer, autumn, and winter (USAF 2012g). 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 2012a). Bird species found in the Tinker area fluctuate throughout the year as they move in and out of the area along their migratory route (USAF 2012g). The majority of birds observed in the Tinker area are considered migratory and are therefore protected under the Migratory Bird Treaty Act (MBTA) (16 USC §703-712). The most abundant birds observed on Tinker AFB property 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*) (USAF 2012g). Similar species would be expected on the BNSF Railyard site and the DLA Infill properties due to similarities in habitat types.

Fish

Surface water habitat in the Tinker AFB area is located within the Crutcho Creek Drainage Basin (CCDB), as discussed in Section 3.2.7.2.1. Studies of surface waters within the CCDB (outside of Tinker AFB boundaries) identify up to 22 native species of fish (USAF 2012g). Tinker AFB records indicate that there are 30 known species of fish on-base, not including hybridized species and non-native fish stocked in four ponds throughout Tinker AFB as a part of recreational sports activities. Overall these fish populations are stable and species richness has been increasing, while fish kills have been decreasing. None of the stocked ponds fall within the BNSF Railyard or DLA Infill sites, nor is there stream habitat capable of supporting these fish species on the BNSF site. However, surface water on DLA Infill site is known to support at least 8 of these 30 species (USAF 2012g). The overall species richness on base is typical for headwater areas and the species of fish identified outside of Tinker AFB are similar to those identified on-base.; some of which include red shiner (*Cyprinella lutrensis*), sand shiner (*Notropis stramineus*), golden shiner (*Notemigonus crysoleucas*), longear sunfish (*Lepomis megalotis*), bullhead minnow (*Pimephales vigilax*), fathead minnow (*Pimephales promelas*), green sunfish (*Lepomis cyanellus*), and western mosquitofish (*Gambusia affinis*) (USAF 2012g and Marsh-Matthews 2013). A complete list of the 30 species of fish identified on Tinker AFB can be found in Appendix D of the preliminary

draft of the Tinker AFB INRMP (not included in this EA). The Arkansas River shiner (*Notropis girandi*) is identified by USFWS in Cleveland County and threatened (USFWS 2012b). Specific discussion about this species is included below in Section 3.2.8.2.4.

Mammals

There are 36 mammal species known to occur on Tinker AFB, most of which are common throughout the general Tinker AFB area, including the BNSF Railyard and DLA Infill sites (USAF 2012g). Common species include fox squirrels (*Sciurus niger*), eastern cottontail rabbits (*Sylvilagus floridanus*), Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and various rodent species (*Neotoma* spp., *Peromyscus* spp., *Sigmodon* spp., etc.) (USAF 2012g). While white-tailed deer (*Odocoileus virginianus*) populations on-base are limited, the population around Tinker AFB is thought to be increasing (USAF 2012g).

Recent studies concluded that species diversity of mammals was higher within green spaces 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. The Shannon-Wiener Diversity index for mammals and herpetofauna for the Wildlife Reserve Area 1 adjacent to the DLA Infill site was 2.71, while only 1.88 for industrial areas adjacent to the BNSF Railyard and DLA Infill site (Hellgren and Bogosian 2009).

Reptiles and Amphibians

Forty-eight species of reptiles and amphibians, collectively known as herpetofauna, are known to occur on Tinker AFB, including gray tree frog (*Hyla versicolor*), 3-toed box turtle (*Terrapene carolina*), red-eared slider (*Trachemys* [*Pseudemys*] *scripta*), and plain bellied water snake (*Nerodia erythrogaster*) (USAF 2012g). Of these 48 species, only 12 are amphibians. This is likely due to the restrictive habitat requirements of amphibians as well as the secretive nature of most amphibian species. 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. The Texas horned lizard is discussed in more detail in Section 3.2.8.2.5.4. As with mammalian species, herpetofauna were most abundant in green spaces, appearing to avoid airfields and industrial areas on base (USAF 2012g). The Shannon-Wiener Diversity index for mammals and herpetofauna for the Wildlife Reserve Area 1 adjacent to the DLA Infill site was 2.71, while only 1.88 for industrial areas adjacent to the BNSF Railyard and DLA Infill site (Hellgren and Bogosian 2009).

Invertebrates

Invertebrate species on Tinker AFB include both insects and mollusks. There are 129 invertebrate species that have been documented on base, with hundreds of others that could likely be present. Although none of these species are federally- or state-listed as

threatened or endangered, there are several species considered vulnerable by the Tinker AFB Natural Resources Program, including two butterflies, the Arogos skipper (*Atrytone arogos*) and the Ottoe skipper (*Hesperia ottoe*). An introduced invertebrate, the Asiatic basket clam (Family *Corbiculidae*), is known to occur in streams and ponds in the Tinker AFB area. This species has negative effects on aquatic ecosystems throughout the state of Oklahoma (USAF 2012g).

3.2.8.2.4 Threatened and Endangered Species and Species of Special Concern

Tinker AFB has a comprehensive SAR monitoring and management program. SAR determinations are made by Tinker AFB natural resource personnel based on information from a variety of sources, including state and federal wildlife agencies as well as non-governmental organizations. These determinations are used to make informed habitat and wildlife management decisions on Tinker AFB. Though species specific information was not included in the draft INRMP, a total of 48 SAR have been documented on Tinker AFB. While the majority or the SAR species are migratory birds, SAR species known to occur on-base also include five mammals, one amphibian, one fish, and two reptile species. Observations of SAR are more common on-base in the GI habitat and have even been reported on the DLA infill site (USAF 2012g). Though the BNSF Railyard property has not been monitored for the occurrence of SAR, it is known to have observations of Texas horned lizards and other SAR species within close proximity to its boundaries. Based on these observations and the similarity of habitat types found on the BNSF Railyard and Tinker AFB properties, it is likely that SAR species occur in all of these areas.

Federally-listed T&E species are protected under Section 7 of the Endangered Species Act of 1973 (16 USC § 1531 et seq.). A list of T&E species was obtained from the USFWS Southwest Region website. The USFWS lists two threatened species (piping plover [*Charadrius melodus*] and Arkansas River shiner [*Notropis girandi*]) and one endangered species (whooping crane [*Grus Americana*]) for Oklahoma County. For Cleveland County, the USFWS lists the aforementioned species plus the black-capped vireo (*Vireo atricapillus*) and the least tern (*Sterna antillarum*). The Sprague's pipit (*Anthus spragueii*) is also listed as a candidate species in Cleveland County (USFWS 2012b). With the exception of the piping plover, none of these T&E species have ever been observed by biologists on Tinker AFB. This includes the 1995 protected species survey done by Geo-Marine, Inc.; 2010 seasonal inventory of avian species by Virginia Polytechnic Institute and State University; and numerous surveys and general field observations by Tinker biologists since 1989 and USDA Wildlife Service biologists since 2001. No critical habitat for any listed species is on Tinker AFB.

There are currently no state-listed endangered or threatened species identified by the Oklahoma Department of Wildlife Conservation (ODWC) as occurring in Oklahoma or Cleveland Counties. The following is a brief discussion of the rare, threatened, and endangered flora and fauna species known historically from Oklahoma and Cleveland Counties that have the potential to be found on Tinker AFB. A detailed report regarding the potential presence of T&E species habitat on the BNSF Railyard property is provided in Appendix E. It should be noted that the survey and report in Appendix E was

conducted in December 2012, prior to the availability of specific project alternative details. While outdated statements or recommendations may be included in Appendix E, any descriptions of the Preferred Alternative and detail impacts should defer to the text in this EA. The preliminary Tinker AFB INRMP includes a detailed discussion of T&E species and species of concern observed on-base, including on the DLA Infill property. Table 3-13 below shows all state- and federally-listed T&E species known to occur in Oklahoma County.

Table 3-13 Threatened and Endangered Species within Oklahoma and Cleveland Counties

Common Name	Scientific Name	Federal Status	State Status	Cleveland County	Oklahoma County	Suitable Habitat Occurrence in the Proposed Project Areas	Potential Species Presence
BIRDS							
Black-capped Vireo	*Vireo atricapillus*	E	--	X	--	**No**—there is no upland deciduous scrubland habitat of the quality preferred by this species on the project sites.	Not Likely in Project Area
Least Tern	*Sterna antillarum*	E	--	X	--	**No—**there are no large rivers, lakes, or reservoirs on the project sites.	Possible Transient over Area
Piping Plover	*Charadrius melodus*	T	--	X	X	**No—**there are no mudflats, sandy beaches, large wetlands, rivers, lakes, or reservoirs on project sites.	Possible Transient over Area
Sprague's Pipit	*Anthus spragueii*	C	--	X	--	**No**—there is no upland prairie grasslands, and the species is sensitive to patch size and avoids edges.	Not Likely in Project Area
Whooping Crane	*Grus americana*	E	--	X	X	**No—**there are no large shallow wetlands, rivers, reservoirs, lakes, or wet prairies on the project sites.	Possible Transient over Area
FISH							
Arkansas River shiner	*Notropis girandi*	T	--	X	X	**No** – there are no shallow channels of wide sandy prairie rivers of the Arkansas River system on the project sites.	Not Likely in Project Area

Source: USFWS, 2012b; ODWC, 2012a
Notes:
Although the proposed sites are located only in Oklahoma County, they are about one mile from the Cleveland County line; therefore, Cleveland County T&E species were included in this assessment
-- = not likely to be present
T = Threatened
E = Endangered
C = Candidate Species, proposed for listing
X = likely to be present

Black-capped Vireo

Black-capped vireos (*Vireo atricapillus*) are federally-listed as endangered with two known populations of in Oklahoma; one in the Wichita Mountains of northern Comanche County and another in the canyon lands of northern Blaine County. They are summer residents through Oklahoma and prefer low brushy thickets or rangelands with scattered clumps of shrubs separated by open grassland areas. Habitat loss is the primary threat to this species for two primary reasons: (1) low growing woody cover required for nesting

has been cleared and/or overgrazed by livestock, and (2) range fires that kept rangelands open have been suppressed (ODWC 2012b).

Although the black-capped vireo is listed as endangered in Cleveland County (Oklahoma/Cleveland County line located approximately one mile south of project sites), Tinker AFB does not have black-capped vireo habitat (i.e., high quality upland deciduous scrubland habitat) at the project site on the base. While it is possible this species could migrate across the base, stopovers would be highly improbable as there is no suitable habitat in the project area.

Least Tern

The least tern (*Sterna antillarum*) is a summer resident within Oklahoma breeding from mid-May to late August (ODWC 2012b). They are typically occurring along large rivers, lakes, and reservoirs. The species requires bare sand or gravel for nesting and can form breeding colonies ranging from two to twenty pairs.

Although the tern is listed as endangered in Cleveland County (Oklahoma/Cleveland County line located approximately one mile south of project sites), Tinker AFB does not have least tern habitat (i.e., large rivers, lakes, or reservoirs) on the base. The largest waterbody on Tinker is 3.5 acres. However, least terns have been documented at the 2900-acre Stanley Draper Lake approximately one mile to the southeast of Tinker AFB. While it is possible that the least tern could also utilize large graveled roof tops on base, no least terns have been observed on-base. Therefore, it is possible this species could migrate across the base, but without suitable habitat, stopovers would be highly improbable.

Piping Plover

The piping plover (*Charadrius melodus*) is a spring and fall migrant through Oklahoma with recorded sightings in April through May and July through late September (ODWC 2012b). The species is typically observed on mudflats, sandy beaches, along shallow wetlands with sparse vegetation, and along the margins of lakes and large rivers where there is exposed sand or mud.

The piping plover has been documented on the base by a single recorded, and USFWS-validated, occurrence. On 11 May 2009, USDA biologists found the partial remains of a piping plover on Runway 18/36. It was presumed to have been struck by an aircraft. Its occurrence was considered an aberration since 1) USDA biologists had been conducting spring bird hazing/surveys on the airfield on a daily basis for several years, and this was the first time this species had been observed on the base and 2) because the base does not provide suitable habitat for this species. Furthermore, that same year, Virginia Tech, under contract to conduct base-wide seasonal bird inventories, had completed their spring survey in early May, and six sample sites on the airfield movement area yielded no piping plover or other T&E species sightings. Although it is not uncommon to see shorebirds on wet runways and grassy areas of Tinker's airfield in spring months, this piping plover

was considered a rare transient. To date, there have been no other sightings of this species on Tinker AFB.

Suitable habitat for this species exists at Stanley Draper Lake approximately one mile to the southeast of Tinker AFB. Though it is possible this species might stopover on Tinker AFB property during migration, it is more likely that it would utilize Stanley Draper Lake for stopover habitat.

Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) is a candidate species for federal listing as either threatened or endangered in Cleveland County (USFWS 2012d). The Sprague's pipit is a spring and fall migrant through Oklahoma and can be a winter resident in some areas of Oklahoma. It prefers uplands prairies and grasslands that are regularly disturbed, by mowing or grazing; although, the Sprague's pipit will not utilize these grasslands until an intermediate height is reached. The base is located within the range of this species' migration corridor (Jones 2010). No suitable habitat is located on base as the Sprague's pipit is also sensitive to patch size and avoids edges (like developed areas on the base). Though possible, it is unlikely that this species would stopover on Tinker AFB property during migration.

Whooping Crane

The whooping crane (*Grus americana*) is a spring and fall migrant most commonly observed in the western half of Oklahoma on the western side of Interstate 35 and east of Guymon in the panhandle (ODWC 2012b). They are typically observed in shallow wetlands; marshes; along the margins of ponds and lakes; sandbars and shorelines of shallow rivers; wet prairies; and crop fields near wetlands.

Due to lack of habitat on Tinker AFB, it is highly improbable this species would stopover on the base. However, suitable habitat for this species does exist at Stanley Draper Lake approximately one mile to the southeast of Tinker AFB. This lake is more likely to be used as stopover habitat.

Arkansas River Shiner

There is no suitable habitat for the Arkansas River shiner located on Tinker AFB or on the BNSF Railyard or DLA Infill sites. Tinker AFB and the potential project areas fall within the Northern Canadian River system, not the Arkansas River system where the shiner is known to occur.

3.2.8.2.5 State Species of Special Concern

In addition to the federally-listed species above, additional species of special concern were identified in the preliminary draft INRMP (USAF 2012g). These species are not listed as T&E species for the Tinker AFB area, but may be candidate species for listing in the future. Appropriate habitat for several of these species of concern exists on Tinker

AFB, the proposed sites, or immediately surrounding areas, as detailed in Table 3-14 and the text below.

Table 3-14 State Species of Concern

Common Name	Scientific Name	Federal Status	State Status	Suitable Habitat Occurrence in the Project Area	Potential Species Presence
BIRDS					
Barn owl	*Tyto alba*	--	SOC	**Yes** – typically hunt in open areas above grasslands, marshes, or agricultural fields, and nests/roosts in tree cavities or man-made structures (barns or silos).	Possible Resident
Bell's Vireo	*Vireo belli*	--	SOC	**Yes** – dense, low, shrubby vegetation. Generally in riparian areas, brushy fields, second-growth forest, scrub oak, coastal chaparral, and mesquite brush lands. Often near water in arid regions.	Possible Summer Resident
Burrowing Owl	*Athene cunicularia*	--	SOC	**Yes** – dry, open areas with short grass and no trees. Found on golf courses, cemeteries, airports, vacant lots, and pastures.	Possible Migrant
Loggerhead Shrike	*Lanius ludovicianus/ L. ludovicianus migrans*	--	SOC	**Yes** – open land with short vegetation such as pastures, lawns, and freshly plowed fields. Nest in dense, brushy vegetation.	Possible Summer Resident
Swainson's Hawk	*Buteo swainsoni*	--	SOC	**Yes** – open country such as grassland, shrub land, and agricultural areas.	Possible Summer Resident
REPTILES					
Texas Horned Lizard	*Phrynosoma cornutum*	--	SOC	**Yes** – typically associated with arid habitats but also found in prairies, woodland margins, and shrublands with abundant grasses and forbs.	Possible Resident*

Source: USAF 2012g

Notes:

SOC = Species of Concern

* While the Texas Horned Lizard is known to occur on base, no individuals have yet been documented in the project area, therefore it is a possible resident in the project area.

Barn Owl

The barn owl (*Tyto alba)* is a year-round resident of the region that prefers to hunt in open grasslands, pastures, marshes, and agricultural fields. The barn owl nests in hollow trees, barns, grain silos, steeples or other man-made structures. In Oklahoma, they are often found in close association with man (ODWC 2013). This species has been documented on Tinker AFB, and appropriate habitat for this species was observed on the

BNSF Railyard and DLA Infill sites in undeveloped brush land areas and the urban developed areas.

Bell's Vireo

The Bell's vireo (*Vireo belli*) is a summer resident that prefers areas with dense, low, shrubby vegetation, especially in riparian areas within early successional stages or in young, second-growth forest (Cornell 2012). They are also known to occur in areas of coastal chaparral, mesquite-brush lands, and in arid areas near water. This species has been documented on Tinker AFB, and appropriate habitat for this species was observed on the BNSF Railyard and DLA Infill sites in undeveloped brush land areas during WESTON's November 2012 site visit.

Burrowing Owl

The burrowing owl (*Athene cuniculara*) is another winter migrant that travels through the western half of Oklahoma (Cornell 2012), found most commonly in the panhandle (ODWC 2012b). The species inhabits dry, open areas with short grass and no trees. They have been observed on golf courses, cemeteries, airports, vacant lots, and pastures. Burrowing owls build their nests in burrows in the ground, either digging their own or using burrows dug by other burrowing creatures (Cornell 2012). A study conducted in 2007 and 2008 found that there was no significant association between the habitat selected by burrowing owls and the soil type, though more burrows were observed in loamy sand and sandy soils (Larson 2009). Another study found that soil texture can affect the distribution of key mammal species that dig the burrows that the owls use. Sandy soils seemed to have a higher density of owls than silt loam soils (Larson and Sayler 2011). This species has been documented on Tinker AFB, and appropriate habitat for burrowing owls was observed on the BNSF Railyard site during WESTON's November 2012 site visit. Based on a review of the Tinker AFB INRMP and aerial photographs, there is no habitat for the burrowing owl believed to exist on the DLA Infill site as there does not appear to be sufficient open grassland habitat.

Loggerhead Shrike

Loggerhead shrikes (*Lanius ludovicianus*) and the migrant loggerhead shrike (*Lanius ludovicianus migrans*) can be found in Oklahoma throughout most of the year and are most commonly observed in open woodland areas (Cornell 2012). The species can also be observed along roads perched on fences or utility lines (Indiana Department of Natural Resources 2012). They eat a wide variety of animals including small mammals, snakes, frogs, and insects, often hanging their prey by impaling them on thorns or barbed wire fences before eating, giving them the nickname "butcher birds". Suitable habitat for the species is located throughout Tinker AFB and on the BNSF Railyard and DLA Infill sites along roadsides and in undeveloped areas with suitable vegetation and structures for perching, and therefore, the loggerhead shrike may occur in the project area.

Texas Horned Lizard

The Texas horned lizards (*Phrynosoma cornutum*) are classified as a species of special concern by the ODWC. Under Oklahoma Administrative Code (OAC 800:25-7-8), a year-round closed season was established in 1992 on the Texas horned lizards making it illegal to kill, capture, keep, or sell this species without ODWC permission. Although this species is typically associated with arid habitats, they can live in a variety of habitat types, including prairies, woodland margins, and shrublands with abundant grasses and forbs (ODWC 2012c). While the Texas horned lizard is common in regions of western Oklahoma, its range and population have both decreased dramatically since the 1960s.

A healthy population of Texas horned lizards are known to occur on Tinker AFB (estimated 33 individuals), primarily in the southwestern corner of the base with isolated pockets in the southeast and northern areas (USAF 2012g; Moody 2014). Over a nine year period (2003-2012) multiple cooperative research efforts were conducted on Tinker AFB. Findings indicated that the Texas horned lizard typically utilizes a mosaic of vegetation. This species mates in May, nest in June, with hatchings occurring in July to August with an average clutch size of 17 eggs with varying survival rates (0.38-0.77; USAF 2012g). However, the survival rate has been decreasing for the last nine years with the lowest survival rate of 0.25 in 2013 (Talbott and Hellgren 2012). Additionally, survival rates of translocated lizards were much lower (of 17 individuals, only 3 survived the first year). The home range of the lizard is typically 1-2 acres and is dependent on bare ground, ground cover, and availability of food source, typically ants (*Crematogaster, Phiedole, Fomica*) (USAF 2012g). It should also be noted that the Texas horned lizard is a cryptically pattern species. Additionally, while the populations can remain viable in fragmented urbanized habitats, the species appears to be directly affected by the amount, or subsequent decrease, of available habitat (Talbott and Hellgren 2012).

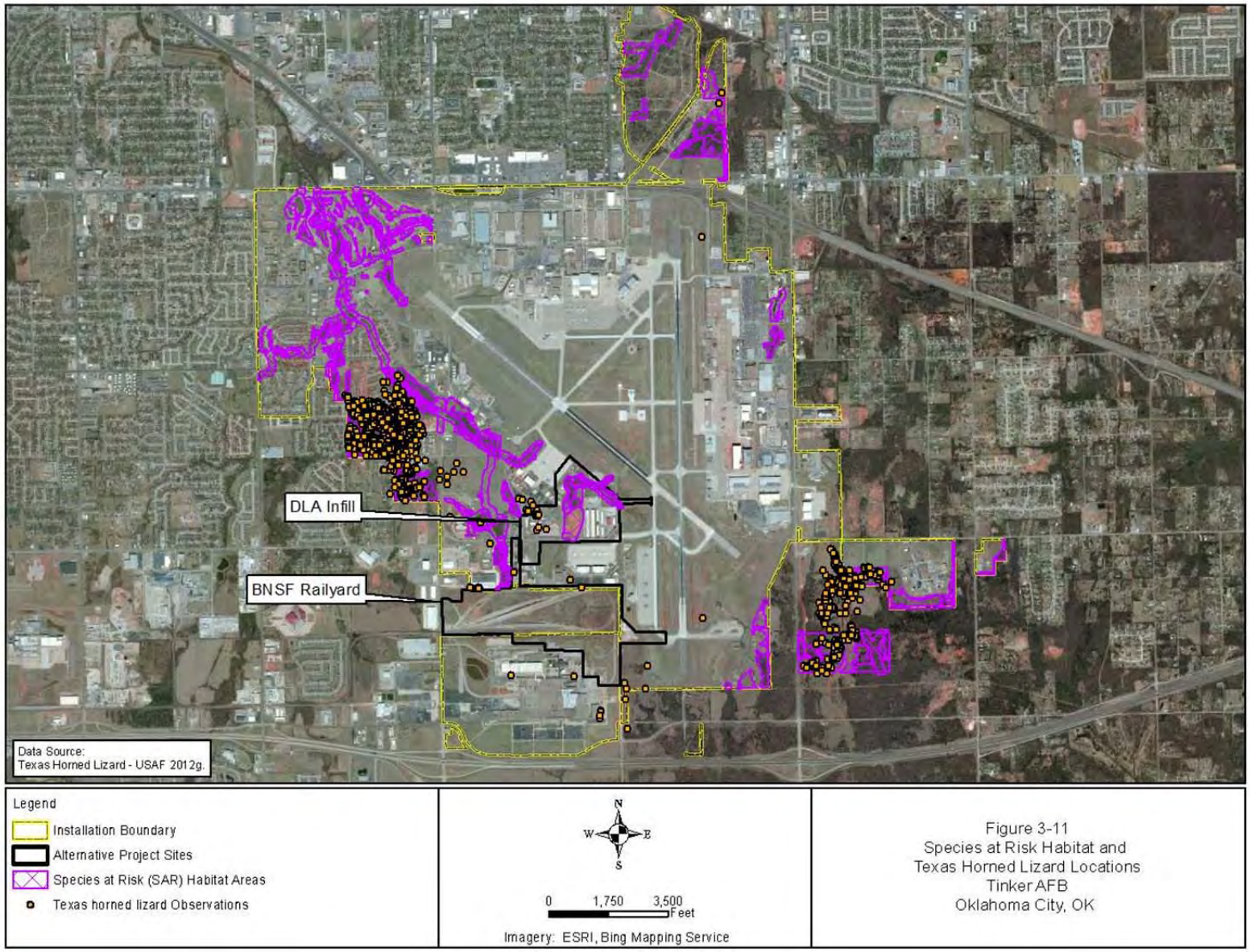
According to Tinker AFB personnel, three live Texas horned lizards were found inside the wall of a parking lot next to a warehouse located immediately north of the BNSF Railyard site (Moody 2012). It is believed that the lizards may have come from the adjacent habitat on the BNSF Railyard site to the south of the warehouse (Building 812). During the November 2012 survey, WESTON personnel observed areas of suitable habitat throughout undeveloped areas of the BNSF Railyard property. Grassy areas with sparse woody vegetation were observed throughout the site. However, based on the information provided by Tinker AFB personnel, it is believed that, if the species is using BNSF Railyard property, the horned lizards would most likely use the habitat on the northern and western portions of the property as these areas are closer to existing habitat and the GI on Tinker AFB. While there have been no reported sightings of horned lizards on BNSF Railyard property, there have been two sightings on the TAC property just south of the BNSF Railyard property. Based on a review of aerial photographs and the Tinker AFB INRMP, the Texas horned lizards are not residents of the DLA Infill site. However, several individuals have also been observed along the southwestern boundary of the DLA Infill site (Buildings 1104, 1122, 1128, and 1126), likely from adjacent habitat for the species, 0.3 miles to the west of the DLA Infill site (Parsons 2002). Ongoing monitoring of the Texas horned lizard has indicated that this species often

wanders into edge habitat, developed areas, or otherwise unsuitable areas from nearby adjacent suitable habitat (Moody 2013). Figure 3-11 shows the areas of Tinker AFB where Texas horned lizards have been observed, as reported in the preliminary INRMP.

3.2.8.2.6 Migratory Birds

Migratory birds are protected by the MBTA (16 USC §703) as well as EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). Illegal actions against migratory bird species are defined by the MBTA as any "attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof" (USFWS 2012a). Approximately one mile southeast of Tinker AFB is Stanley Draper Lake (Figure 1-1), which provides attractive nesting, roosting, hunting and stopover habitat to migratory birds. As discussed in the Tinker AFB INRMP, the base may be in route to Stanley Draper Lake for migratory birds, and 209 bird species have been documented on Tinker AFB (USAF 2012g). As listed previously, the six most abundant bird species identified in a 2010 study were the eastern meadowlark, Franklin gull, European starling, mourning dove, northern cardinal, and the barn swallow. Tinker AFB maintains a migratory bird depredation permit issued through USFWS to conduct intentional takes of migratory birds for the purposes of wildlife control under the Bird/Wildlife Aircraft Strike Hazard (BASH) program. The BASH program is discussed further in Section 3.2.9.

It is possible some migratory species might stopover on Tinker AFB property during migration. As nesting sites for some species of migratory birds can change from year to year, nests for migratory birds could be constructed within the survey area during future breeding seasons. However, no active nests were observed during WESTON's November 2012 site visit to Tinker AFB and the BNSF Railyard site.


DLA Infill
BNSF Railyard
Data Source:
Texas Horned Lizard - USAF 2012g.
Legend
Installation Boundary
Alternative Project Sites
Species at Risk (SAR) Habitat Areas
Texas horned lizard Observations
N
W
E
S
0
1,750
3,500
Feet
Imagery: ESRI, Bing Mapping Service
Figure 3-11
Species at Risk Habitat and
Texas Horned Lizard Locations
Tinker AFB
Oklahoma City, OK

3.2.9 Bird/Wildlife-Aircraft Strike Hazard Program

Along with the Natural Resources Program, Tinker AFB manages its avian species under a BASH Program through the base's safety office. The primary species controlled under Tinker AFB's BASH program are Canada geese (*Branta canadensis*), egrets (*Egreta* spp., *Ardea* spp., etc.), gulls (*Leucophaeus* spp., *Larus* spp., etc.), rock doves (*Columba livia*), European starlings, herons, waterfowl, and non-avian species such as beavers (*Castor canadensis*), and coyotes (*Canis latrans*). Control of wildlife species on Tinker AFB for the purposes of BASH is generally limited to habitat management and harassment techniques, though sometimes the use of lethal control measures is required. Tinker AFB maintains a depredation permit for the take of these problematic species (USAF 2012g).

3.2.9.1 Definition of Resource

Bird and wildlife strikes by aircraft constitute a safety concern because of the potential for damage to aircraft, injury to aircrews, or local populations if an aircraft strike and subsequent aircraft accident should occur in a populated area. Also, if the frequency of bird strikes were high, certain bird species populations might be reduced.

3.2.9.2 Existing Conditions

Over 95 percent of reported bird strikes occur below 3,000 ft AGL. Approximately 50 percent of bird strikes occur in the airport environment and 15 percent during low-level cruise (AFSEC 2012). Table 3-15 contains the distribution of Air Force-wide wildlife strikes by altitude. Tinker AFB, like all Air Force installations with a flying mission, report bird strike data to the Air Force for use in calculating the data in Table 3-15. Historically, one-half of one percent of all reported bird/wildlife-aircraft strikes involving Air Force aircraft resulted in a serious mishap.

Table 3-15 US Air Force Wildlife Strikes by Altitude

Altitude (feet AGL)	Percent of Total
0	22.37%
0-99	16.03%
100-199	5.62%
200-299	5.19%
300-399	2.02%
400-499	9.47%
500-599	1.81%
600-699	1.65%
700-799	2.11%
800-899	0.71%
900-999	8.78%
1,000-1,499	7.64%
1,500-1,999	7.06%
2,000-2,499	2.21%
2,500-2,999	3.32%
3,000-3,499	0.61%
3,500-3,999	0.89%
4,000-4,499	0.26%
4,500-4,999	0.57%
5,000 and greater	1.67%

Source: AFSEC 2012
Note: AGL – above ground level

Table 3-16 lists the Tinker AFB bird/wildlife-aircraft strikes rates for the period 2003-2012; Table 3-17 presents the Tinker AFB bird-aircraft strikes by the time of day; and Table 3-18 summarizes the number of bird-aircraft strikes by month for the period 2007-2012. None of the Tinker AFB bird-aircraft strikes has resulted in a Class A mishap (USAF 2012i).

Table 3-16 Historic Tinker AFB Bird-Aircraft Strike Rates

Year	Rate
2003	11.0
2004	9.5
2005	6.4
2006	5.3
2007	6.1
2008	12.0
2009	8.5
2010	3.9
2011	4.9
2012	4.2

Source: USAF 2012i
Note: Rate is based on the number of strikes per 10,000 aircraft operations.

Table 3-17 Aircraft Strikes by Time Blocks

	Time Block				
Year	12:00 a.m.-5:59 a.m.	6:00 a.m.-11:59 a.m.	12:00 p.m.-5:59 p.m.	6:00 p.m.-11:59 p.m.	Unknown
2007	1	3	6	9	1
2008	0	4	9	19	8
2009	0	5	6	11	4
2010	0	2	3	3	1
2011	0	1	7	4	1
2012	0	4	6	7	7

Source: USAF 2012i

Table 3-18 Bird-Aircraft Strikes by Month

	Year						
Month	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Total**
January	0	0	1	1	2	0	4
February	1	0	1	1	0	0	3
March	3	0	3	3	2	3	14
April	4	6	2	0	1	2	15
May	3	8	6	1	2	4	24
June	1	3	3	0	1	3	11
July	3	2	3	0	1	6	15
August	2	6	4	0	1	2	15
September	1	6	0	1	0	1	9
October	2	5	3	3	6	0	19
November	0	4	1	1	3	2	11
December	0	0	0	1	0	0	1
Total	**20**	**40**	**27**	**12**	**19**	**23**	**141**

Source: USAF 2012i

AFI 91-202 (The US Air Force Mishap Prevention Program) requires that Air Force installations supporting a flying mission have a BASH plan for the base. The Tinker AFB plan provides guidance for reducing the incidents of bird strikes in and around areas where flying operations are being conducted. The plan is reviewed annually and updated as needed. Appendix C contains guidance regarding the Bird Avoidance Model and the Aviation Hazard Avoidance System. Collisions between aircraft and birds are an inherent risk. However, aircrews use guidance and procedures contained in the Tinker AFB BASH Plan, which uses data from the Bird Avoidance Model, to minimize the potential for bird-aircraft strikes.

3.2.10 Cultural Resources

3.2.10.1 Definition of Resource

Cultural resources are structures, buildings, archaeological sites, districts (a collection of related structures, buildings, and/or archaeological sites), cemeteries, and objects that may be classified as archaeological or non-archaeological. Archaeological resources are defined as being minimally 50 years old and are characterized by the physical remains, often fragmentary and sometimes buried, of past human activities. Archaeological resources may be associated with the prehistoric period (i.e., before written records), the historic period, or both. Non-archaeological resources date to the historic period and include recognizable buildings, structures, and objects and are often associated with substantial archival information or oral history data.

Federal laws, including both NEPA and the NHPA, require consideration of cultural resources during project planning. Compliance with the NHPA requires consultation with the SHPO and/or federally recognized tribes to determine the undertaking's effects on cultural resources. If a cultural resource is determined by the SHPO to be eligible for listing in the National Register of Historic Places (NRHP), it is then considered to be a Historic Property. Historic Properties may be prehistoric archaeological, historic archaeological, or historic non-archaeological in character.

The Area of Potential Effects (APE) for cultural resources is defined by 36 CFR 800.16(d) as "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." The APE includes all locations where the undertaking may result in disturbance of the ground, all locations from which elements of the undertaking may be visible, and all locations where the undertaking may result in changes in traffic pattern, land use, public access, etc. Tinker AFB, in consultation with the Oklahoma SHPO, has defined the APE for the proposed construction of the KC-46A Depot Maintenance facilities as extending one-half mile (2,640 ft) from the boundary of each construction site and/or land acquisition site.

3.2.10.1.1 Temporal Context for Cultural Resources

Tinker AFB is located in the south central Oklahoma archaeological region. Important research into the prehistory of central Oklahoma is detailed by Wyckoff and Brooks (1983), Bell (1984), and Hofman et al (1989). In this region, 12,000 to 14,000 years of human occupation are divided into five main periods: the Paleoindian, the Archaic, the Plains Woodland Period, the Plains Village Period, and the Historic Period.

Paleoindian period

The Paleoindian Period represents the oldest, undisputed occupation in the Oklahoma area. This period roughly dates from 12,000 to 6,000 years before present (BP) and is represented by small nomadic bands of people hunting the now extinct megafauna of the Pleistocene era such as mammoth and bison and to a lesser extent, the exploitation of various wild plant resources (although this is poorly documented in the region). These groups tended to be highly mobile and consisted of egalitarian bands (Bell 1984; Wyckoff and Brooks 1983). Several sites from western Oklahoma provide some insight into the life ways of these early North American inhabitants. These sites include the Domebo site described by Leonhardy (1966), the Perry Ranch Site (Saunders and Penman 1979) and the Cooperton Site (Anderson 1975). The Paleoindian Period is represented by scattered surface discoveries of distinctive fluted, lanceolate points (such as Clovis, Folsom, and various Plano points) in Lincoln, Seminole, Coal, Pottawatomie, Cleveland, and Oklahoma Counties suggesting a paleo presence in the central Oklahoma region (Drass 1979).

Archaic Period

The Archaic Period in this region of Oklahoma dates from approximately 6,000 BP to Anno Domini (AD) 1 and is characterized by an intensification and increased efficiency of hunting and gathering. These peoples were organized into nomadic and semi-nomadic groups who most likely established base camps in order to centralize various activities (Hofman et al. 1989; Wyckoff and Brooks 1983).

Additionally, Archaic peoples lived in larger groups than during the Paleolithic period and exploited a more broad use of resources which included the hunting of large and small mammals, birds, and the harvesting of aquatic resources, as well as an increase in the utilization of wild plant resources. This is evidenced by the increased variety of the artifact assemblage such as large or medium size dart points, along with scrapers, bifaces, and ground stone tools. Other artifacts such as worked bone, boatstones, and gorgets appear with less frequency (Hofman et al. 1989; Wyckoff and Brooks 1983). Sites typical to the Archaic tend to be small camps of special activity centers (lithic procurement or food processing sites for example).

Many sites in the area have been found that date to the Archaic, but the time period is not well understood owing to the high level of regional variability. In this area of Oklahoma, Archaic manifestations include the Grove I and Grove II foci of Northeastern Oklahoma (Purrington 1971), the Wister Phase (Bell 1980; Galm and Flynn 1978) in the southeast, and the Summers Complex (Leonhardy 1966) in the west.

The Plains Woodland Period

The Plains Woodland Period, dating from approximately AD 1 to AD 900 is characterized by cultural influences from Kansas and Missouri, notably the appearance of cordmarked and sand tempered plain ceramics in central Oklahoma, as well as zoned and stamped wares in northeastern Oklahoma. These groups had semi-nomadic to semi-sedentary mobility patterns as evidenced through the presence of storage pits and post holes (as well as the presence of pottery). Faunal remains indicate a shift to the hunting of smaller game such as deer over larger game such as bison and the continued use of plant resources is evidenced from the abundance of grinding implements, and stone and shell hoes (Hofman et al 1989; Wyckoff and Brooks 1983). Also entering into the artifact assemblage are small corner notched projectile points, often preceding the introduction of pottery. Sites characteristic of this period in this south central Oklahoma include the Brewer (Duffield 1953) and the Pruitt (Barr 1966) sites, while Woodland sites in north Central Oklahoma include the Hammons (Young 1977), Von Elm (Hartley 1974), and Vickery (Rohrbaugh 1974) sites. Northeastern Oklahoma during the Woodland Period is defined by the Delaware A focus (Purrington 1971).

The area of southeastern Oklahoma, at this time, was beginning to see an influence of new ideas from the southern Gulf States (Schambach 1970). These influences, referred to as the Trans-Mississippi South Tradition (Schambach 1970) are characterized by thick plainware pottery and small corner notched projectile points. Although little evidence for cultivation has been found in southeastern Oklahoma, possible cultivation in the form of

squash, beans and maize may have taken place during the Woodland Period. An overall trend towards the diversification of resource exploitation and increasing sedentisim is represented by the Fourche Maline phase in Oklahoma (Bell 1980; Galm and Flynn 1978).

Plains Village Period

The Village Period begins approximately AD 900 and continues into the Historic Period beginning around AD 1500 and is characterized by a dramatic increase in sedentary and semi-sedentary horticulturists to the region. This is the most well-known and extensively studied prehistoric cultural tradition in the central Oklahoma area. The villages during this time tended to be small in size and had extensive, continuous occupations. Subsistence strategies focused on small scale farming supplemented with the collection of wild plants and the hunting of large game, especially bison (Hofman et al 1989; Neal 1988; Wyckoff and Brooks 1983).

The area to the east, in the Arkansas River Valley, is characterized by the development and increased reliance of agricultural activities, increases in population, and a settlement pattern consisting of small farmsteads and hamlets that supported large ceremonial centers. Three phases characterized this area and time: the Harlan, Spiro, and Fort Coffee (Brown, Bell and Wyckoff 1975). These phases mark the development and eventual decline of this pattern of subsistence and its relation to the Caddoan peoples to the east and south.

To the west, the Plains Village complex is evident. This complex is represented by the Custer and Washita River phases and is characterized by site scattered along the Washita and Canadian rivers. Both phases show a close relationship with the previous Plains Woodland phase. Hofman (1975) suggests the Custer and Washita phases represent a single tradition of semi-sedentary horticulturists, represented by sedentary occupation of villages or hamlets during the planting season followed by hunter/gathering at other times of the year.

Historic Period

The historic period in this part of Oklahoma begins roughly 400 years ago and, following Lintz (1982), can be broken into four sub-periods for purposes of description. The first period is called the Exploration and Trade period and dates from 1541-1803. The first contact between Europeans and the indigenous groups takes place during the Exploration and Trade period. This period also saw the establishment of French dominance in the area facilitated by trade with the Wichita, Caddo, and Osage. The second period, known as the Early Indian Removal sub-period, dates from 1803-1865 and is characterized by the transfer of the Robinson Creek Watershed from the Osage with the goal of relocating the Creek Nation. Following this, the Late Indian Removal sub-period (1865-1891) saw the Creek Nation, owing to its support of the Confederacy during the Civil War, cede the western portion of its territory to US control. The Sac and Fox Indians were relocated to the Robinson Creek Drainage area (between the Cimarron and North Canadian Rivers) in 1867. Several years later in 1889, the Unassigned Lands to the west were opened up to

Non-Indian settlement through the Springer Amendment. Also in 1889, the Indian Appropriation Bill coerced Indian groups to accept individual land allotments and to sell surplus lands to the US government. Towards the end of the Late Indian sub period, the Sac and Fox lands were opened up to the Oklahoma Land Rush in the early 1890's. The last historic sub-period is termed the Euro-American Settlement and dates from roughly 1891 to the present. This period is characterized by the opening of the region to settlement, the establishing of the Oklahoma Territory by the Organic Act of 1890 and the establishment of various European settlements in the area.

Oklahoma County itself was established in 1890 out of the Unassigned Lands and was originally designated as County Two, but later named after Oklahoma City. Originally acquired as a part of the Louisiana Purchase of 1803, Oklahoma was frequently visited by fur traders, and in the spring of 1823, frontier trader Thomas James reached the North Canadian River area near present day Oklahoma City. In 1832, trader and noted author Washington Irving traversed the Oklahoma County area on his way back to Fort Gibson, which he described in his work *A Tour of the Prairies* (1835) (Wilson 2012).

The Osage tribe ceded the area north of the Canadian River, part of which was used for the relocation of the Creek and Seminole who were forcibly removed from the southeastern United States in the 1820's and 1830's. Following the Civil War, the Creek and Seminole ceded their land as called for by the Reconstruction Treaties of 1866. These vacated lands became known as the Unassigned Lands which were opened up to Anglo settlers in the Oklahoma Land Run of 1889 (Wilson 2012).

Prior to the 1889 Land Rush, the Southern Kansas Railway (later known as the Atchison, Topeka and Santa Fe Railway) constructed a line from the Kansas-Oklahoma border through present Oklahoma County. A watering stop for steam engines was established in 1887 at the North Canadian River. This stop was known as Oklahoma Station, and changed to Oklahoma Station late that year before finally being renamed Oklahoma City in 1923 (Wilson 2012).

It is estimated that 50,000 settlers participated in the opening of the Unassigned Lands in 1889, with many claiming lands near the established railroads. This led to Oklahoma City becoming a city of 6,000 people overnight on April 22, 1889. One year later in 1890, the Organic Act established seven counties in Oklahoma, with present day Oklahoma County being designated as County Two and Oklahoma City being selected as county seat (Wilson 2012).

Early in Oklahoma County history, the economy was primarily based on agriculture with principal crops being cotton, wheat, corn, oats, Kaffir corn, potatoes, alfalfa, hay, and sorghum. By 1908, approximately 160,000 acres of Oklahoma County were under cultivation. Livestock and poultry development were also important to the economy of the area during this time. Also in 1908, Oklahoma County had a total of four brick plants, three flour mills, two cotton oil mills, a cotton compress, and a meat packing plant, among other industries. Between 1917 and 1919, geologists determined that the area around Oklahoma City were favorable for the presence of oil and gas deposits, although the petroleum industry did not take off in the area until the Oklahoma City

Discovery Well in 1928. By the 1930's, hundreds of wells were operating in the area with twelve oil refineries and fifty oil companies being located in Oklahoma City (Wilson 2012).

More recently, Oklahoma City has become a transportation hub. Following the establishment of the railroad in the late 1800's and early 1900's roadways were constructed to accommodate the increasing popularity of the automobile, and by the 1920's the airline industry began to become an important part of the region (Wilson 2012).

Tinker Air Force Base represents one of the largest and most important military installations in the United States. Plans for the establishment of the installation began in late 1940, with construction starting on July 30, 1941. By 1943, the base was a major producer of aircraft and for aircraft maintenance and the installation expanded. During World War II, the air base employed thousands of Oklahomans and military personnel from across the United States. At its employment height, the base had 13,500 workers with another 23,000 working for Douglas Aircraft, of which nearly half were women. During this time Douglas employees produced more than 5,000 C-47s for the war effort and at one time were constructing 13 Skytrains per day. At the same time, workers at Tinker repaired, modified, and maintained B-17, B-24 and B-29 bombers. In 1948, the air base was struck by a massive tornado causing some 10 million dollars in damage. Five days later, on March 25, 1948, base meteorologists issued the first official tornado warning in American History in anticipation of another tornado strike. In the 1950's, the base supported the war effort in the Korean War (Crowder 2012).

3.2.10.2 Existing Conditions

3.2.10.2.1 Preferred Alternative

Of the approximately 200 acres that are within the footprints of the Preferred Alternative, about 40 acres are already owned by Tinker AFB and 156 acres would be acquired.

Archaeological Resources

The area of the Preferred Alternative currently within Tinker AFB, has been inventoried for archaeological resources (USAF 2011c) and one archaeological site is present.

Site 34OK146 is located immediately to the east of the BNSF Railyard site on a portion of the Preferred Alternative currently owned by Tinker AFB. The site was recorded in 1992 as the remains of a mid-twentieth century farmstead and associated trash dump (Klinger and Smith 1992). Shovel testing conducted at that time revealed that the archaeological deposits are limited to the surface and are concentrated within a 200 square meters area. Cultural materials associated with the site include milk glass, amber glass, amethyst glass, whiteware sherds, brown glazed earthenware, transfer-printed whiteware, window glass, bottle stopper fragments, screwed container fragments, zinc jar lids, and rusted metal fragments. The site was recommended as not eligible for listing in

the NRHP and the Oklahoma SHPO has concurred with this recommendation (USAF 2011c).

The portion of the Preferred Alternative that is currently owned by BNSF Railyard was inventoried for archaeological resources in November 2012 (Darnell 2013). The conclusions of this inventory are included in a document titled *Archeological Survey of a Proposed Expansion of Tinker Air Force Base* which can be found in Appendix B. Archaeologists excavated 81 subsurface shovel tests and found the overwhelming majority of the project area to be heavily disturbed resulting from construction of the BNSF Railyard and support infrastructure. Of the 81 tests, only one was positive and 80 tests were negative. The one positive test was within the boundaries of the single newly discovered archaeological site, designated 34OK228.

Site 34OK228 is located at the northern edge of the BNSF Railyard property and consists of one small outbuilding. Associated surface artifacts include beer and soda bottles, aluminum cans, miscellaneous glass bottle and jars, several cathode ray picture tubes, paint cans, and miscellaneous household debris. Based on the construction material and the artifact assemblage, the site dates to the early to mid-1950s. Due to the dilapidated condition of the structure, its vernacular construction, the lack of subsurface cultural resources and the general lack of significant historical context, site 34OK228 has no research value and cannot be considered significant. Site 34OK228 was assessed by AmaTerra as not eligible for listing in the NRHP. No other archaeological sites are present within the BNSF Railyard site. The report of this survey was submitted to the Oklahoma SHPO by Tinker AFB on 7 October 2013 and a letter of concurrence was received 17 October 2013.

Non-Archaeological Historic Properties

According to the *Assessment of Effects to Historic Properties: KC-46A Depot Maintenance Activation,* no non-archaeological Historic Properties are located within the proposed footprint of the Preferred Alternative. In addition, none are located within the APE for indirect effects (USAF 2011c; Eisenhour 2013). The report of this survey was submitted to the Oklahoma SHPO by Tinker AFB on 7 October 2013 and a letter of concurrence was received 17 October 2013.

3.2.10.2.2 Alternative 1

Alternative 1 is located wholly within Tinker AFB and all archaeological and non-archaeological cultural resources have been inventoried (USAF 2011c). A historic properties survey of 93 structures and 1,000 acres on Tinker AFB, including the Alternative 1 area was completed in April 1992. A letter of concurrence was received from SHPO in June 1992. No archaeological resources or non-archaeological Historic Properties are located within the APE for direct effects of Alternative 1.

3.2.11 Hazardous Materials and Wastes

3.2.11.1 Hazardous Materials

Hazardous material use and management at Tinker AFB are regulated under the Toxic Substance Control Act (TSCA), OSHA, Emergency Planning and Community Right-to-Know Act, Air Force Occupational Safety and Health Standards, ODEQ, and Oklahoma Corporation Commission. The regulations require personnel using hazardous materials to be trained in the application, management, handling, and storage of material; to know the location of material safety data sheets (MSDSs) for all hazardous materials that they are using; and to wear the correct PPE required for materials that are being used. Tinker AFB has a Hazardous Materials Management Program (HMMP) in place to meet the TSCA requirements. Through the HMMP, the procurement, use, and disposal of hazardous materials located on Tinker AFB and all associated property are documented. The HMMP also contains training requirements, exposure records, inventory, PPE requirements, waste management, and a database of MSDSs for all hazardous materials used on-base (USAF 2011e).

Current operations at Tinker AFB require the use of hazardous materials in varying quantities for aircraft maintenance and operations. Additionally, maintenance of the KC-135 aircraft fleet involves the use of various hazardous materials, some of which may be present at DLA Infill. The location of hazardous materials, procedures and equipment at Tinker AFB used to prevent and clean up a release, and actions to be taken in the event of a release are located in the *Tinker AFB Spill Prevention Control and Countermeasures Plan* (USAF 2010b). Existing impacts at DLA Infill due to hazardous materials releases are covered under the ERP, discussed in Section 3.2.11.2.2.

Hazardous material use and management at the BNSF Railyard are regulated under TSCA, OSHA, ODEQ, and Oklahoma Corporation Commission. The regulations require personnel using hazardous materials to be trained in the application, management, handling, and storage of material; to know the location of MSDSs for all hazardous materials that they are using; and to wear the correct PPE required for materials that are being used. It is unknown whether or not previous operations at the BNSF Railyard have required the use of hazardous materials other than petroleum products; however, potential impacts due to hazardous material usage were investigated as part of the Phase I Environmental Baseline Survey soil and groundwater investigation conducted at the BNSF Railyard in December 2012 and discussed in Section 3.2.11.2.3, Other Identified Contamination.

3.2.11.1.1 Existing Conditions

Asbestos

Tinker AFB has a database of all known asbestos that is identified through sampling during renovation projects and all known asbestos in any given building. The Civil Engineering group manages the program for Tinker AFB.

An Asbestos Management Plan (AMP) is in effect at Tinker AFB, and state certified and accredited contractors are hired to perform abatement and removal when applicable. The plan details procedures for notification, record keeping, protection, and abatement associated with asbestos containing material (ACM). The AMP ensures that Tinker AFB is in compliance with all ACM related federal, state, and local regulations (USAF 2010c). ACM is potentially present in pipe insulation, cement pipe, floor tile, floor tile adhesive, roof patching sealant, wall board in mechanical closets, wall and ceiling texture, and wall board panels. The AMP in place at Tinker AFB would be applied at the facilities located at the Preferred and Alternative action sites. The plan details procedures for notification, record keeping, protection, and abatement associated with ACM. The AMP ensures that Tinker AFB is in compliance with all ACM related federal, state, and local regulations (USAF 2010c).

The facilities present on the BNSF Railyard site and DLA Infill site were constructed before 1985, during the time that ACM was still used in construction. The extent of ACM usage in these facilities is not known but it suspected that some ACM exists at the facilities. Any buildings constructed prior to 1985 should be considered to potentially have ACM present. Table 3-19 identifies buildings in the DLA Infill area at Tinker AFB slated for demolition under Alternative 1 that were constructed prior to 1985, or buildings for which the construction date is unknown.

Table 3-19 Asbestos Containing Material Assessment Findings for DLA Infill

Building Name	Facility Number	Construction Year	Finding	Approximate Area (sf)
Miscellaneous Outdoor Pavilion	31100	U	S	740
Operating Storage, Jet Fuel	21091	U	S	632
Non-real Property Shed	1126	U	S	130
Communications Receiver	1110	1953	S	2,124
Electrical Power Station Building	1111	1953	S	231
Supply Shed, Equipment	1118	1955	S	64,000
Supply Shed, Equipment	1119	1955	S	64,000
Air Force Communications Service Maintenance	1100	1962	S	5,471
Water Pump Station	1106	1969	S	158
Depot Maintenance Facility	1105	1983	S	2,104
Reserve Forces Operational Facility	1126	1984	S	1,800

Notes:
sf – square feet
U – Unknown
NS – No suspect ACM present
S – Suspected ACM present based on construction year (pre-1985)

Lead-Based Paint

At this time, a base-wide lead based paint (LBP) survey has not been conducted for Tinker AFB. Therefore, all facilities constructed prior to 1980 have the potential to contain LBP.

Tinker AFB currently maintains a database related to the limited LBP surveys conducted on-base, and has a LBP Management Plan. The database contains information from LBP surveys and sampling conducted during and after 1994. The LBP Management Plan contains procedures for assessing risk, hazard management and risk reduction, medical screening procedures, record keeping procedures, waste disposal requirements, and procedures for capture and removal of LBP scrapings or dust (USAF 2010d). Historical painting activities did not include capture and proper disposal of paint scrapings or dust; therefore, it is possible that the soil in areas where LBP was used may exhibit elevated concentrations of lead.

The facilities present on the BNSF Railyard site and DLA Infill site were constructed before 1980, during the time that LBP was still used in construction. The extent of LBP usage in these facilities is not known, but it suspected that some LBP exists at the facilities. Table 3-20 identifies buildings slated to be demolished in Alternative 1 that are suspected to have LBP based on the construction year.

Table 3-20 Lead-Based Paint Assessment Findings for DLA Infill

Building Name	Facility Number	Construction Year	Finding	Approximate Area (sf)
Miscellaneous Outdoor Pavilion	31100	U	S	740
Operating Storage, Jet Fuel	21091	U	S	632
Non-real Property Shed	1126	U	S	130
Communications Receiver	1110	1953	S	2,124
Electrical Power Station Building	1111	1953	S	231
Supply Shed, Equipment	1118	1955	S	64,000
Supply Shed, Equipment	1119	1955	S	64,000
Air Force Communications Service Maintenance	1100	1962	S	5,471
Water Pump Station	1106	1969	S	158

Notes:
sf – square feet
U – Unknown
NS – No suspect LBP present
S – Suspected LBP present based on construction year (pre-1980)

Pesticides

Pest management at Tinker AFB is conducted in accordance with the Tinker AFB Integrated Pest Management Plan (Tinker AFB 2013). The Pest Management Program is managed by the Pest Management Shop and the main bulk storage facilities for pesticides are located at Building 1049, the Pest Management Shop, and Building 6020, Golf Course Pesticide Storage Facility. Lists of pesticides stored at Tinker AFB are maintained by these facilities. The list of approved pesticides for use at Tinker AFB can be found on the Armed Forces Pest Management Board's website: www.afpb.org. Pest control priorities are divided into three categories: high priority areas (food service, clinics and hospitals, schools, training areas, and recreational areas and facilities) that receive continuous monitoring and treatments regardless of funding limitations; medium priority areas (warehouses used for food storage, high visibility areas, weed control sites, semi-improved areas, and some ecologically significant unimproved grounds like native prairies) that receive routine pest control subject to availability of funds; and low priority areas (administrative buildings, laboratories, warehouses storing non-infestable products, and unimproved grounds) which only receive on-call pest control services subject to fund availability.

Pesticide spills are managed in accordance with the Installation Spill Contingency Plan. Hazardous wastes resulting from pesticide spills and response are handled in accordance with the Installation Hazardous Waste Management Plan.

Historical pesticides used at Tinker AFB included diazinon, allethrin, chlordane, and pyrethrin-based products and were applied within the appropriate guidelines. Historically, chlordane was injected beneath foundations of buildings when termite

infestations were observed. Due to the persistence of chlordane in the environment, it is likely that concentrations of chlordane may be present in soils (USAF 2007b).

3.2.11.2 Hazardous Waste

Hazardous wastes are defined by the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA), which was further amended by the Hazardous and Solid Waste Amendments, RCRA subtitle C (40 CFR, Parts 260 through 270). The USEPA regulatory authority is delegated to the state of Oklahoma. Hazardous waste management at Tinker AFB is also regulated under AFI 32-7042, *Hazardous Waste Compliance*.

These regulations are implemented at Tinker AFB through hazardous waste permitting procedures and the Tinker AFB Hazardous Waste Management Instruction, OC-ALC-TAFB Instruction 32-7004 (Hazardous Waste Management Plan). The document details hazardous waste packaging, turn-in, transportation, storage, recordkeeping, and emergency procedures. Approximately 1,170 tons of RCRA hazardous waste were generated and disposed of at an off-site treatment, storage, and disposal facility during 2012 (USAF 2013b). Hazardous waste is generated at Tinker AFB from aircraft and jet engine maintenance; automotive, building, and grounds maintenance; laboratory chemicals; spent hazardous materials; and spills. Air Force waste management operations at Tinker AFB are registered with the USEPA under identification number OK1571724391 (USAF 2011d).

Day-to-day operations at Tinker AFB generate multiple types of hazardous wastes that require special handling and proper disposal. These include oils and fuels, cleaning compounds, paints, solvents, and batteries. Hazardous wastes—including those potentially generated from maintenance and operation of the KC-135 aircraft fleet at DLA Infill—are collected at 1,200 initial accumulation points and approximately 400 hazardous waste staging areas. After the collection vessel has reached 90 percent capacity, the waste is transferred to the Tinker AFB permitted Hazardous Waste Management Facility, Building 808, and Hazardous Waste Storage Facility, Building 810. Once at Building 810, the waste is sampled and removed by a certified contractor within 365 days for off-base treatment/disposal at an appropriate facility (USAF 2007b).

3.2.11.2.1 Existing Conditions

The hazardous wastes located at the BNSF Railyard site and DLA Infill site are regulated by the same federal and state regulations as those of Tinker AFB. DLA Infill is also managed under the Hazardous Waste Management Plan as Tinker AFB. The BNSF Railyard property is not listed as a RCRA hazardous waste generator according to the EPA RCRAInfo database.

3.2.11.2.2 Environmental Restoration Program

The ERP, formerly known as the Installation Restoration Program, was implemented by the DoD to identify and evaluate areas and constituents of concern of toxic and hazardous

material disposal and spill sites. Once the areas and constituents had been identified, the ERP was tasked to remove the hazards in an environmentally responsible manner. All response actions were based upon provisions of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), and the *Superfund Amendments and Reauthorization Act of 1986* as clarified in 1991 by EO 12580, Superfund Implementation.

Tinker AFB has a total of 40 ERP sites, seven of which are CERCLA regulated, and 33 of which are RCRA regulated. Tinker is listed as an EPA Superfund site because six of the ERP sites are listed on the National Priorities List. All six are more than one half mile away from the proposed demolition and construction activities associated with the Preferred Alternative or Alternative 1. Twenty-four of the sites are solid waste management units in the RCRA Operating Permit (USAF 2010e). Currently 26 of the ERP sites are closed or require no further response action. Of the 14 open ERP sites, five of these sites are located within one-half mile of all the proposed demolition and construction activities associated with the Preferred Alternative or Alternative 1. Table 3-21 provides additional information about the ERP sites (USAF 2010e). Figure 3-12 shows the five ERP sites relative to the BNSF Railyard and the DLA Infill. In general groundwater under Tinker AFB moves in the direction of the Tinker Aerospace Complex (south-southwest). The ERP sites are located upgradient of the BNSF Railyard and cross gradient to the DLA In-fill. According to Tinker AFB, groundwater sampling results from monitoring wells on Tinker AFB around the BNSF Railyard have been non-detect for chemicals of concern (USAF 2012h). The information provided below on the five active ERP sites that are within one-half mile of the proposed demolition activities has been summarized from the ERP Community Relations Plan. The BNSF Railyard is not currently subject to the program, as it is not property of the DoD.

Table 3-21 Tinker AFB Environmental Restoration Program – ERP Sites and AOC Located Within One-half Mile of Proposed Construction and Demolition Activities

Site ID	Site Name	Regulatory Phase	Description
LF012	Landfill #2	LTM	Site is approximately 27.5 acres and houses general, industrial, and radiological waste. Site was utilized from 1945 to 1952. Industrial solvents and petroleum products are believed to be located in the northeast corner of the landfill. Radiological waste (burned radium dials) is located in the center of the landfill. Landfill was capped in 1998 and long-term groundwater monitoring commenced in 2001. Low levels of volatile organics, semi-volatile organics, trichloroethylene (TCE), and vinyl chloride were observed during trench water sampling.
LF013	Landfill #3	LTM	Site is approximately 8.25 acres and houses general and industrial waste. Landfill was utilized from 1952 to 1961. Industrial waste includes lead contaminated soils, sludge containing waste oils, and sludge from the Petroleum Oil Lubricant Facility. Landfill was capped in 1991 and long-term groundwater monitoring commenced in 1998. Low levels of volatile organics, semi-volatile organics, and TCE, methyl ethyl ketone, toluene, and metals were observed during trench water sampling.
LF014	Landfill #4	LTM	Site is approximately 12.4 acres and houses general, industrial, and radiological waste. Landfill was utilized from 1961 to 1968. Industrial waste includes land farming sludges collected from the bottom of petroleum and solvent storage tanks. These wastes are located in the central portion of the landfill. Drainage controls around the landfill were put in place in 1997, the landfill was capped in 1998, and long-term groundwater monitoring commenced in 1998. Low levels of volatile organics, semi-volatile organics, and TCE, methyl ethyl ketone, toluene, and metals were observed during trench water sampling.
LF015	Landfill #5	LTM	Site is approximately 6 acres and houses approximately 75,000 cubic yards of general and industrial waste. Site consists of trenches that run from northwest to southeast. Trenches are estimated to be 400 feet long, 50 feet wide, and 16 feet deep. Site is located in the southern area of Tinker AFB and is bounded by Tower Road on the west, Taxiway E to the south, and Crutcho Creek to the north and east. A compacted clay and topsoil cover was constructed over the trenched area in August 1990, the landfill was capped in 1998 to 1999, and long-term groundwater monitoring commenced in 2001.
WP018	Industrial Waste Pit #1	RA-O	Site is a 1.4 acre unlined pit that housed waste oils, cyanide, chromates, phenols, and solvent and was in use from 1947 to 1958. Site is located 500 yards southwest of Building 2121, approximately 400 yards west of Douglas Boulevard. Pit was filled in 1958, and investigation of the site began in 1981. Analytical results have indicated a migration of contaminants through soil and surface water pathways, but the extent of the migration has not been identified. A Corrective Measures Study was completed in 2008, and monitored natural attenuation with institutional controls was recommended as the preferred alternative for the site.

Notes:
AOC = Area of Concern
ERP = Environmental Restoration Program
LTM = Long Term Monitoring
NFRAP = No Further Response Action Planned
RA-O = Remedial Action Operation
ROD/DD = Record of Decision /Decision Document
TCE = trichloroethylene

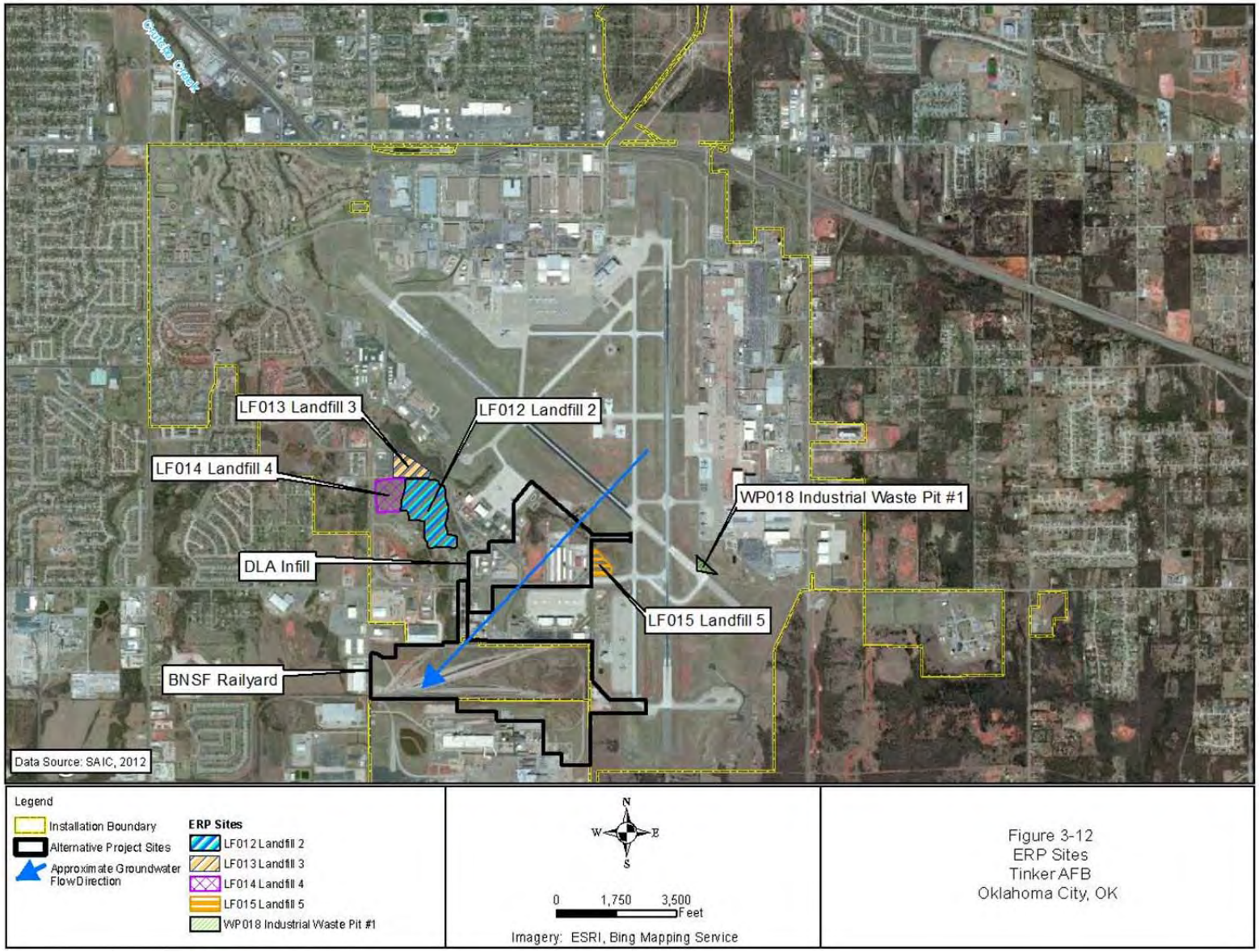


Figure 3-12
ERP Sites
Tinker AFB
Oklahoma City, OK

3.2.11.2.3 Other Identified Contamination

As part of the Phase I Environmental Baseline Survey conducted in December 2012, and the Phase II Environmental Baseline Survey conducted in October and November 2013, soil and groundwater sampling was performed at the BNSF Railyard. The locations of the soil borings and temporary monitoring wells drilled in the location of the Preferred Alternative are shown on Figure 3-13. Details of the investigations are described in the Draft Phase I Environmental Baseline Survey and Draft Phase II Environmental Baseline Survey Addendum.

During the Phase I Environmental Baseline Survey, soil and groundwater samples were collected from the soil cores and wells and analyzed for VOCs by SW-846 Method 8260B, semi-volatile organic compounds by SW-846 Method 8270C, and RCRA 8 metals by SW-846 Method 6010/7470. During the Phase II Environmental Baseline Survey, soil samples were collected from soil cores and analyzed for VOCs, SVOCs, Priority Pollutant List Metals, barium, and total petroleum hydrocarbons (TPH) using Texas Method 1006. A Streamlined Risk Evaluation of the analytical data was performed and included in a Human Health Risk Evaluation that was prepared for the entire BNSF Railyard property. The Human Health Risk Evaluation examined potential exposure pathways for human health and the environment at the property, the result of which was risk-based comparison criteria for commercial/industrial use of the property.

No reported concentrations of VOCs, semi-volatile organic compounds, or TPH exceeded any risk-based comparison criteria in the areas of the BNSF Railyard site that would be affected by the Preferred Alternative. One shallow soil sample location (SB61S at 4 ft below ballast material) contained arsenic with a reported concentration of 24 milligrams per kilogram (mg/kg), which slightly exceeds the maximum background arsenic concentration of 21 mg/kg for Central Oklahoma (ODEQ 2009). The value of 24 mg/kg is statistically similar to 21 mg/kg. In the areas of the BNSF Railyard site that would be affected by the Preferred Alternative, all groundwater results were below the Maximum Contaminant Levels (MCLs) or within the upper tolerance limits for background levels of metals. Groundwater sampling outside the area affected by the Preferred Alternative did return results of cadmium exceeding MCLs and risk-based comparison criteria at MW09S (15 µg/L) and MW10D (8.9 µg/L). The EPA MCL for cadmium is 5 µg/L (USAF 2013c). Additional sampling and further investigation were not performed to confirm the presence of cadmium in the groundwater.

It should be noted that railroad tracks, railroad ties, and ballast material were not sampled. However, if the BNSF Railyard site is the chosen alternative, the railroad tracks, creosote-soaked railroad ties, ballast material, and any impacted soil beneath the track areas would need to be removed as part of construction activities. Prior to recycling or disposal they would also need to be sampled and characterized. Additionally, any remaining soil would be thoroughly tested to eliminate any negative indoor air quality impacts in buildings constructed over these sites in the future. It should be noted that creosote-soaked railroad ties are not considered a hazardous waste (USEPA 1980).

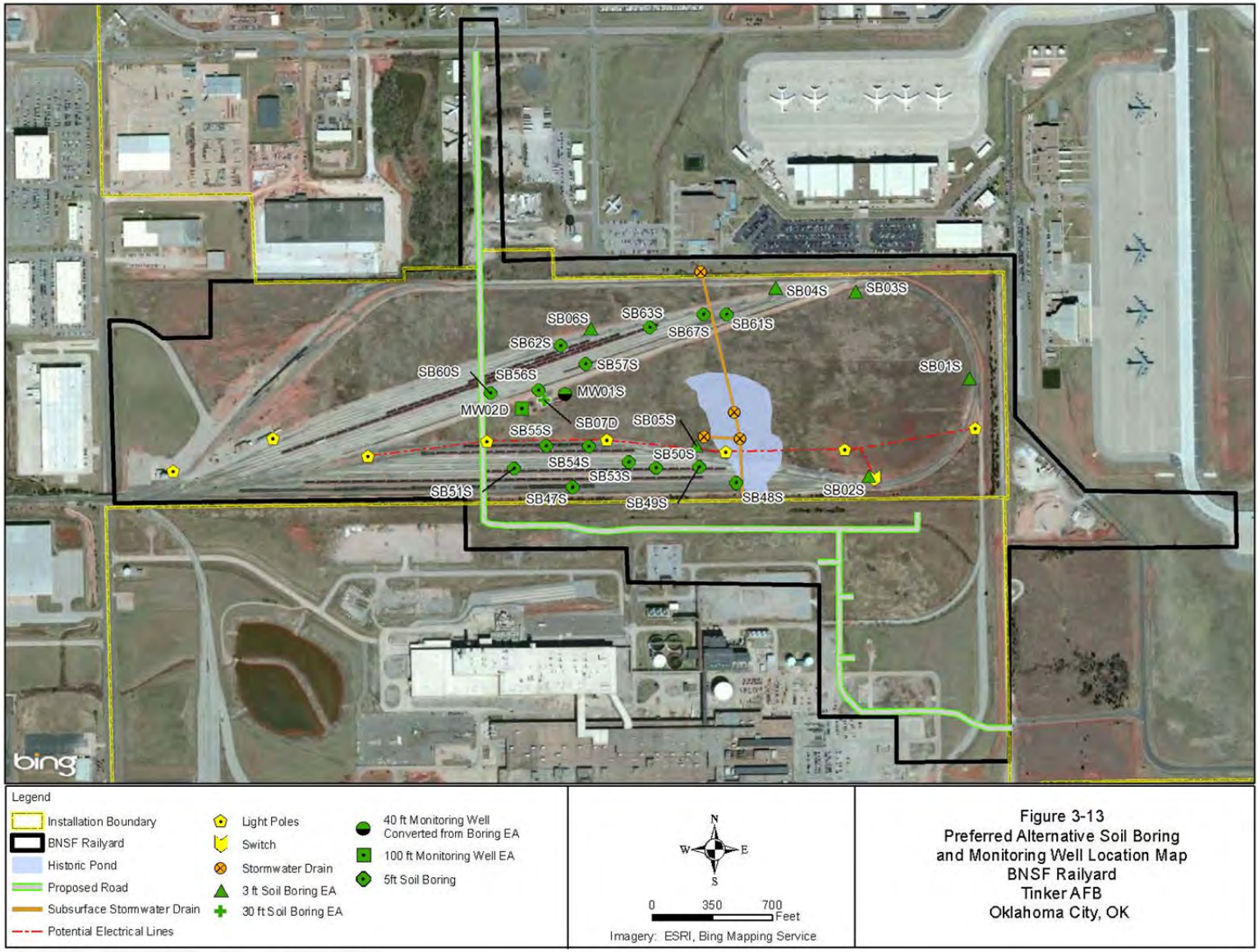


Figure 3-13
Preferred Alternative Soil Boring and Monitoring Well Location Map
BNSF Railyard
Tinker AFB
Oklahoma City, OK

Some new development is proposed to occur where potential areas of concern have been identified on the TAC facility. Detected levels of PAHs and arsenic were reported within these areas.

3.2.12 Utilities and Infrastructure

3.2.12.1 Definition of the Resource

Utilities and infrastructure present on and surrounding Tinker AFB include the potable water, wastewater, stormwater, electricity, natural gas, solid waste disposal, and transportation resources.

To determine the current and future utilization of these services, historical data is reviewed and compared to an effective population. The effective population determines the number of people who utilize a service per 24-hour day, by factoring in the number of on-base and off-base personnel. Under this metric, Tinker AFB personnel who live off-base (i.e. civilian employees) are weighted by a factor of one-third to represent their average eight-hour per day demand on installation utilities. By calculation, Tinker AFB currently has an effective population of 20,115 (Table 3-22). To determine the per capita usage of a utility, the historical data is reviewed (i.e., annual usage of potable water) and then divided by the effective population. The number generated is the annual per capita usage of that utility. When utilizing an effective population to determine utility usage statistics, it must be noted that the historical usage numbers include all domestic, industrial, commercial, and public use. Including these types of usages creates a higher value and does not represent an actual "per person" consumption rate for the installation.

Table 3-22 Tinker AFB Effective Population

Category	Population	Effective Population Factor	Effective Population
On-Base Personnel (24-hour population)	14,718	1.00	14,718
Off-Base Personnel [a] (8-hour population)	16,354	0.33	5,397
Total	**31,072**	**--**	**20,115**

Source: USAF 2013d

3.2.12.2 Existing Conditions

3.2.12.2.1 Sanitary Sewer

Tinker AFB operated a sanitary wastewater treatment plant that was closed in 1996 (USAF 2007b). Currently, sanitary wastewater generated at Tinker AFB is discharged to the Oklahoma City sanitary sewer via four discharge points. The associated infrastructure was constructed in 1943 and includes 46 sanitary wastewater lift stations. Based on an assessment performed in association with the 2007 General Plan,

replacement and upsizing of sewer pipes are needed to support future development (USAF 2007b). Approximately 950 million gallons of wastewater is currently generated at Tinker AFB per year (USAF 2012j). Considering a current effective population of 20,115, the per capita generation of sanitary wastewater would be approximately 47,230 gallons per year, or 129 gallons per day.

Wastewater generated on the BNSF Railyard property discharges to the Oklahoma City sanitary sewer system; however, at the time of publication of this EA, the amount of wastewater generated at the BNSF Railyard property was not available.

3.2.12.2.2 Industrial Wastewater

Tinker AFB currently holds two Industrial Wastewater Discharge Permits (No. 0029-TAC and No. 0029-FC) for Significant Categorical Industrial Users. The permits are granted by the City of Oklahoma Utilities Department and authorize discharge of industrial wastewater to the Oklahoma City sanitary sewer system in a manner that complies with all applicable regulations regarding industrial wastewater discharge. The current permit No. 0029-TAC expires 31 December 2015 and authorizes Tinker AFB to discharge process wastewater from Outfall 001, located on the Tinker Aerospace Complex Manufacturing Property along S. Air Depot Blvd and north of SE 74th St. Permit No. 0029-FC expires 15 December 2015 and authorizes the discharges from Outfalls 001 through 005, including discharges from the Industrial Wastewater Treatment Plant (IWTP) (Outfall 003). Wastewater treated at the plant includes wastewater generated from paint stripping and painting, vehicle and aircraft washing and maintenance, acid etching, vapor decreasing, steam condensate, electroplating, chemical cleaning, and barrel rinsewater. The current permitted discharge for industrial wastewater is 1.5 million gallons per day. Currently, the IWTP receives and treats one million gallons per day of industrial wastewater (USAF 2007c). Tinker AFB is required to monitor discharge from outfalls and comply with reporting requirements as outlined in the permits.

No evidence of industrial wastewater generation was observed at the BNSF Railyard property.

3.2.12.2.3 Potable Water

As discussed in Section 3.2.7, Water Resources, Tinker AFB and the surrounding vicinity are positioned above the Garber-Wellington Aquifer, the primary source of potable water for the area. Tinker AFB utilizes a system of 22 groundwater wells that range in depth from 380 ft to 706 ft in depth to obtain water that is chlorinated prior to distribution to consumers (USAF 2007b). Tinker AFB operates Water System ID Number OK2005508. Based on the 2012 Water Quality Report, drinking water meets all federal and state requirements. Additionally, a secondary source of potable water for Tinker AFB may be received from the Oklahoma City Stanley Draper water system (USAF 2012k). The current average annual water consumption for Tinker AFB is approximately 900 million gallons per year (USAF 2012j). Based on the effective base population of 20,115, potable water usage is approximately 44,740 gallons per year, or 123 gallons per person,

per day. The Tinker AFB water supply and distribution system is reportedly operating at approximately 75 percent capacity and supplies approximately 6.5 million gallons per day. The system consists of approximately 562,000 linear ft of asbestos cement cast iron, mostly installed in 1943, and polyvinyl chloride pipe, installed as recently as 2001 (USAF 2007b).

Usage rates of potable water for the BNSF Railyard property were not provided at the time of this report. However, it is believed the property is supplied with potable water from Oklahoma City.

3.2.12.2.4 Solid Waste

Solid waste generated at Tinker AFB is picked up for off-site disposal in a licensed landfill facility. All solid waste disposal is handled by a private contractor. Yard waste is transferred to the south side of the installation for composting. Construction and demolition debris are not included in the contract for solid waste disposal. Tinker AFB also provides a recycling program for office and household waste. Several best management practices for waste management are applied at Tinker AFB and are outlined in an Integrated Solid Waste Management Plan. Based on information collected for the Tinker AFB General Plan, solid waste generated at the Installation poses no significant constraints to operation and development at the Installation (USAF 2007b).

Solid waste generated at the BNSF Railyard property consists primarily of general office waste, including paper and cardboard. Waste is collected in an onsite dumpster and removed for off-site disposal by Waste Management approximately once per month (USAF 2013c).

3.2.12.2.5 Transportation

The transportation network in the vicinity of Tinker AFB is maintained by Oklahoma City, Oklahoma County, Midwest City, Del City, and the Oklahoma Department of Transportation. The major roadways that provide access to Tinker AFB from off-site include Sooner Road, Southeast 29th St, Douglas Blvd, and Interstate Highway 40. Major roads that support traffic within Tinker AFB are Air Depot, East Drive, Arnold, and Patrol Road. Eleven Entry Control Points are located along the perimeter of Tinker AFB to provide access for delivery vehicles and heavy equipment. The total average weekday traffic count for Tinker AFB is 61,518 vehicles, including 32,941 inbound vehicles and 28,606 outbound vehicles. Traffic counts during weekend days are substantially lower (13,275 total, including 6,941 inbound and 6,334 outbound) (USAF 2013e). Approximately 400 acres of designated parking facilities exist on Tinker AFB; however, the amount of designated parking is insufficient for the needs of all personnel (USAF 2007b).

Public transportation in Oklahoma City is provided by the Central Oklahoma Transportation and Parking Authority MetroTransit. The system operates 25 interconnecting bus routes and three express bus routes. An installation shuttle bus

system operates on weekdays to provide hourly shuttle service to key locations throughout the installation (USAF 2007b).

The rail network in the immediate vicinity of Tinker AFB includes the BNSF Railyard property, adjacent to Tinker AFB. Approximately 40,000 linear ft of rail are currently present on the BNSF Railyard property. One 1,500-ft spur track is located on Tinker AFB, but has been out of service since the 1980s. The rail spur may need upgrades or enhancements if it is placed back in service.

3.2.12.2.6 Electricity/Natural Gas

Electricity services are supplied to Tinker AFB by Oklahoma Gas and Electric Company (OG&E) through a looped 138-kilovolt (kV) transmission line and four substations. The distribution system includes 36 12.47-kV feeder circuits utilizing approximately 286,000 single-conductor linear feet (SCLF) of overhead lines with 143 pole-mounted transformers and 900,000 SCLF of underground lines utilizing 139 pad-mounted transformers. Approximately 72 generators provide backup power to select buildings. OG&E provides additional backup power via a turbine-powered 80 megawatt peaking plant and standby generator (USAF 2007b).

Natural gas is supplied to Tinker AFB by Oklahoma Natural Gas Company via a Government supply contract administered by the Defense Energy Supply Center. Three metered delivery points are utilized and maintain a range of 40-50 pounds per square inch gauge. Based on an assessment conducted with the 2007 General Plan, natural gas distribution lines are old and deteriorated and may result in gas pressure instability (USAF 2007b).

Communication distribution lines at Tinker AFB utilize underground conduit to house copper cable and fiber optic cable. The main telephone electronic voice switching system for Tinker AFB uses approximately 10,500 of 16,000 lines currently in use (USAF 2007b).

Electricity is supplied to the BNSF Railyard property by OG&E. It is unknown whether natural gas is supplied to the BNSF Railyard property.

3.2.13 Socioeconomic Resources

3.2.13.1 Definition of the Resource

The socioeconomic status of Tinker AFB and the area surrounding the project are addressed in this section. It is assumed that the majority of the approximately 350 people required for construction and demolition and approximately 85 percent of the 1,700 office and maintenance personnel would be drawn from the local, civilian workforce, and approximately 255 people would be drawn from outside the local population due to individuals with specialized skill sets relocating to the area. The scope of this section includes population, economic activity, housing, and education.

3.2.13.2 Existing Conditions

3.2.13.2.1 Population

According the US Census Bureau, the total population of Oklahoma County is 732,371, of which 591,967 live in Oklahoma City. Oklahoma City, which is located entirely within Oklahoma County, is experiencing a faster growth rate than Oklahoma County. The population percent change for Oklahoma County from April 1, 2010 to July 1, 2011 was 1.9 percent, as compared to 2.1 percent for Oklahoma City, and 0.9 percent for the state of Oklahoma (USCB 2010a).

There are approximately 8,880 active duty personnel stationed at Tinker AFB and approximately an additional 16,350 civilian workers, for a total workforce of 25,230. The base also supports approximately 5,840 dependents and provides services to approximately 32,830 retirees (USAF 2013d).

3.2.13.2.2 Economic Activity

Tinker AFB Economic Activity and Contribution

Tinker AFB's economic influences are geographically far-reaching, affecting Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma Counties. The surrounding communities and Tinker AFB depend on one another for employment, goods, and services. The installation generates economic activity in the region through employee payrolls, service contracts, construction programs, local procurements, and other expenditures.

In FY 2011 Tinker AFB was Oklahoma's largest single-site employer. There were over 26,500 direct jobs with nearly $1.5 billion annual payroll, and an additional 33,000 indirect jobs valued at approximately $1.38 billion. The installation has an annual statewide total economic impact of over $3.8 billion (USAF 2011f).

Regional Employment and Income

According to the US Census Bureau, per capita income in Oklahoma City was $25,450, as compared to US per capita income of $27,915 (USCB 2010a). From 2007 to 2011, Oklahoma City unemployment rate was 4.4 percent, which was higher than the state average (4.0 percent) and below the US average (5.6 percent) (USCB 2010b).

In Oklahoma City, the leading non-governmental industries in 2010 were education, health, and social services (20.4 percent of working civilian population); retail trade (11.7 percent of working civilian population); and professional, scientific, management, administrative, and waste management services (10.2 percent of working civilian population) (USCB 2010b).

3.2.13.2.3 Housing

The Tinker AFB Housing Requirements and Market Analysis defines the housing market area as covering a 60-minute commute or 20 miles from Tinker AFB's headquarters building or major work centers (USAF 2007d). The Greater Oklahoma City area has a wide variety of housing options with low-cost of living. In 2012, Oklahoma City had a total of 260,000 housing units, 12 percent of which were vacant. Of the total housing units, 70 percent were in single-unit structures, 27 percent were in multi-unit structures, and 3 percent were mobile homes (USCB 2012a). Housing costs in Oklahoma City are approximately 14.6 percent below the national average. New home average sale prices in Oklahoma City are $246,953 for 2,400 square foot new-build home and the average rental rate is $703 per month for 2-bed, 2-bath, 950 square foot, unfurnished apartment (Greater Oklahoma City 2013).

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. AHRN is a community housing website sponsored by the DoD and all Service branches and designed to improve the process of connecting military members and their families with available housing (AHRN 2013). Currently, there are approximately 240 available rental listings posted on AHRN within Tinker AFB's housing market area.

3.2.13.2.4 Education

Children, who live in the general vicinity of Tinker AFB, would attend schools within the Midwest City-Del City School District or the Moore Public School System. The Midwest City-Del City School District includes 17 elementary schools, five junior high schools, and three high schools. Midwest City-Del City School District provides an educational program for over 14,000 students (Mid-Del Schools). The Moore Public School System has 23 elementary schools, five junior high schools, and three high schools. Approximately 21,600 children attend schools within the Moore Public School System.

3.2.14 Environmental Justice

3.2.14.1 Definition of Resource

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 that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

3.2.14.2 Existing Conditions

The two census tracts potentially affected by the Preferred Alternative and Alternative 1 were used to determine presence of an environmental justice community and this section presents data summarizing the existing conditions of these two census tracts. The Census Tracts potentially affected are Census Tracts 1074.03 and 1075.00. This analysis follows the *Air Force Interim Guidance for Environmental Justice Analysis*, November 1997, and the CEQ Environmental Justice Guidance under NEPA, December 1997.

In order to determine if minority and low-income populations or children are disproportionately impacted by the Preferred Alternative or alternatives, two areas of comparison must first be determined:

- the area potentially affected by impacts from resources or Region of Influence (ROI) (i.e., air quality, noise, land use), and
- the larger regional community that includes the affected area and serves as a Community of Comparison (COC).

Impacts to Environmental Justice communities would be directly related to impacts from other resource areas covered in this EA. The ROIs for the environmental justice analysis includes the two census tracts that encompass impacts from resource areas. The COC is the regional area surrounding the ROI that is the demographic area used to compare and analyze the potential environmental justice impacts that results in the identification of an environmental justice community.

Disadvantaged groups within the ROI and COC, including low-income and minority communities, are specifically considered in order to assess the potential for disproportionate occurrence of impacts.

Minority Population: Black or African Americans, American Indians and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and some other race. For the 2010 Census, race and Hispanic origin (ethnicity) were considered two separate concepts and were recorded separately. For the purposes of this analysis, the total minority race population will be separate from the total Hispanic population to determine total minority race population from the Hispanic total within the affected areas.

Low-Income Population: Persons living below the poverty level, according to income data collected in US Census 2010.

Table 3-23 summarizes census data for minority and low income populations for Census Tracts 1074.03 and 1075.00. The Preferred Alternative is located within Census Tracts 1074.03, and Alternative 1 is located within Census Tract 1075.00. Additional information for comparison is provided for Oklahoma City, Oklahoma County, the state of Oklahoma, and the US.

At least one criteria listed below must be met to determine if an environmental justice community is present:

- Affected area's percentage of minority or low-income population is greater than that of the general population, the affected area is considered to be a minority or low-income population.
- The minority population (including Hispanics or Latinos) or low-income population is greater than 50 percent, this is considered a majority-minority or majority low-income population.

According to the percentages listed in Table 3-23, there is an environmental justice community present in Census Tract 1074.03, because there is a higher minority percentage than that of the general population.

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

Demographic Area	Total Population	Total Hispanic/ Latino Population	Percent Hispanic/ Latino	Total Minority Race Population	Percent Minority Race[a]	Total Low-Income Population	Percent Low Income
Region of Influence (ROI)							
Census Tract 1074.03	5,551	470	8.5	2068	**37.3**	488	8.8
Census Tract 1075.00	2,444	372	15.2	422	17.3	315	12.9
Community of Comparison (COC)							
Oklahoma City, OK	572,742	96,470	16.8	193,306	33.8	97,939	17.1
Oklahoma County, OK	712,491	103,397	14.5	227,399	31.9	123,261	17.3
Oklahoma	3,714,520	318,007	8.6	970,957	26.2	605,466	16.3
United States	306,603,772	49,215,563	16.1	79,436,759	25.9	43,844,339	14.3

Source: USCB 2010b and USCB 2010c
Notes:
[a] Minority Race includes Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; and some other race.
Bold text notates the presence of an Environmental Justice population
COC – Community of Concern
OK - Oklahoma
ROI – Region of Influence

(No document text on this page)

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4.1 IMPACT RATING DEFINITIONS

Potential impacts for each resource area are described in terms of their significance. Significant impacts are those impacts that would result in substantial changes to the environment (as defined by 40 CFR 1508.27) and should receive the greatest attention in the decision-making process. The following impact rating definitions were used to characterize the estimated level of direct, indirect, and cumulative impacts to each resource evaluated in this EA:

- Beneficial – The term used to indicate the action would have a positive net impact on the resource area under consideration.
- No Impact/Negligible Impact – The term used to indicate an environmental impact that could occur, but would be less than minor and might not be perceptible.
- Minor Impact – The term used to indicate that, while impacts would be perceptible, they would clearly not be significant.
- Less than Significant Impact – The term used to indicate an environmental impact that is not significant, but is readily apparent. Examples include cases where the predicted consequences of implementing an action suggest the need for additional care in following standard procedures, or applying precautionary measures to minimize adverse impacts.
- Significant but Mitigable Impact – Significant impact anticipated though the Air Force can put management actions or other measures in place to mitigate impacts to less than significant.
- Significant – An adverse environmental impact, which, given the context and intensity, violates or exceeds regulatory or policy standards or otherwise exceeds the identified threshold. The significant impact, however, cannot be mitigated with practical means to a level below significance.

4.2 DESCRIPTION OF THE EFFECTS OF ALL ALTERNATIVES ON THE AFFECTED ENVIRONMENT

4.2.1 Airspace Use and Management

Aircraft operations impacts may be considered significant if: (1) the airspace does not have the capacity to accommodate the activities associated with the action; or (2) the airspace use and management procedures needed to support the action would conflict with the baseline airspace use and management procedures.

4.2.1.1 Preferred Alternative

Under the Preferred Alternative at Tinker AFB, average annual airfield operations would increase by 1,636 operations from 30,507 to 32,143 operations (compare Tables 3-1 and 4-1), an approximate 5 percent increase. The anticipated annual operations would equate

to 17 percent of the airfield capacity, a one percent increase when compared to the baseline. Based on a 24-hour day, the average hourly operations would be about 4 operations, approximately 9 percent of the IFR hourly capacity (a three percent increase). The 4 operations would equate to about 8 percent of the VFR hourly capacity (a two percent increase). The airfield has the capacity to accommodate the KC-46A operations; therefore, impacts to airfield capacity would be less than significant.

Ground control procedures would be developed for operations on the new 1,200-ft taxiway. Aircraft taxi operations on the taxiway would not interfere with other aircraft ground operations.

No new aircraft flight tracks would be necessary because the KC-46A aircraft would use the flight tracks used by C/KC-135 and other aircraft (see Figure 3-1). Likewise, the altitudes KC-46A aircraft would fly on the tracks would be the same as those for the C/KC-135 aircraft. For these reasons, the existing air traffic control procedures for the airspace surrounding the airfield and at the airfield would accommodate the KC-46A operations on Runways 13/31 and 18/36. The addition of KC-46A operations would not impact the existing airfield operations or air traffic control procedures.

Table 4-1 Preferred Alternative Annual and Average Daily Airfield Operations

Unit	Aircraft	Modeled As (if different)	No. of Flying Days per Year	Departure			Arrival			VFR Patterns			IFR Patterns			Totals		
				Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
507th ARW (AFRC)	KC-135R		260	400	-	400	360	40	400	432	48	480	1,008	112	1,120	2,200	200	2,400
552nd (ACC)	E-3A			1,500	-	1,500	1,350	150	1,500	4,050	450	4,500	4,050	450	4,500	10,950	1,050	12,000
NAVY 522ACC	E-6	KC-135R		600	-	600	540	60	600	4,082	454	4,536	875	97	972	6,097	611	6,708
Tinker Aircraft Totals				2,500	-	2,500	2,250	250	2,500	8,564	952	9,516	5,933	659	6,592	19,247	1,861	21,108
10 FLTS DEPOT MAINTENANCE	B-1		260	52	-	52	52	-	52	134	-	134	135	-	135	373	-	373
	B-52H			87	-	87	87	-	87	542	-	542	360	-	360	1,076	-	1,076
	E-3A			24	-	24	24	-	24	152	-	152	100	-	100	300	-	300
	KC-135A/B/R	KC-135R		213	-	213	213	-	213	1,326	-	1,326	884	-	884	2,636	-	2,636
	KC-46			273	-	273	273	-	273	238	-	238	852	-	852	1,636	-	1,636
10 FLTS DEPOT total				649	-	649	649	-	649	2,392	-	2,392	2,331	-	2,331	6,021	-	6,021
Transient	A-10A		365	12	-	12	12	-	12	30		30	18		18	72	-	72
	B-1			3	-	3	3	-	3			-			-	6	-	6
	B-52H			7	-	7	7	-	7			-			-	14	-	14
	C-12, C-26, DH-6, E-9, PC-12	C-12		47	-	47	47	-	47			-			-	94	-	94
	C-130, AC-130, MV-22	C-130H&N&P		56	-	56	56	-	56	134		134	90		90	336	-	336
	A320; B-737, -747, -757, -767; C-17, C-32, C-40, C-9; DC-10, E-8, KC-767	C-17		53	-	53	53	-	53	-	-	-	-	-	-	106	-	106
	C-20, C-35, C-37, C38, C-560, C-680, E-6, F-2000, FA-20, G-159, G-5, T-39, UC-35	C-20		44	-	44	44	-	44	128		128	84		84	300	-	300
	BE-36, C-21A	C-21A		19	-	19	19	-	19			-			-	38	-	38
	C-5A, KC-10	C-5A		7	-	7	7	-	7			-			-	14	-	14
	C-2, E-2C	E-2C		13	-	13	13	-	13			-			-	26	-	26
	E-3A			18	-	18	18	-	18	42		42	28		28	106	-	106
	F-15	F-15A		46	-	46	46	-	46	110		110	74		74	276	-	276
	F-16	F-16C		49	-	49	49	-	49	118		118	78		78	294	-	294
	A-4, A-6, A-JET, AV-8, C-146, F-18, F-21, F-4, F-5, GR-4, S-3, T-1, T-45	F-18A/C		163	-	163	163	-	163	374		374	248		248	948	-	948
	F-22			18	-	18	18	-	18	42		42	30		30	108	-	108

Table 4-1 Preferred Alternative Annual and Average Daily Airfield Operations (Continued)

Unit	Aircraft	Modeled As (if different)	No. of Flying Days per Year	Departure			Arrival			VFR Patterns			IFR Patterns			Totals		
				Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Transient (Continued)	C-172, C-182, H-3, KODIAK, P-28A, T-44, T-6	GASEPF	365	29	-	29	29	-	29	-	-	-	-		-	58	-	58
	C-135	KC-135R		87	-	87	87	-	87	208	-	208	140	-	140	522	-	522
	AH-1, UH-1, UH-60, CH-47, H-46, H-53, S-64	UH-60		73	-	73	73	-	73	-	-	-	-		-	146	-	146
	T-38A	T-38A		258	-	258	258	-	258	620	-	620	414	-	414	1,550	-	1,550
Transient Totals				1,002	-	1,002	1,002	-	1,002	1,806	-	1,806	1,204	-	1,204	5,014	-	5,014
Grand Totals				**4,151**	**-**	**4,151**	**3,901**	**250**	**4,151**	**12,762**	**952**	**13,714**	**9,468**	**659**	**10,127**	**30,282**	**1,861**	**32,143**

Notes:
(8) Total operations (30,507) exclude VFR Itinerant, Special Use, and Overflight Tower Counts.
(9) Departure and arrival totals from Traffic Count Summary for FY2013; if departures and arrivals did not balance then the lower was increased to match.
(10) Based (507th, 552nd, Navy E-6) sorties from squadron interviews; closed patterns operations estimated by patterns per sortie
(11) Transient departures and arrivals from FY2012 Transient Alert counts (FY2013 not available at time of analysis).
(12) Transient aircraft that conduct pattern operations modeled at a rate of 2 pattern circuits per sortie (60 percent VFR/40 percent IFR).
(13) 10 FLTS departure and arrival operations not directly obtainable so the previous 2006 study operations were scaled to match Traffic Count total departures and arrivals.
(14) 10 FLTS pattern operations scaled from previous 2006 study to match remaining unaccounted pattern operations

4.2.1.2 Alternative 1

The KC-46A aircraft and airspace operations under Alternative 1 would be identical to that for the Preferred Alternative. Therefore, the discussion and analysis for the Preferred Alternative applies to Alternative 1 and any impacts would be less than significant.

4.2.1.3 No-action Alternative

The types of aircraft operating at the Tinker AFB, as well as airspace and runway use would remain the same as the baseline. Airfield operations would continue to be approximately 16 percent of the annual airfield capacity. The average hourly operations would continue to be about 6 percent of the IFR hourly capacity or 6 percent of the VFR hourly capacity. The air traffic control procedures, which accommodate the current types of activity, would continue to be used to control aircraft operations. Likewise, the airfield would have the capacity to continue to accommodate the current level of aircraft operations. Therefore, there would be no impact to airspace use and management as a result of the No-action Alternative.

4.2.1.4 Measures to Reduce Impacts

No impacts would be anticipated because (1) the airspace has the capacity to accommodate the Preferred Alternative and Alternative 1 activities anticipated at Tinker AFB, and (2) the aircraft operations at the airfield could be accomplished without conflicting with the existing airspace management procedures. No mitigation or best management practices would be recommended.

4.2.2 Noise

4.2.2.1 Aircraft Noise

At the time of preparation of this document, the KC-46A aircraft had not been produced and actual flight noise data for the aircraft was not available for the NOISEMAP noise model. Thus, it was necessary to identify a surrogate aircraft that could be used to estimate KC-46A noise data. The Air Force created approximated acoustic data sets for the KC-46A based on B-767 data measured during actual aircraft flyovers by the National Aeronautics and Space Administration (NASA). NASA did not measure static runup noise during the flyover noise measurement process. Static runup noise occurs when aircraft engines are run for aircraft maintenance activities, when aircraft engines are running while the aircrew accomplished aircraft checks prior to taxiing for takeoff, or when aircraft engines are running at the end of the runway prior to takeoff. After reviewing the flight data in NOISEMAP files, Air Force acoustic scientists selected the KC-135R aircraft to estimate the KC-46A static runup noise data. Accordingly, the B-767 noise data in the noise model were used for aircraft flight operations and the KC-135R noise data in the model were used for static runup operations for KC-46A operations [40 *CFR* Part 1502.22(b)(4)].

The level of impact associated with noise and the impact's potential for significance was determined by considering how the Proposed Action could interact with the existing baseline noise environment and noise resource categories in terms of context, intensity (e.g., Proposed Action noise levels), and duration. Adverse noise impacts may result in annoyance, incompatible land uses, or safety issues. Adverse impacts may be perceived as significant if noise levels exceed USEPA, United States Department of Housing and Urban Development, FAA, or DoD guidelines and/or result in reduced public safety or incompatible land uses.

4.2.2.1.1 Preferred Alternative

Single Event Noise Analysis. Table 3-2 lists the sound levels generated by overflights of based aircraft for typical flight operations. The KC-46A is noticeably quieter than a B-1, B-52 and E-3 aircraft for departures. The KC-46A is quieter than all based aircraft on arrival.

Averaged Noise Analysis. The primary source of noise in the vicinity of Tinker AFB would continue to be from aircraft operations. Like the other depot maintenance aircraft, KC-46As would be operated about 260 days per year, with approximately six KC-46A operations each average busy day. About seven percent of the total average busy day events would occur during environmental nighttime (*i.e.*, 10:00 p.m. to 7:00 a.m.). However, it is anticipated that none of the KC-46A events would occur during nighttime.

Figure 4-1 presents the Preferred Alternative noise contours and Figure 4-2 compares the Preferred Alternative and baseline noise exposure. The baseline aircraft ground tracks depicted in Figure 3-1 would continue to be used under the Preferred Alternative because there would be no need to change the tracks for the Preferred Alternative. As shown in Figure 4-2, the Preferred Alternative noise contours are coincidental with the baseline noise contours. Table 4-2 lists the numbers of acres and population within the Preferred Alternative 65 dB DNL noise contour line.

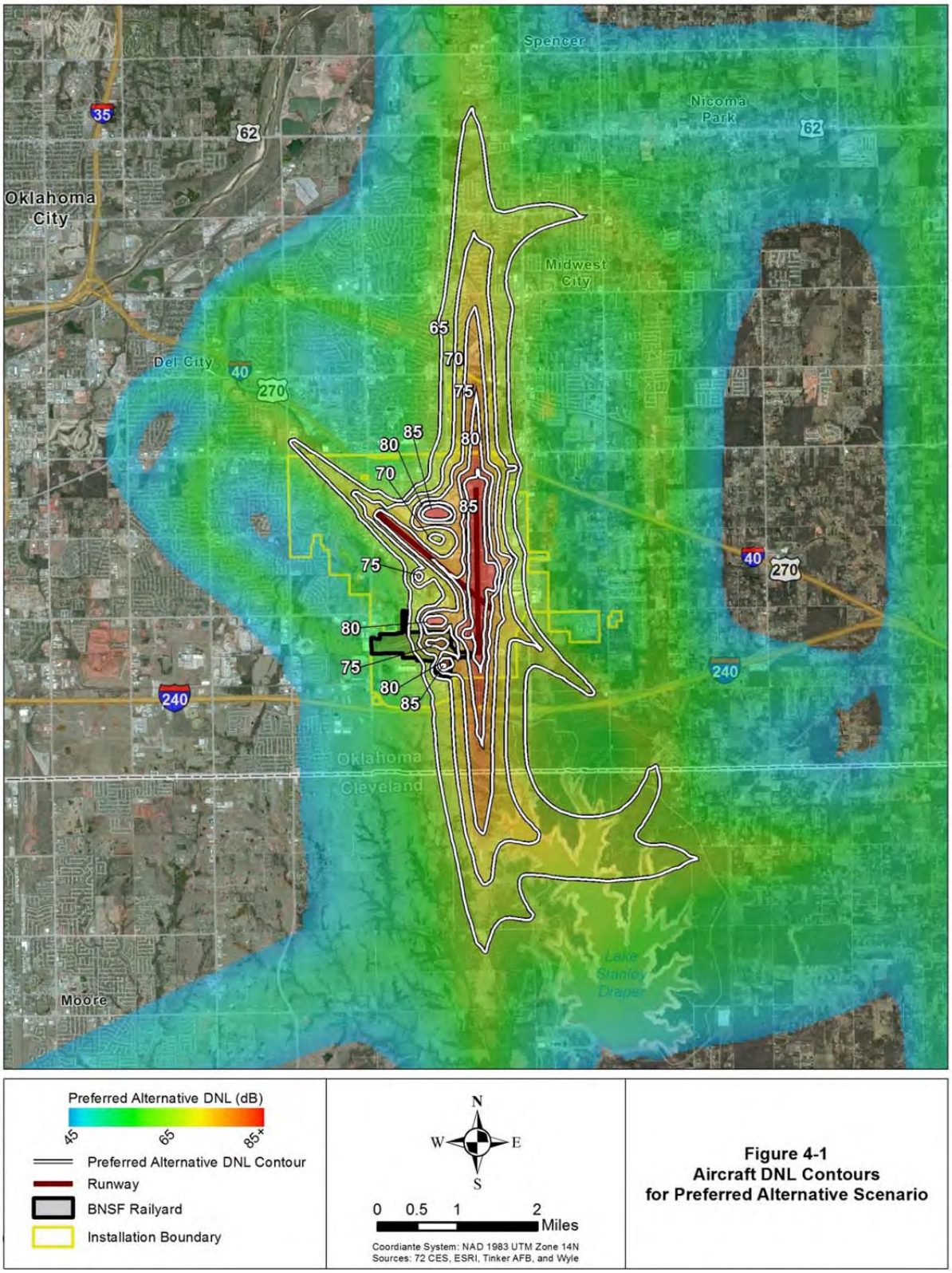


Figure 4-1
Aircraft DNL Contours
for Preferred Alternative Scenario

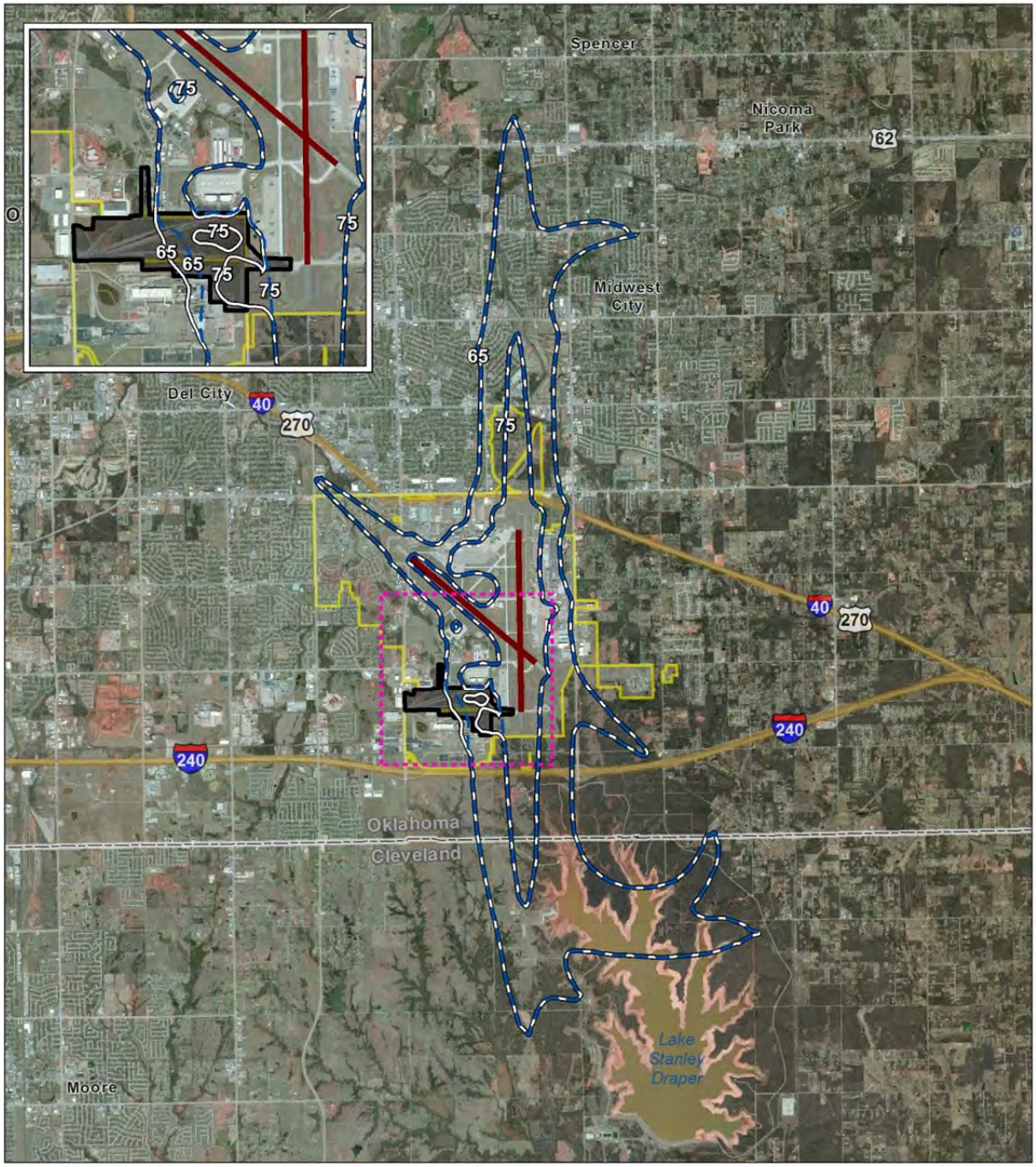


Figure 4-2
Comparison of Selected DNL Contours for Preferred Alternative and Baseline Scenarios

Table 4-2 Preferred Alternative Noise Exposure

DNL	Acreage						Population Off-base	
	On-Base	Change	Off-Base	Change	Total	Change	Total	Change
65-69	706	-13	2,869	-22	3,575	-35	5,032	0
70-74	747	-13	984	21	1,731	8	2,105	1
75-79	752	36	407	16	1,159	52	216	0
80-84	393	13	63	0	456	13	0	0
85+	357	1	0	0	357	1	0	0
Total	**2,954**	**24**	**4,324**	**15**	**7,278**	**39**	**7,354**	**1**

Note: Bodies of water excluded from computation
Sums may not equate due to rounding

Noise exposure would marginally increase by 15 acres off-base and less than 2 persons. Therefore, there would be no impact to aircraft noise levels as a result of the Preferred Alternative.

4.2.2.1.2 Alternative 1

The KC-46A airspace operations under Alternative 1 would be identical to that for the Preferred Alternative. KC-46A engine run-up operations at the DLA site would be the only difference from the Preferred Alternative noise analysis. Figure 4-3 presents the Alternative 1 noise contours and Figure 4-4 compares the Alternative 1 and baseline noise exposure. Table 4-3 lists the numbers of acres and population within the Alternative 1 65 dB DNL noise contour line.

Noise exposure would marginally increase by 1 acre off-base and less than 2 persons. There would be no significant impact to aircraft noise levels as a result of Alternative 1.

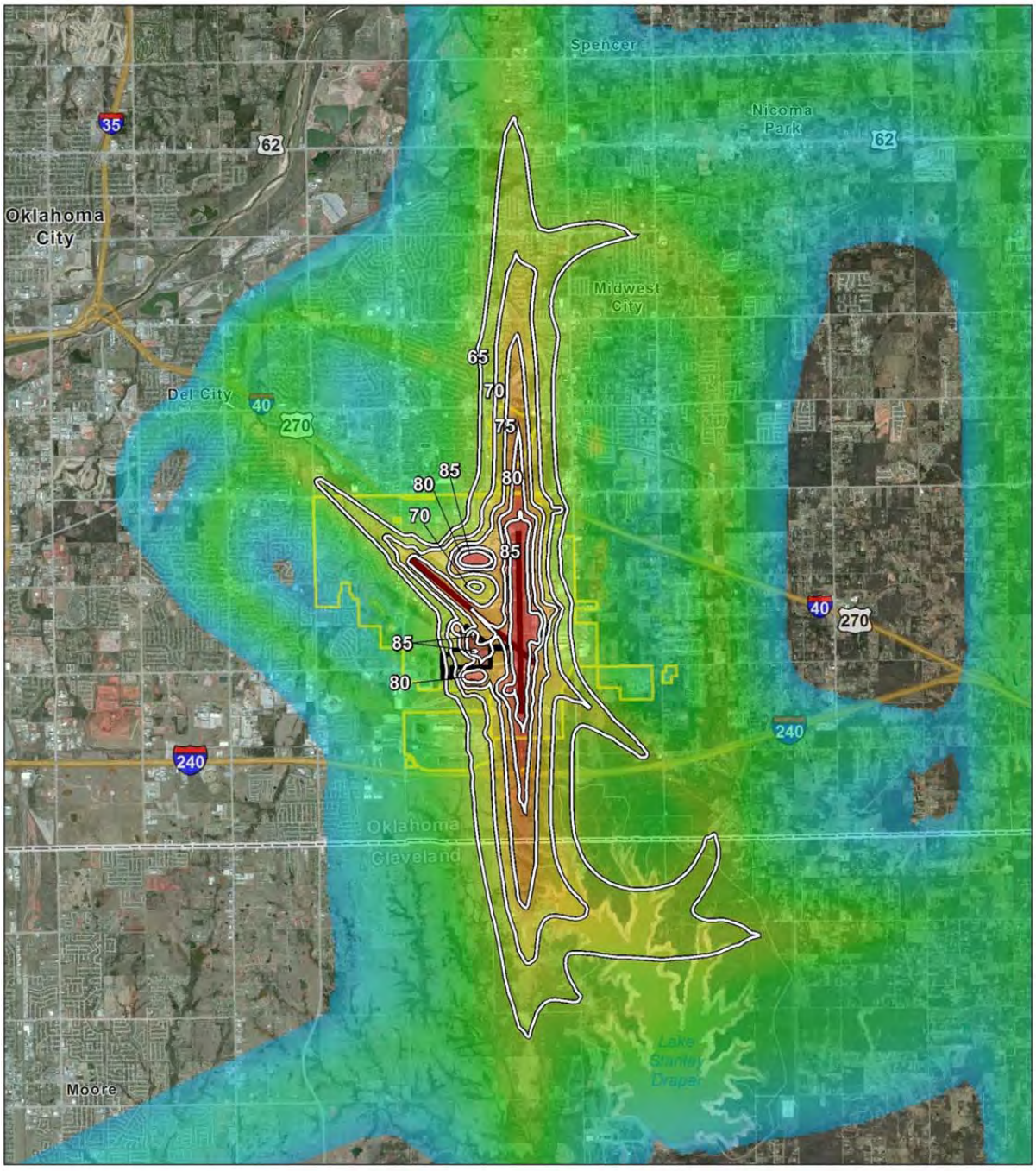


Figure 4-3
Aircraft DNL Contours
for Alternative 1 Scenario

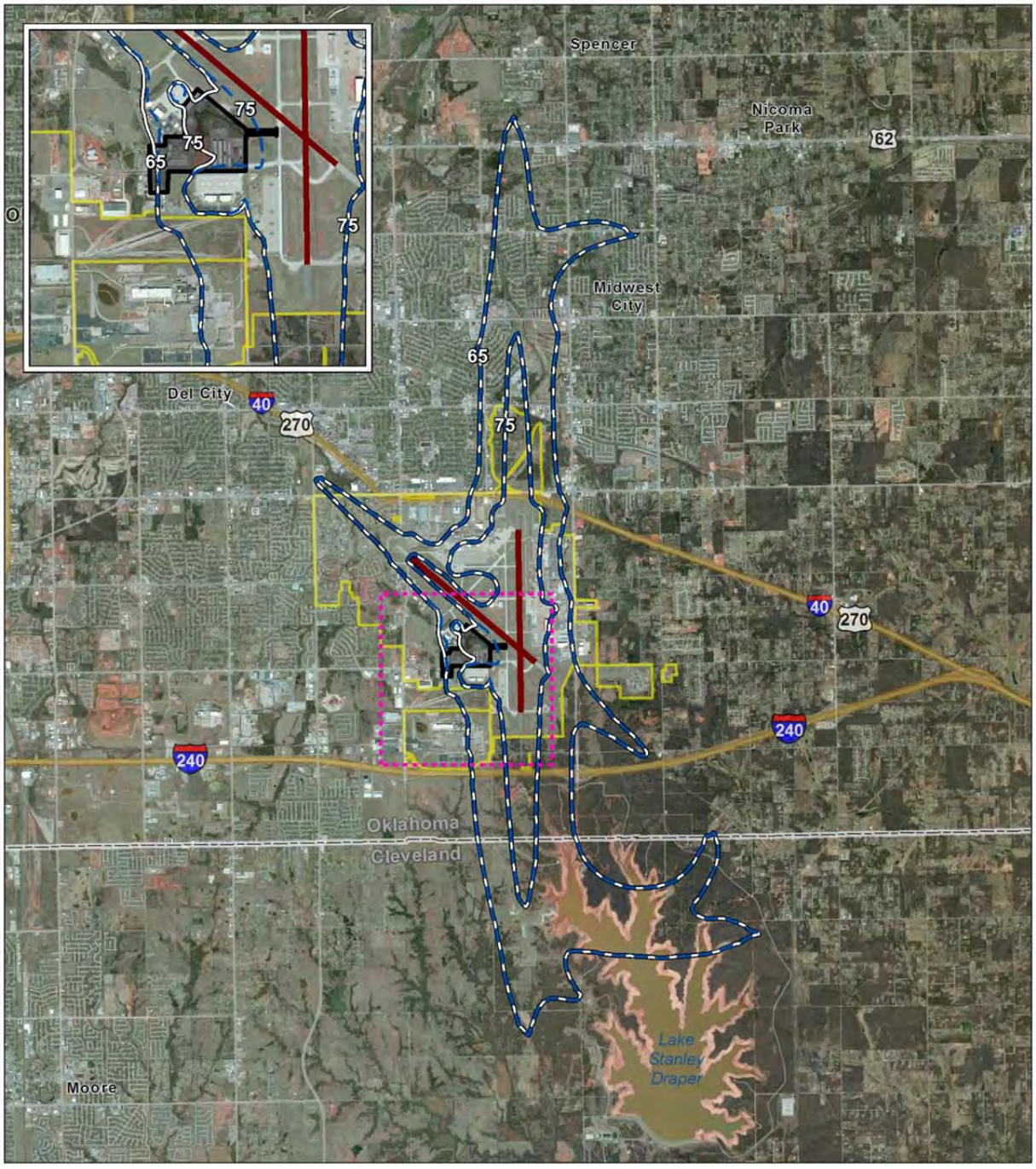


Figure 4-4
Comparison of Selected DNL Contours for Alternative 1 and Baseline Scenarios

Table 4-3 Alternative 1 Noise Exposure

DNL	Acreage						Population Off-base	
	On-Base	Change	Off-Base	Change	Total	Change	Total	Change
65-69	666	-53	2,891	0	3,557	-54	5,032	0
70-74	725	-35	964	1	1,689	-34	2,105	1
75-79	774	58	391	0	1,165	58	216	0
80-84	424	44	63	0	487	44	0	0
85+	357	1	0	0	357	1	0	0
Total	**2,946**	**15**	**4,309**	**1**	**7,255**	**16**	**7,354**	**1**

Note: Bodies of water excluded from computation
Sums may not equate due to rounding

4.2.2.1.3 No-action Alternative

Noise would continue to be generated by aircraft operations. The number of off-base acres and population exposed to noise of 65 dB DNL and greater would continue at 4,309 acres and 7,352 persons (see Table 3-2). Therefore, there would be no impact to aircraft noise as a result of the No-action Alternative.

4.2.2.2 Construction Noise

The following factors were considered in evaluating potential noise impacts: (1) the degree to which noise levels generated by construction activities were higher than the ambient noise levels; (2) the degree to which there is annoyance and/or interference with activity as a result of the alternative; and (3) the proximity of potential noise-sensitive receptors to the noise source.

Building construction and demolition work can cause an increase in sound that is well above the ambient level. Table 4-4 lists noise levels associated with the types of construction equipment expected to be utilized during demolition, site preparation, construction, and finishing work associated with the Preferred Alternative and Alternative 1. As shown in Table 4-4 the construction equipment produces peak SPLs ranging from 75 to 85 dBA at 50 ft from the source which decreases by 6 dBA with every doubling of the distance from the source. It should also be noted that this table includes the level generated, but does not account for the ability of sound to be reflected/absorbed by nearby objects, which could further reduce noise levels.

Table 4-4 Construction Equipment Peak Sound Pressure Levels

Equipment	Generated Noise[a] dBA				
	50 ft	100 ft	200 ft	400 ft	800 ft
Backhoe	78	72	66	60	54
Compactor	83	77	71	65	59
Crane	81	75	69	63	57
Dump Truck	76	70	64	58	52
Excavator	81	75	69	63	57
Front-end Loader	79	73	67	61	55
Grader	85	79	73	67	61
Paver	77	71	65	59	53
Pickup Truck	75	69	63	57	51
Roller	80	74	68	62	56
Scraper	84	78	72	66	60

Source: USDOT 2006
Notes:
[a] Noise from a single source.
dBA - "A-weighted" decibel
ft - feet

Noise naturally dissipates by atmospheric attenuation as it travels through the air. Factors that can affect the amount of attenuation are ground surface, foliage, topography, and humidity. Assuming that noise from the construction equipment radiates equally in all directions, the sound intensity would diminish inversely as the square of the distance from the source. Therefore, in a free field (no reflections of sound), SPLs from construction noise decreases 6 dB with every doubling of the distance from the source (USEPA 1977).

4.2.2.2.1 Preferred Alternative

The increased construction noise levels associated with the Preferred Alternative would come from the demolition of existing infrastructure and construction of new facilities on the BNSF Railyard site.

The noise associated with the operation of machinery on construction sites is typically short-term, intermittent, and highly localized; therefore, would not accumulate over time and would last only as long as the duration of construction and demolition activities.

It is anticipated that typical construction vehicles and equipment to be used during demolition, site preparation, construction, and finishing work would be similar to those presented in Table 4-4. Construction equipment expected to be used at the site would produce peak SPLs ranging from 75 to 85 dBA at 50 ft from the source (USDOT 2006). It should also be noted that Table 4-4 includes the SPL generated at various distances from the source, but does not account for the ability of sound to be reflected/absorbed by nearby objects, which could further reduce noise levels.

Areas adjacent to proposed construction activities would temporarily experience peak outside noise levels similar to those noted in Table 4-4. Air Force and civilians working at facilities near the proposed project sites would experience short-term elevated noise levels due to construction activities. In some cases, these facilities are immediately adjacent to, or adjoining the proposed construction sites. Workers would experience noise levels similar to those noted in Table 4-4, not accounting for additional noise reduction properties of building materials. Considering a 20 dB decrease in noise levels due to noise attenuating properties of windows and walls (US Navy 2005), building occupants of facilities within 50 ft of construction could expect to experience peak noise levels of 65 dB or less (USDOT 2006). All noise generated from construction activities would be limited to daytime hours and would only last as long as the duration of the project activities.

The closest noise-sensitive receptors to the project site are residences, located approximately 3,280 ft northwest from the site. Due to the distance from the site, short-term, peak, outside noise levels from construction activities would be approximately 39 dBA to 49 dBA at the nearest residences, which is below baseline noise levels and would be considered a negligible impact.

4.2.2.2.2 Alternative 1

Impacts under Alternative 1 would be similar to those described for the Preferred Alternative with different noise-sensitive receptors.

The closest noise-sensitive receptors to the DLA Infill campus would be residences, located approximately 3,630 ft northwest from the site. Due to the distance from the site, short-term, peak, outside noise levels from construction activities would be approximately 43 dBA to 49 dBA at the nearest residences, which is below baseline noise levels and would be considered a negligible impact.

4.2.2.2.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the baseline noise environment as described in Section 3.2.2.

4.2.2.3 Measures to Reduce Impacts

There would be no public health and welfare, nonauditory health effects, or hearing damage due to aircraft noise. Although there could be communication interference, the conditions would be intermittent and last for short periods of time. No mitigation or BMPs are recommended for aircraft noise.

Noise-generating heavy equipment at the project site should be equipped with the manufacturer's standard noise control devices (i.e., mufflers, baffling, and/or engine enclosures). All equipment should be properly maintained to ensure that no additional noise from worn or improperly maintained equipment parts is generated. Construction activities would occur between 0700 and 1900 hours and would be conducted according to OSHA regulations 29 CFR 1910.95 and 29 CFR 1926.52. Occupational exposure to

the noise from heavy equipment could be reduced by requiring workers to wear appropriate hearing protection. Hearing protective devices such as ear plugs or ear muffs should be worn at all locations where workers may be exposed to high noise levels. No mitigation measures would be required.

4.2.3 Ground and Aircraft Safety

The potential to increase or decrease safety risks to the public, the military, and property were analyzed in this section. Measures to reduce risk potential are also addressed. The Preferred Alternative has the potential to increase the risk for accidental death, serious bodily injury, illness or property damage. Analysis of construction safety considered health and safety of personnel for physical hazards, proper techniques, PPE, and best practices for construction site cleanliness. An aircraft safety impact may be significant if the change in the number or type of aircraft operations could potentially change the aircraft mishap rate. Significant impacts to ground, traffic, or construction safety may occur if there is an increase in the number and severity of incidents at Tinker AFB, proposed construction sites, or surrounding roads.

4.2.3.1 Aircraft Safety

4.2.3.1.1 Preferred Alternative

The Air Force does not have Class A mishap rates for the KC-46A because the aircraft is still in acquisition/production. The KC-46A aircraft design, types of operations (i.e., takeoffs, landings, and closed patterns), and aircraft operating characteristics (i.e., altitudes and airspeeds) would be very similar / nearly identical to the KC-135. Due to the similarities between the anticipated KC-46A and the KC-135, the KC-135 Class A mishap rates (see Table 3-4) are used for aircraft safety impact analysis (40 *CFR* Part 1502.22).

It is impossible to predict the precise location where an aircraft involved in an in-flight accident would impact the ground. However, aircraft operations are accomplished to avoid overflying residences and built-up areas to the maximum extent practicable. The levels and types of operations that KC-46A aircraft would accomplish at Tinker AFB would be consistent with those accomplished by the KC-135. Therefore, it is anticipated that the KC-135 Class A mishap rate would apply to KC-46A operations and that, over time, the KC-46A mishap rate would be comparable to that for the KC-135. The risk would be low that a KC-46A aircraft involved in an accident at or around Tinker AFB would strike a person or structure on the ground. Therefore, the change in the aircraft mishap rate associated with the Preferred Alternative would be negligible.

As previously noted, the KC-46A and KC-135 aircraft design, types of operations, and aircraft operating characteristics would be very similar/nearly identical. For these reasons, the addition of KC-46A aircraft operations at Tinker AFB would not affect the Tinker AFB AICUZ document because the noise contours remain the same as those in the AICUZ (see Figure 4-2).

4.2.3.1.2 Alternative 1

The Preferred Alternative and Alternative 1 are identical when considering the type and level of aircraft operations at the Tinker AFB airfield. Therefore, the discussion and analysis for the Preferred Alternative applies to Alternative 1. The risk would be low that a KC-46A aircraft involved in an accident at or around Tinker AFB would strike a person or structure on the ground and the change in the aircraft mishap rate associated with Alternative 1 would be negligible.

4.2.3.1.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the baseline conditions described in Section 3.2.3.2.1. The risk would continue to be low that an aircraft involved in an accident at or around the Tinker AFB would strike a person or structure on the ground.

4.2.3.2 Ground Safety

4.2.3.2.1 Preferred Alternative

Under the Preferred Alternative nuisance dust may impact workers and bystanders during the construction of the depot maintenance area. During construction for the Preferred Alternative at the BNSF Railyard facility, the majority of ground safety issues would be due to slips, trips and falls, unfamiliar work environment, and task specific hazards such as working with hand tools or power tools and heavy equipment. It is possible to expect an increase in the number of incidents due to the increase in activity occurring on the base. Construction would present a short-term hazard which would be mitigated with best management practices at each phase of the project to help ensure the safety of all involved. During the construction portion of the project there would be approximately 350 additional people accessing the Base regularly, or a one percent increase occurring during working hours only. After construction, at full depot maintenance capacity, there would be an increase in support personnel of approximately 255, or a one percent increase in the working day population. This influx of personnel could increase the potential for ground safety and traffic incidents by a similar amount. It is expected that the distribution of the types and severity of incidents would remain consistent after the addition of support personnel on base. This means that for the largest Class of mishaps recorded in 2013, Class D mishaps (298), it is expected that there could be an increase of 18 mishaps annually, for a total of 316. However, the close proximity of resources within the consolidated depot maintenance campus and the level of technological upgrades would create an environment for efficiency and minimal risk that would help to minimize any potential increases in safety mishaps. Therefore, the anticipated change in ground safety mishaps as a result of the Preferred Alternative would be minor.

Traffic Safety

Construction activities of any magnitude would change the dynamics of travel around the installation especially in the area closest to the work being conducted. The ingress and

egress of additional contractor's vehicles and construction equipment would add congestion thereby adding to the potential for an accident. The added traffic from such vehicles and equipment would also hinder the routes available through the base and increase the flow of traffic through any established detour routes, thus increasing the likelihood of an incident. Specifically the need to reroute Midwest Boulevard would alter the flow of traffic in that portion of the Base. Communication to base residents and employees well in advance of construction commencement would be necessary in order for them to plan alternate travel routes. Signage placed around the base to clearly mark detours, alternate parking areas, expected time delays and potentially dangerous work areas would help to minimize congestion, traffic accidents, and hazards for pedestrians during the construction time period, thus reducing the risk of potential bodily injury, death or property damage. By implementing these BMPs, it is not expected that construction associated with the Preferred Alternative would impact the number or severity of traffic accidents.

Traffic counts and patterns on Tinker AFB are expected to change once construction is complete. New as well as modified routes on base would need to be established. The combination of 255 additional employees on base and the minor change in the base footprint would likely result in a minor increase in traffic incidents. However, it is expected that the distribution of the types and severity of incidents would remain consistent after implementation of the Preferred Alternative.

Construction Safety

Construction and demolition are inherently dangerous activities due to the use of large, powerful, and noisy pieces of equipment; however, during construction activities associated with the Preferred Alternative, additional measures would be taken in order to protect both the construction workers and the residents of the installation. The relocation of overhead electrical lines would be cause for additional monitoring during work. The possibility of electrocution or discovery of underground utility components would require additional expertise and PPE if found. There would be a short-term, minor increase in the potential for incidents during this time. Clear demarcation of the work area as well as fencing would be needed to keep construction activities and debris in the construction area and bystanders out of the potentially dangerous work areas. Demolition may increase the risk to workers as well as base personnel of being exposed to hazards like asbestos, lead based paint or nuisance dust; however, all construction contractors would be accountable for maintaining a safety program which protects their employees and limits the exposure to all base personnel during the time of work. Construction employees would be given the proper training to identify hazards as well as all necessary PPE to do their jobs safely. The PPE would include hard hats, steel toed boots, hearing protection, work gloves, reflective vests, safety harnesses, signaling flags, communication devices and any other equipment deemed necessary in the safety plan. Use of PPE and signage at the construction site would protect workers and bystanders from sharp or heavy tools and construction materials, loose construction debris, large and noisy moving equipment, as well as biological hazards such that an increase in the number or severity of construction accidents would not be expected under the Preferred

Alternative. Therefore, it is expected that the Preferred Alternative would have no impact on the rate or severity of construction accidents.

4.2.3.2.2 Alternative 1

Ground safety impacts under Alternative 1 would be similar to the Preferred Alternative except that demolition of existing buildings would be required in order to make room for the construction of the new maintenance facilities. Demolition may increase the risk to workers as well as base personnel of being exposed to hazards like asbestos, lead based paint or nuisance dust; however, all construction contractors would be accountable for maintaining a safety program which protects their employees and limits the exposure to all base personnel during the time of work. Impacts to the rate and severity of construction accidents under Alternative 1 would be short-term and negligible.

4.2.3.2.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the baseline conditions described in Section 3.2.3.2.2.

4.2.3.3 Measures to Reduce Impacts

No mitigation measures would be required. BMPs such as posting signs in unfamiliar work areas to mark detours, alternate parking areas, expected time delays and potentially dangerous work areas; and communication with base residents and employees well in advance of construction commencement would help to minimize congestion, traffic accidents, and hazards for pedestrians during the construction time period. This would help to reduce the risk of potential bodily injury, death or property damage. Additionally, use of signage and PPE such as hard hats, steel toed boots, hearing protection, work gloves, reflective vests, safety harnesses, signaling flags at the construction site would protect workers and bystanders from sharp and/or heavy tools, construction materials, loose construction debris, large and noisy moving equipment, as well as biological hazards. Infrastructure capabilities would be increased to accommodate the influx of personnel. Trained personnel would be available for removal of more serious hazards such as asbestos and lead. Disturbed soils would be watered to reduce fugitive dust.

4.2.4 Air Quality

The following factors were considered in evaluating air quality: (1) the short- and long-term air emissions generated from construction/demolition, paving operations and aircraft maintenance operations; (2) the type of emissions generated; and (3) the potential for emissions to result in ambient air concentrations that exceed one of the NAAQS or SIP requirements. The air emission calculations for the Preferred Alternative and Alternative 1 included in the sections below are detailed in Appendix F.

Potential emissions from the Preferred Alternative and Alternative 1 would occur from construction/demolition activities and aircraft operations at Tinker AFB. Construction/demolition would include activities such as grading, excavation, filling, and equipment operation. Thus, construction/demolition emissions would be localized within

the area surrounding the project location. Aircraft emissions would occur within a larger geographical area around Tinker AFB. For this reason, the analysis in this EA will address potential impacts from the Preferred Alternative and Alternative 1 within the entire AQCR 184. As an existing Title V Permit holder, a PSD permit is required when an increase in emissions of a regulated air pollutant has the potential to exceed specific values. The requirement of a PSD permit alone does not indicate the action is significant. PSD permitting will be required prior to the construction of facilities associated with the KC-46A program. Potential emissions from the Preferred Alternative and Alternative 1 would occur from construction/demolition activities and aircraft operations at Tinker AFB. Construction/demolition would include activities such as grading, excavation, filling, and equipment operation. Thus, construction/demolition emissions would be localized within the area surrounding the project location. Aircraft emissions would occur within a larger geographical area around Tinker AFB. For this reason, the analysis in this EA will address potential impacts from the proposed and alternative actions within the entire AQCR 184.

At Tinker AFB VOC emissions generated from aircraft maintenance operations are not minimized through use of controls, but rather the Tinker AFB strategy is to comply with established national emission standards for hazardous air pollutants.

4.2.4.1 Preferred Alternative

The Preferred Alternative would result in short-term emissions and fugitive dust during the construction of the depot maintenance area. There would be minimal ambient air impacts from these localized short-term emissions that would quickly dissipate away from the activity source. It has been assumed that each of the four phases of development would be one year in duration and most construction activities would be divided equally among the four phases. The long-term emissions would increase due to the addition of stationary combustion sources at the boiler and chiller plants, flight emissions, engine testing (in test cells), and the increase in personnel POVs. VOC emissions would increase primarily from the increase in solvent use during general cleaning/depainting and fuel component testing. The change in flight and engine testing emissions at maximum capacity is just a small portion of the long term net emissions increase.

The combustion of fuel by construction equipment and worker vehicles involved in the Preferred Action and Alternative 1 would result in emissions of CO, VOC, NO_x, SO_2, and PM_{10} and $PM_{2.5}$ (USAF 2003). $PM_{2.5}$ emissions factors have not been developed for all operations; it is conservatively assumed that $PM_{2.5}$ emissions are equivalent to PM_{10} emissions.

Annual short-term emissions for the Preferred Alternative are summarized in Table 4-5. Potential net long term annual emissions increase over the baseline (2012) occurs in year 2029 at maximum KC-46A capacity and the continued maintenance of 22 KC-135 aircraft. The potential net long-term emissions increase is summarized in Table 4-6. The number of aircraft undergoing maintenance at Tinker AFB during the KC-135 drawdown and KC-46A beddown schedules are shown in Tables F-25 and F-26 of Appendix F.

Long term annual emissions include the following: change in flight and engine testing emissions (in test cells), personnel privately owned vehicles, general solvent use, depainting, fuel components testing, boiler plant, and chiller plant. Note that some of the depot maintenance activities would not be expected to occur until much later in the repair schedule. The first cycle of depot maintenance activities are scheduled to begin in 2018.The KC-46A VOC emissions from general solvent use and depainting is based upon the annual VOC emissions of a single KC-135 in 2012, increased by 39.8 percent to account for the larger KC-46A (USAF 2013f). It was assumed that for a single KC-46A that has 2 engines, VOC emissions from fuel component testing will be half that of a single KC-135 that has 4 engines. There would likely be a minimal to no increase in ground support equipment that currently exists at Tinker AFB, therefore emissions were not estimated from ground support equipment. Emergency generators for hangar door lifts would be operated less than 500 hours per year; therefore, would not be a major contributor to air emissions. As older AGSE are retired, the replacement AGSE may have lower emissions than the AGSE they replace. It is not known when stationary sources such as boilers and chillers will no longer be operated. Therefore, the emissions shown are conservative because they do not include any reduction from the removal of these sources.

The Tinker AFB Title V Permit will have to be updated to reflect any change in significant stationary sources located on the base. See Table F-24 in Appendix F for the change in emissions from aircraft flights, engine testing, and maintenance activities above the baseline (2012) for each year during the drawdown/beddown. The contribution from flight emissions to the totals shown in Table F-24 is minimal. Therefore, the change in emissions shown in Table F-24 is primarily from stationary sources. Required permit modification is not an indication that the increase in emissions would have significant ambient air impacts.

Review of emissions from the Preferred Alternative in Table 4-5 and Table 4-6 indicates that there would be an increase in emissions associated with the Preferred Alternative. The greatest percentage of impact to the local emissions at maximum KC-46A capacity and the continued maintenance of 22 KC-135 aircraft would be potential net long-term annual VOC emissions (144 tons per year [tpy]) at 0.091 percent of regional emissions. An increase in regional emissions of 0.091 percent would not be considered significant, and no mitigation would be required. The KC-46A engine was designed to minimize criteria pollutant emissions and no other engine emission reduction modifications are feasible. Therefore, impacts to air quality in year 2029 at maximum KC-46A capacity and the continued maintenance of 22 KC-135 aircraft as a result of the Preferred Alternative would be considered less than significant.

Table 4-5 Expected Short-Term Annual Emissions from Preferred Alternative and Alternative 1

	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2
Preferred Alternative (tpy)	3.3	35.7	23.8	26.9	5.6	1.4
Percent of Regional Emissions	2.09E-03	9.59E-03	0.029	0.021	0.023	0.053
Alternative 1 (tpy)	3.3	35.2	24.3	37.3	7.0	1.5
Percent of Regional Emissions	2.09E-03	9.46E-03	0.030	0.29	0.29	0.057
AQCR 184 (tpy)a	157,761	372,258	82,054	130,111	24,177	2,641

Notes:
AQCR = Air Quality Control Region
CO = carbon monoxide
NO_x = nitrogen oxides
$PM_{2.5}$ = particulate matter equal or less than 2.5 micrometers in diameter
PM_{10} = particulate matter equal or less than 10 micrometers in diameter
SO_x = sulfur oxides
tpy = tons per year
VOC = volatile organic compound
[a] Includes emissions from point, area, on-road, non-road mobile sources, and biogenic sources. Total for all counties in AQCR 184 is shown. Source: USEPA 2012a. Emissions come from an extract of USEPA's National Emission Inventory (NEI). Data for year 2008 were extracted from the NEI Version 2 April 2012. NEI is an emissions database developed by USEPA, 2008 is the latest year of emissions available.

Table 4-6 Summary of Potential Net Long Term Annual Emissions Increase at Full KC-46A Capacity

	VOC	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2
Preferred Alternative, All Sources (tpy)[a]	144	93.7	26.5	8.0	8.1	2.7
Preferred Alternative, Stationary Sources Only (tpy)	140	63.4	32.9	2.4	2.4	0.0
Percent of Regional Emissions	0.091	0.025	0.032	NA	NA	0.10
Alternative 1, All Sources (tpy)[a]	144	93.7	26.5	-8.0	-8.1	-2.7
Alternative 1, Stationary Sources Only (tpy)	140	63.4	32.9	2.4	2.4	0.0
Percent of Regional Emissions	0.091	0.025	0.032	NA	NA	0.10
No-action Alternative	0.0	0.0	0.0	0.0	0.0	0.0
AQCR 184 (tpy)[b]	157,761	372,258	82,054	130,111	24,177	2,641

AQCR = Air Quality Control Region
CO = carbon monoxide
NO_x = nitrogen oxides
$PM_{2.5}$ = particulate matter equal or less than 2.5 micrometers in diameter
PM_{10} = particulate matter equal or less than 10 micrometers in diameter
SO_x = sulfur oxides
tpy = tons per year
VOC = volatile organic compound

[a] Includes change in flight emissions, engine testing, personnel privately owned vehicles, general solvent use, depainting, fuel components testing, boiler plant and chiller plant. There would likely be a minimal to no increase in ground support equipment that currently exists at Tinker AFB, therefore emissions were not estimated from ground support equipment. Emissions shown are the maximum increase over baseline (2012) that occurs in the year 2029 at full KC-46A operation (90 aircraft) and 22 KC-135 aircraft that will continue undergoing maintenance at Tinker AFB. It is not known when stationary sources such as boilers and chillers will no longer be operated at complete KC-135 retirement. Therefore, the emissions shown are conservative because they do not include any reduction from the removal of these sources.

[b] Includes emissions from point, area, on-road, non-road mobile sources, and biogenic sources. Total for all counties in AQCR 184 is shown. Source: USEPA 2012a. Emissions come from an extract of USEPA's National Emission Inventory (NEI). Data for year 2008 were extracted from the NEI Version 2 April 2012. NEI is an emissions database developed by USEPA, 2008 is the latest year of emissions available.

4.2.4.2 Alternative 1

Alternative 1 would result in greater short-term emissions during the construction of the depot maintenance area, than for the Preferred Alternative as a greater amount of soil fill is required to be brought in for this alternative. The largest short-term increases in emissions would be 35.2 tpy of CO. Fugitive dust emissions for Alternative 1 would be three times greater than those for the Preferred Alternative; however fugitive dust would quickly dissipate away from the activity source. There would be minimal ambient air impacts from these localized short-term emissions.

Review of emissions from Alternative 1 in Table 4-5 and Table 4-6 indicates that the greatest percentage of impact to the local emissions would be potential net long term annual VOC emissions (144 tpy) at 0.091 percent. The long-term emissions shown in Table 4-6 would be identical to the Preferred Alternative (i.e., 144 tpy).

Impacts to air quality from Alternative 1 would be considered less than significant.

4.2.4.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the existing Tinker AFB emissions as described in Section 3.2.4.2.

4.2.4.4 Greenhouse Gases

A comprehensive air emission inventory that assesses levels of CO_{2eq} emissions generated at Tinker AFB for all construction, stationary, and mobile source emissions is not currently available to support the EA analysis. The baseline emissions information is typically relevant to determining whether the increased emissions associated with the alternatives are significant. However, since there is currently no accepted methodology for quantitatively relating amounts of CO_{2eq} emissions to an associated amount of climate change, the absolute differences between a baseline and an amount associated with a given action alternative is not essential for decision making. Instead, the CO_{2eq} emissions for the action alternatives will be used to compare action alternatives against each other.

Tinker AFB is currently subject to the annual reporting requirements of CO_{2eq} from stationary source fuel combustion, as required by 40 CFR Part 98 - Mandatory Greenhouse Gas Reporting. Under the Preferred Alternative and Alternative 1: the potential net long term annual emissions from stationary combustion sources would release approximately 89,236 metric tons of CO_{2eq} per year, respectively. The potential increase in CO_{2eq} from stationary combustion sources in the Preferred and Alternative Action exceeds the PSD GHG rule applicability threshold and a PSD permit would be required.

It is currently not possible to mathematically relate CO_{2eq} emission levels to a corresponding climate change. The USAF is poised to support climate-changing initiatives globally, while preserving military operations, sustainability, and readiness by working, where possible, to reduce GHG emissions (USAF 2010f). The PSD permit application submitted for this project included all air pollutants that exceeded specific values and reporting thresholds.

4.2.4.5 Measures to Reduce Impacts

Little impact to local air quality would be expected from the Preferred Alternative and Alternative 1 associated with the construction of the depot maintenance facilities at Tinker AFB. Therefore, no mitigative actions would be required. BMPs could include watering to reduce fugitive dust, erosion measures, the use of low sulfur and bio-diesel fuel in construction/transport vehicles. KC-46A flight and engine testing emissions are less than or comparable to those that currently exist from KC-135 flight and engine testing. Therefore, no increased impacts to climate and air quality are expected and mitigation of aircraft emissions is not required. Future POV and stationary combustions sources will have lower emissions rates than those that currently exist, thereby decreasing or minimizing potential impacts to climate and air quality from those sources.

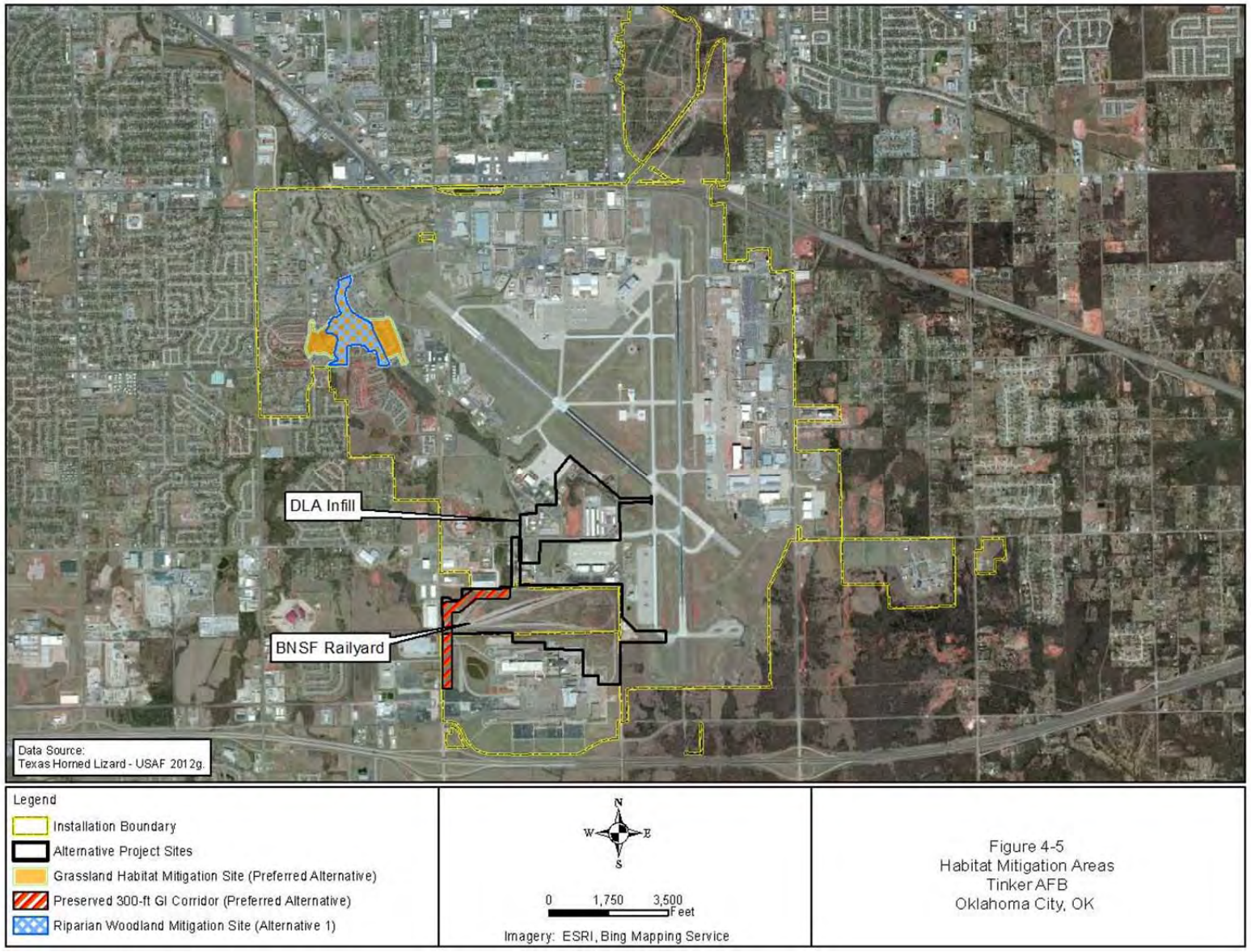
4.2.5 Land Use

Proposed demolition, KC-46A depot maintenance construction operations, and KC-46A maintenance facility operations were examined and compared to existing land-use conditions and land-use plans to determine impacts to land use at Tinker AFB and surrounding properties. Potential impacts may be considered significant if an action results in the long term change to land-use restrictions, potential conflicting uses on- and off-base, or loss of land utilized by the public.

4.2.5.1 Preferred Alternative

Under the Preferred Alternative, BNSF Railyard operations would cease and all infrastructure and equipment associated with the railyard would be removed. The Preferred Alternative would result in a change of approximately 240 acres of Airfield, Industrial, Community (Services) (off-base land use), Open Space, and Undeveloped land uses, to Aircraft Operations and Maintenance. A small amount, 3.57 acres (1.78 percent), of Open Space is located within a CZ in the area of the Preferred Alternative and would be converted to Aircraft Operations and Maintenance. This change in land use would be expected to conflict with the Tinker AFB General Plan, which provides a recommendation to convert land located within the CZ to open space. The 3.57 acres of land located within the CZ proposed as Aircraft Operations and Maintenance, would accommodate a new taxiway, and would be clear of facilities and obstructions to flight as required by Air Force Manual 32-1123(I). Taxiways are permissible within a CZ. In addition, approximately 9 acres of GI area are located within the Preferred Alternative. Following Land Management guidance included in E.O. 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, the land use features associated with the GI and its connective corridor will be relocated if impacted. Under the Preferred Alternative a 300-foot corridor of GI would remain intact and preserved on the north and western boundaries on the BNSF Railyard site (Figure 4-5), therefore relocation of GI resources would not be required. A housing area, currently under lease to a housing privatization contractor is slated to be demolished and then the land conveyed back to Tinker AFB. As discussed under biological resources 4.2.8.1, approximately 50 acres of this former housing area would also be converted to GI, to mitigate for grassland habitat loss (identified as Grassland Habitat Mitigation and Riparian Woodland Mitigation Sites on Figure 4-5). It is anticipated that the demolition of this housing area and subsequent conveyance will be completed prior to the initiation of the Proposed Action of this EA. It is also anticipated that once conveyed to Tinker AFB, approximately 50 acres of this area would be restored to mixture of high quality wooded riparian/grasslands habitat and become GI. Therefore under the Preferred Alternative GI would increase by approximately 54 to 64 acres.

Therefore, the minimal amount of acreage, land use changes, and relocation of natural environments that would result from the Preferred Alternative are expected to result in no impacts to land use compatibility with the current on- and off-base land uses. Expected future land use designations in the area of the Preferred Alternative are shown in Figure 4-6 and presented in Table 4-7 below.


DLA Infill
BNSF Railyard
Data Source:
Texas Horned Lizard - USAF 2012g.
Legend
Installation Boundary
Alternative Project Sites
Grassland Habitat Mitigation Site (Preferred Alternative)
Preserved 300-ft GI Corridor (Preferred Alternative)
Riparian Woodland Mitigation Site (Alternative 1)
N
W
E
S
0
1,750
3,500
Feet
Imagery: ESRI, Bing Mapping Service
Figure 4-5
Habitat Mitigation Areas
Tinker AFB
Oklahoma City, OK

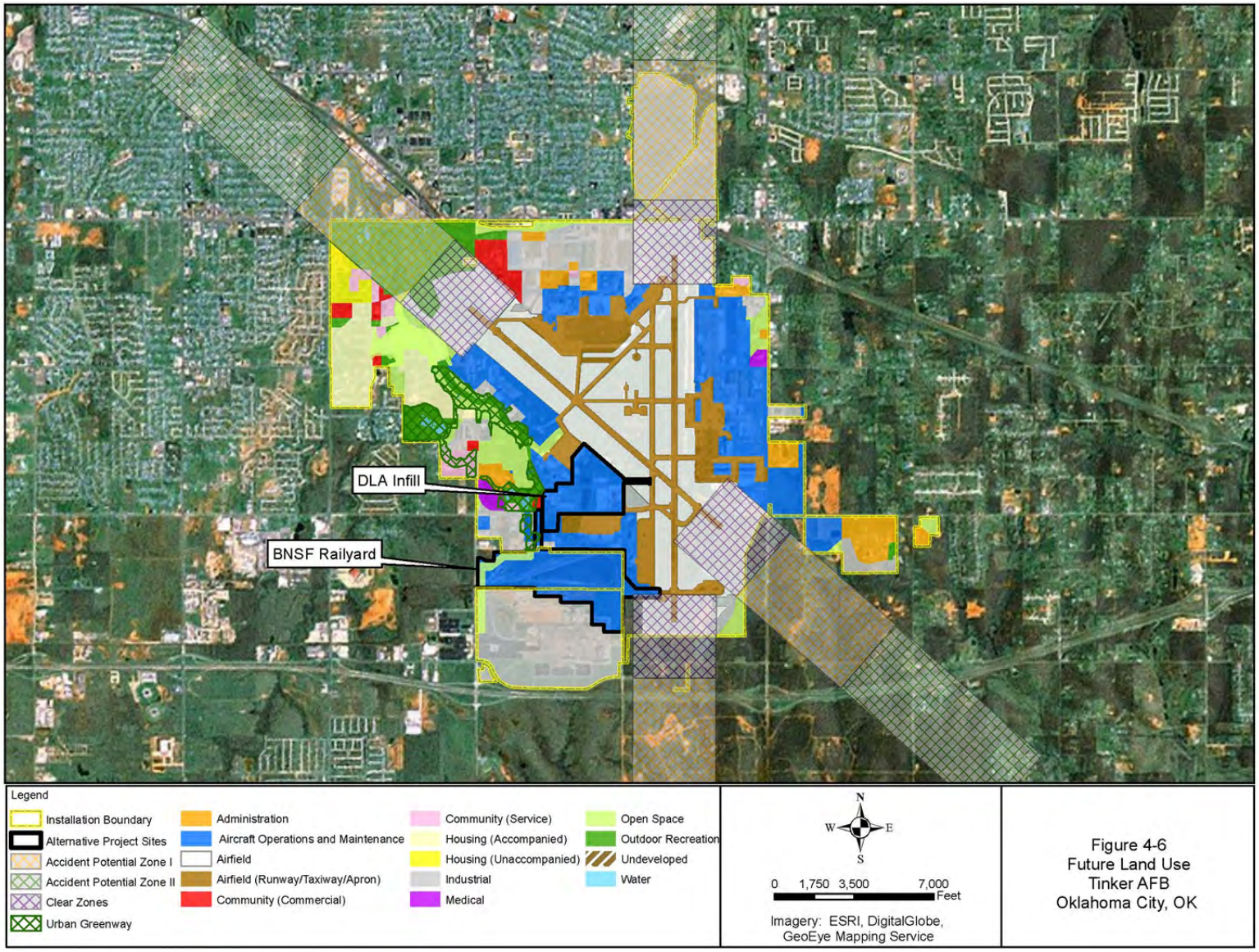


Figure 4-6
Future Land Use
Tinker AFB
Oklahoma City, OK

Table 4-7 Alternative Land Use Designation Changes

Land Use Designation	Preferred Alternative			Alternative 1			No-action Alternative		
	Current Acres within BNSF Area	Proposed Acres within BNSF Area	Change (acres)	Current Acres within DLA Infill Area	Proposed Acres within DLA Infill Area	Change (acres)	Current Acres within Base	Future Acres within Base	Change[a] (acres)
Administration	0	0	0	0	0	0	119.07	161.76	42.69
Housing (Accompanied)	0	0	0	0	0	0	182.45	241.99	59.54
Housing (Unaccompanied)	0	0	0	0	0	0	59.91	41.89	-18.02
Medical	0	0	0	0	0	0	27.51	25.47	-2.04
Outdoor Recreation	0	0	0	0	0	0	367.86	368.84	0.98
Undeveloped	0	0	0	0	0	0	11.05	0	-11.05
Water	0	0	0	0	0	0	12.38	12.38	0
Industrial	55.94	0	-55.94	51.65	0	-51.65	893.98	1,021.12	127.14
Aircraft Operations and Maintenance	7.71	239.21	231.5	9.86	114.67	104.81	541.25	1,030.24	488.99
Airfield	0.57	0	-0.57	1.44	0	-1.44	1,021.18	1,173.01	151.83
Airfield (runway/taxiway/apron)	1.33	0	-1.33	3.81	0	-3.81	532.15	561.48	29.33
Community (Services)	155.48	0	-155.48	0	0	0	22.54	63.11	40.57
Community (Commercial)	0	0	0	6.16	0	-6.16	80.53	74.47	-6.06
Open Space	18.18	0	-18.18	41.75	0	-41.75	907.89	215.84	-692.05

Note:
Green Infrastructure (GI) within the Preferred Alternative is currently classified as Community (Services) land use. GI within Alternative 1 overlies Open Space, Industrial, and Airfield (Runway/Taxiway/Apron) land use categories.
[a] The change in acreage associated with the No-action Alternative is resultant from Tinker AFB's future land use plan and does not result from any activities associated with the Preferred Alternative or Alternative 1.

No new facilities are proposed to be constructed within the CZ under the Preferred Alternative; however, if new facilities are constructed within the Airfield CZs only facilities permissible under UFC 3-260-1 would be allowed (USAF 2007a). A portion of a taxiway is proposed to be constructed within the CZ; however, this use is compatible with land use restrictions associated with CZs. Land use restrictions associated with the Airfield CZs and APZs and the size of these areas would not change as a result of the Preferred Alternative. Parcels outside of Airfield CZs and APZs that would be vacated as a result of facility demolition would be returned to a developable land use status compatible with the surrounding land uses. (USAF 2008)

There are no ESQD arcs or EMP hazard areas located within the area of the Preferred Alternative as discussed in Section 3.2.5.2.1. Therefore, no impacts to ESQD arcs or EMP hazard areas as a result of the Preferred Alternative are expected to occur.

As discussed in Section 3.2.5.2.1 there are no ERP sites located within the area of the Preferred Alternative. As a result of the Preferred Alternative, there would be no change expected in the location of ERP sites and no demolition or construction activities would occur within ERP sites. Therefore, no impacts are expected to ERP sites as a result of the Preferred Alternative. Further detailed discussion of ERP sites can be found in Section 4.2.11.3.1.

4.2.5.2 Alternative 1

Under Alternative 1, DLA Infill facilities and operations would relocate to an existing 150,000 sf building located on the TAC facility. This relocation would include storage operations and approximately 15 office personnel.

Impacts under Alternative 1 would be similar to those described for the Preferred Alternative; however, approximately 44 acres of GI corridor, including a water storage area, would be converted to impermeable surfaces. Following Land Management guidance included in E.O. 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, the land use features associated with the GI and its connective corridor will be relocated outside of the project area in order to offset impacts to such environments and uses. A housing area, currently under lease to a housing privatization contractor is slated to be demolished and then the land conveyed back to Tinker AFB. It is anticipated that the demolition of this housing areas and subsequent conveyance will be completed prior to the initiation of the Proposed Action of this EA. It is also anticipated that once conveyed to Tinker AFB, approximately 50 acres of this area would be restored to mixture of high quality wooded riparian/grasslands habitat and become GI (See Figure 4-5); therefore, no significant impacts would be anticipated under Alternative 1. These changes would not be expected to conflict with any existing on- or off-base land uses. Expected future land use designations in the area of Alternative 1 are shown in Figure 4-6 and Table 4-7 in Section 4.2.5.1.

Land use restrictions associated with the Airfield CZs and APZs and the size of these areas would not change as a result of Alternative 1. Parcels outside of Airfield CZs and APZs that would be vacated as a result of facility demolition would be returned to a

developable land use status compatible with the surrounding land uses (USAF 2008). Therefore, Alternative 1 would have a long-term beneficial impact with respect to land-use planning on Tinker AFB.

There are no ESQD arcs or EMP hazard areas located within the Alternative 1 area. As a result of Alternative 1, there would be no change expected in the location of EMP hazard areas, ESQD arc areas, and no demolition or construction activities would occur within ESQD arc areas. Therefore, no impacts to ESQD arcs or EMP hazard areas are expected to occur as a result of Alternative 1.

There are two ERP sites (FT 024 and OT 023) located within the area of Alternative 1. FT 024 (Fire Training Area #4) and OT 023 (Facility 1123) have an ERP status of "Site Closeout is complete" (USAF 2010e); therefore, no current contamination exits and remediation activities have been completed. Under Alternative 1, there would be no change expected in the location of ERP sites and no demolition or construction activities would occur within actively contaminated ERP sites. Therefore, no impacts are expected to ERP sites as a result of Alternative 1. These sites are discussed in further detail in Section 4.2.11.3.2.

4.2.5.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the baseline land-use environment as described in Section 3.2.5.2. Land-use would continue on Tinker AFB as it currently does with continued maintenance associated with the KC-135 aircraft.

4.2.5.4 Measures to Reduce Impacts

Any newly constructed facilities as part of the alternative actions within the Airfield Clear Zones would only be permissible facilities allowed under UFC 3-260-1 (USAF 2007a). GI habitat would be maintained and preserved wherever possible. The GI corridor and associated vegetative and riparian areas would be expected to be relocated offsite to mitigate for the loss of natural environment onsite.

4.2.6 Physical Resources

Protection of unique geological features, minimization of soil erosion, identification of topographic changes, and the siting of facilities in relation to potential geologic hazards are considered when evaluating potential impacts of the Preferred Alternative and Alternative 1 on physical resources. Generally, impacts can be avoided or minimized if proper construction techniques, erosion control measures, and structural engineering designs are incorporated into project development.

Analysis of potential impacts on geological resources typically includes:

- Identification and description of resources that could potentially be affected.
- Examination of the Preferred Alternative and Alternative 1 and the potential effects they would have on the resource.
- Provision of mitigation measures in the event that potentially adverse impacts are identified.

Effects on geology and soils may be significant if they alter the lithology, stratigraphy, 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 implementation of the alternative, resulted in a change in floodplains such that stormwater could not be managed, or resulted in the probability that the project area would be flooded from stormwater.

4.2.6.1 Preferred Alternative

Preferred Alternative demolition and construction activities would occur in currently developed industrial land uses and would not be expected to have any adverse impacts on earth resources. The project areas have been previously disturbed by construction activities at the BNSF Railyard site, including railway lines, control buildings, underground utilities and drainage culverts, and roadways. The soils in the vicinity of these activities have been altered over time and the project areas are permanently disturbed with existing facilities and paved roads.

Under the Preferred Alternative, demolition, grading, and construction activities are expected to be implemented. Approximately 108 acres (44 percent) of the area of the Preferred Alternative would be impacted by short-term construction-related soil erosion. The area would be paved for aircraft beddown, maintenance, and supporting infrastructure, causing long-term or permanent loss of vegetation. Despite an increase in impervious cover by 125 percent, soils at the BNSF site have a very low to moderately low capacity to transmit water; therefore; there would be a negligible change in stormwater infiltration. Additionally, the detention basins associated with the Preferred Alternative would be designed to release stormwater at a rate equal to or less than existing current conditions.

Construction associated with the Preferred Alternative could also result in erosion of loose fine-grained soil materials, such as down-gradient of paved areas. Areas with clayey soils would be less susceptible to erosion. Since there is a large area of highly erodible soils at the Preferred Alternative site (Kirkland and Renthin soils), BMPs chosen to reduce erosion should be designed for optimal erosional control with consideration for the nature of disturbance. Highly disturbed construction areas would require the implementation of the most effective BMPs.

Additionally, construction of the new depot maintenance facility would generate fugitive dust; however, this disturbance would be short-term, would fall off rapidly with distance from the construction site, and would last only as long as the duration of construction. Building and dock foundations would extend into the subsurface and underground storage tanks may be installed for fueling operations, resulting in soil excavations and backfilling with engineered-specific soils. The impervious surfaces of paved areas impede erosion of soils directly beneath, but may increase erosion of soils down-grade of the paved areas if adequate drainage controls, such as drainage system BMPs, are not implemented. The areas and percent of the soil units that would be impacted by the Preferred Alternative are presented in Table 4-8.

Table 4-8 Areas and Percent of Soil Units Affected by the Preferred Alternative

Soil Unit	Soil Units in Construction Area (acres)	Soil Units in Total Area (acres)	Percent of Impacted Soil Unit
Kirkland-Urban land complex	8.85	29.93	29.57
Norge silt loam	0.20	1.99	10.05
Norge-Urban land complex	0	1.32	0
Renthin silty clay loam	9.99	10.49	95.23
Renthin-Urban land complex	83.99	175.97	47.73
Urban land	4.57	19.51	23.42
Total	**107.6**	**239.21**	**44.42**

As a result of anticipated disturbance at the Preferred Alternative site, erosion would be expected to occur over the short term during construction operations. This would impact the south central portion of the site, to the west at the proposed storm water detention pond area, and to the southeast at the corrosion control and run up ramp area. In areas where impervious surfaces are created by construction, such as concrete aprons, ramps and building foundations, no long-term impacts to soil erosion are anticipated.

No loss of prime farmland is anticipated to occur at the Preferred Alternative site, since no soils types mapped across the site are identified as such.

Minor topographic impacts are anticipated to occur where fill is placed for building construction.

4.2.6.2 Alternative 1

Impacts to stormwater infiltration as a result of Alternative 1 would be similar to those described for the Preferred Alternative, except that under Alternative 1, there would be a 34 percent increase in impervious cover.

Existing base facilities and infrastructure are presently located at the Alternative 1 site. These structures would be decommissioned and undergo new construction activities,

further modifying any existing surface soils and topography. Erosion associated with demolition and new construction activities would be expected to occur due to construction vehicle traffic and site grading which would remove existing vegetative cover. Approximately 70 acres (82 percent) of the Alternative 1 area would be impacted by short-term construction-related soil erosion. This includes the central portion of the site and to the northeast at the corrosion control and AGSE areas. In areas where impervious surfaces are created by construction, such as concrete aprons, ramps and building foundations, no long term impacts to soil erosion are anticipated. The areas and percent of soil units that would be impacted by the Alternative 1 activities are presented in Table 4-9.

Since there is a large area of highly erodible soils at the Alternative 1 site (Latrass and Renthin soils), BMPs chosen to reduce erosion should be designed for optimal erosional control with consideration for the nature of disturbance. Highly disturbed construction areas will require the implementation of the most effective BMPs.

The Lawrie Loam, 0 to 1 percent slopes, rarely flooded soils (LawA) is listed in the Oklahoma County Soil Survey as prime farmland. However, according to the Oklahoma County Soil Survey, urban or built-up areas of the listed soils are not considered prime farmland. Since LawA soils occur in a developed central portion of the DLA Infill area, they would not be considered prime farmland. No loss of prime farmland is anticipated to occur at the Alternative 1 site.

Table 4-9 Areas and Percent of Soil Units Affected by Alternative 1

Soil Unit	Construction Area (acres)	Total Area (acres)	Percent of Impacted Soil Unit
Ashport silty loam	12.17	15.32	79.44
Grainola-Ashport complex	0.56	1.14	49.12
Grainola-Urban-Ironmound land	0.00	0.22	0.00
Lawrie loam	3.29	3.29	100.00
Lawrie-Urban land complex	3.14	3.15	99.68
Renthin silty clay loam	0.93	0.97	95.88
Renthin-Urban land	3.07	3.85	79.74
Urban land	43.65	54.16	80.59
Water	4.55	4.55	100.00
Total	71.37	86.70	82.32

For topography, the intermittent stream and storm water detention pond at the Alternative 1 site would be removed and the surface drainage pattern would need to be redirected by diverting storm water flow to downstream of the 507th Apron through use of conveyance features. The topography would undergo major alterations as a result of construction-related site grading. In initial phase of construction, approximately 300,000 cubic yards of fill material would be placed in low areas. Fill material for subsequent phases of construction would be added as needed. It is likely that wherever fill material is placed,

soils would be classified as an Urban complex variation of the original soil type. The addition of fill material would result in a short-term, major increase in vehicle traffic on- and off-base. Construction traffic impacts are further discussed in Section 4.2.12.5.2. Fill material used would originate from the TAC borrow pit or other off-site locations to be determined. Additionally, stormwater drainage would be accommodated with the construction of detention basin, as further discussed in Section 4.2.7.1 Drainage. Topographic impacts would be less than significant.

4.2.6.3 No-action Alternative

Under the No-action Alternative, there would be no impact to physical resources and conditions would remain as described in Section 3.2.6.2.

4.2.6.4 Measures to Reduce Impacts

For the Preferred Alternative and Alternative 1, alterations would be short term and associated with construction, and no long term impacts would be expected once construction operations have been completed and facility landscaping and paving is in place. Should the Preferred Alternative or Alternative 1 actions be implemented, no mitigation measures would be needed. Drainage system BMPs would be installed to prevent soil loss and minimize sediment runoff during storm events occurring when construction is underway. Temporary soil stabilization and sediment controls would be implemented, including preservation of existing vegetation to the extent practical, management and control of storm water run-on / areas of concentrated flows, and management of disturbed soil areas. Any topsoil that is disturbed would be temporarily stockpiled for reuse on site where feasible.

4.2.7 Water Resources

4.2.7.1 Drainage

Potential impacts to drainage discussed in the following subsections were evaluated based on the findings outlined in the August 2013 Hydrology and Hydraulic Report prepared by USACE to support this EA (USACE 2013). The report included hydrologic and hydraulic modeling based on a 2002 floodplain study prepared for Tinker AFB. The models were then updated to reflect current conditions and the expected conditions resulting from development of the KC-46A project for each alternative. Parameters considered as part of the evaluation include increases in peak flow, runoff volume, and expected change to peak 100-year water surface. The Hydrology and Hydraulic Report, as well as information obtained from the DLA Planning Meeting was reviewed for proposed stormwater mitigation efforts. These documents are included as Appendix G of this EA.

4.2.7.1.1 Preferred Alternative

Under the Preferred Alternative, impacts to the location of stormwater management features would be expected. However, no changes to the net stormwater discharge would

be expected due to construction of a stormwater collection and distribution system in accordance with Executive Order 11988.

Based on the 2013 Hydrology and Hydraulic Report, the greatest increase to 100-year peak discharges for Crutcho Creek Basin would be 253 cubic feet per second (cfs) and would occur downstream from the convergence of East Crutcho Creek and Crutcho Creek, near Arnold Street. A minimal increase (no greater than 0.1 ft) in the 100-year peak water surface would occur. The 100-year runoff volume would increase by 9.6 acre feet (USACE 2013). Modeling results are included in the 2013 Hydrology and Hydraulic Report included in Appendix G.

Based on the 2013 Hydrology and Hydraulic Report, the project area for the Preferred Alternative provides sufficient area for on-site detention features to manage the additional stormwater discharge mentioned above. Several potential detention areas have been identified to meet the additional detention needs for the Preferred Alternative and would be selected during design of the KC-46A project. The following options for stormwater detention may be selected either individually or combined with other options:

Detention options for discharge to Crutcho Creek:

- Construct ditch or pipe features to divert stormwater to existing ponds located on the TAC property adjacent south. Outflow structures would be modified as needed.

- Construct new detention feature (approximately 750 ft by 50 ft on southern portion of the BNSF property).

- Construct two additional detention features (BNSF Detention Basin #2 and #3 as shown in the 2013 Hydrology and Hydraulic Report, included in Appendix G). These locations are less preferred as the BNSF Detention Basin #2 is located in the area of the IWTP and a potential area of concern associated with the adjacent TAC property.

Detention options for discharge to East Crutcho Creek:

- Modify the existing Fire Detention Pond as needed to accommodate the increased discharge.

- Construct a detention feature on the west side of the 507th ramp. Stormwater would discharge to East Crutcho Creek and would require mitigation for vegetation and stream loss.

A figure showing the locations of these detention options is included in Appendix G. Although the Preferred Alternative would result in increased impervious cover and increased stormwater generation, discharge from the detention basin will be equal to or less than the existing release rate into the creek northwest of the campus (USACE 2012). In addition, the stormwater management features would be in accordance with Executive

Order 11988. Therefore, impacts to drainage as a result of the Preferred Alternative would be less than significant.

Attempts would be made to steer drainage from the Preferred Alternative site location away from Beaver Marsh Filter, Beaver Pond, and Redbud Pond, as these areas are used for recreational purposes and provide habitat for aquatic fauna. The exact pathway for drainage would be determined during the design process.

4.2.7.1.2 Alternative 1

Development of the KC-46A project under Alternative 1 would result in an increase of impervious cover of approximately 34 percent in the DLA Infill area. Under Alternative 1, the existing Fire Detention Pond would be removed, and a small portion of the existing stormwater detention basin adjacent east of the proposed construction would be removed (see Figure 3-8). The proposed construction would occur within portions of the 100-year and 500-year floodplain. As a result of construction under Alternative 1, an increase in the 100-year runoff volume of 9.3 acre feet would occur and would require measures to offset the additional volume. The greatest increase to the 100-year peak discharge for the Crutcho Creek Basin is expected to be 1,199 cfs and would occur along East Crutcho Creek near S Air Depot Blvd (USACE 2013). Approximately 70 acre feet of storage would need to be off-set for construction of the KC-46A project under Alternative 1. However, it is unlikely there is sufficient space within the DLA Infill area to manage the additional discharge, and an off-site location would need to be identified (USACE 2013).

Under Alternative 1, a series of stormwater detention features would be necessary to manage additional stormwater runoff. The stormwater detention features considered as part of the DLA site design are as follows:

- Construct detention basin west of the 507th ramp – this location would aid in flood attenuation as far upstream as possible. However, this would require removal of riparian vegetation. Additional discussion regarding riparian habitat is provided in Section 4.2.7.4.

- Modify the existing Beaver Pond – this modification would require dredging sediment and modification of the spillway/drawdown structure. Groundwater monitoring in this area is ongoing due to ERP sites previously discussed in Section 3.2.11. Proximity of stormwater management features to ERP sites would be considered during the design and construction of features.

- Construct new detention basin near the military family housing – the stormwater would be piped from the DLA Infill, across the airfield, and through and/or around the 3rd Herd campus. The basin would be irregularly shaped and would serve as an area to restore a meandering stream system characteristic of the presettlement stream in this location.

The locations and descriptions of these stormwater features are shown in Appendix G.

Although Alternative 1 would result in removal of existing stormwater detention 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 to drainage as a result of Alternative 1 would be less than significant.

4.2.7.1.3 No-action Alternative

Under the No-action Alternative, no impacts to drainage resources would be expected. New development of the KC-46A project would not occur, and additional stormwater management features would not be constructed. Stormwater discharge to surface water would continue to be managed under the existing permit.

4.2.7.2 Floodplains

Impacts to floodplains as a result of the alternatives may be considered significant if changes in topography resulted in a change to the extent of the existing floodplain such that the stormwater could not be managed, or an increase in the probability of flooding in the project area.

4.2.7.2.1 Preferred Alternative

No portion of the Preferred Alternative site is located within the 100- or 500-year floodplain. As previously discussed, an increase in impervious cover of approximately 124 percent is expected as a result of the Preferred Alternative. Based on the 2013 Hydrology and Hydraulic Report, minimal increase to the Crutcho Creek Basin 100-year peak water surface would be expected, and the increase in 100-year runoff volume from the KC46A development would be 9.6 acre feet. The greatest increase to the 100-year peak discharge for the Crutcho Creek Basin is expected to be 253 cfs (USACE 2013). Although the increased impervious cover could result in increased quantity of stormwater runoff and potentially increase the size of the floodplain downstream, the proposed stormwater features associated with the Preferred Alternative would be designed in accordance with Executive Order 11988 (Floodplain Management) to accommodate the increased stormwater discharge. Therefore, no impacts to floodplains located on Tinker AFB are expected as a result of the Preferred Alternative. Additional discussion of stormwater impacts, including potential stormwater detention locations associated with the Preferred Alternative, is included in Section 4.2.7.1, Drainage.

4.2.7.2.2 Alternative 1

As described in Section 3.2.7.2.2, portions of the DLA Infill site are located within a 100-year and 500-year floodplain of Crutcho Creek. Construction under Alternative 1 would require elevation of the land above the flood plain and require a permit to construct within a floodplain (USACE 2012). As a result of construction under Alternative 1, the floodplain upstream of the 507th Apron to Tower Road would be filled

and developed, resulting in the elimination of East Crutcho Creek upstream of the 507th Apron and Fire Pond.

Under Alternative 1, the increase in 100-year runoff volume from the KC46A development would be 9.3 acre feet. The greatest increase to the 100-year peak discharge for the Crutcho Creek Basin is expected to be 1,199 cfs and would occur along East Crutcho Creek near S Air Depot Blvd (USACE 2013).

The largest increase of water surface would occur near the confluence of East Crutcho Creek and Crutcho Creek and would increase approximately 2.3 ft. Without the addition of the proposed stormwater management features, some buildings located near the 507th Apron (B-1071, B-1082, B-1030, and B-1068), Air Depot Blvd 9 (B-1101 and B-1022), Arnold St (B-6001 and B-5604), and Base Housing (B-3001, B3005, B-3009, and B-3101) would potentially be impacted (USACE 2013). Individual buildings that could be impacted by the water surface increase are shown on Figures 5-6 through 5-9 of the 2013 Hydrology and Hydraulic Report included in Appendix G.

To minimize impacts to floodplains, off-site locations for flood storage and diverting stormwater flow to downstream of the 507th Apron through use of conveyance features would be established. Therefore, adjustment to the current elevation of the property would not have significant impacts to floodplain areas due to additional stormwater management features designed in accordance with Executive Order 11988. Details regarding the proposed stormwater management features are discussed in Section 4.2.7.1, Drainage.

4.2.7.2.3 No-action Alternative

The No-action Alternative would not impact floodplains characteristics. The current mission needs are being addressed appropriately in these regards; however, the addition of a larger aircraft and the increase in personnel on the base would likely require updates and or additions to the base infrastructure.

4.2.7.3 Surface Water

This section focuses impact analysis directly on surface water quality. Impacts to surface water as a result of the alternatives may be considered significant if the action would result in decreased water quality resulting in noncompliance with applicable agency standards and regulations. Impacts related to stormwater discharge are discussed in Section 4.2.7.1 Drainage.

4.2.7.3.1 Preferred Alternative

As discussed in Section 3.2.7.2.3, no surface water bodies are present on the BNSF Railyard property. Surface water features impacted as a result of construction, demolition, and operations associated with the Preferred Alternative include Crutcho Creek and East Crutcho Creek (a tributary to Crutcho Creek). These creeks would likely experience an increase in sediment, potential chemical contamination from aircraft maintenance operations, and debris from the construction and demolition activities. The

Preferred Alternative would require extensive demolition, construction, and paving activities on the BNSF Railyard property, resulting in an approximate 125 percent increase of impervious cover. The increased impervious cover could increase the amount of sediment entering nearby surface water features from stormwater runoff. The receiving surface water could also experience an increase in potential chemical contamination from aircraft maintenance operations and debris from the construction and demolition activities. Attempts would be made to steer runoff from the Preferred Alternative site location away from Beaver Marsh Filter, Beaver Pond, and Redbud Pond. The exact pathway for drainage would be determined during the design process.

The additional sediment entering surface water features from construction and demolition activities could result in short-term impacts to the quality of the surface water. However, a SWPPP would be implemented for all construction areas to minimize the amount of sediment released to surface water from construction and demolition activities. Implementation of the SWPPP would also assist in the prevention of chemical constituents from spills entering downstream surface water. All necessary permits would be obtained prior to construction of the KC-46A project, including an ODEQ permit to discharge stormwater associated with construction activities under the OPDES General Permit OKR10.

Additionally, the Unified Facilities Criteria on Low Impact Development (LID) (UFC 3-210-10) would be considered during design of stormwater management features. LID utilizes a strategy to maintain site hydrology and mitigate adverse impacts of stormwater runoff and nonpoint source pollution. Stormwater management features would be designed and constructed in accordance with Section 438 of the Energy Independence and Security Act (EISA Section 438) and Executive Order 11988 and would result in no net increase in stormwater discharge. Additional discussion of stormwater management features is included in Section 4.2.7.1, Drainage.

4.2.7.3.2 Alternative 1

The construction and demolition activities proposed for Alternative 1 would result in an approximate 33 percent increase of impervious cover. The tributaries located on the Alternative 1 site feed into Crutcho Creek and would likely experience an increase in sediment, potential chemical contamination from aircraft maintenance operations, and debris from the construction and demolition activities. Crutcho Creek serves as approximately half of the main drainage basin for the Base (USACE 2012). As previously discussed, Tinker AFB stormwater permits would be obtained or amended as necessary to comply with applicable ODEQ stormwater regulations.

Under Alternative 1, existing flood storage and conveyance features, including the Fire Pond detention feature, would be removed. The pond currently maintains a constant water depth of approximately 1,238 ft with approximately no discharge to East Crutcho Creek (CH2MHill 2010). In addition, East Crutcho Creek would be eliminated upstream of the 507th Apron and Fire Pond. As this creek is a jurisdictional Water of the U.S., permitting would be required with the USACE for impacts to the creek under Section 404/401 of the CWA. Permits would be obtained through detailed coordination with the

USACE-Tulsa District and will be compliant with all USACE general and project specific requirements. It is anticipated that the permit process would be completed over 60-90 days. Though not detailed at the time of this EA, mitigation will also be required for losses on riparian areas greater than 500 ft in length. It is anticipated that mitigation could include avoidance, minimization, or even compensatory mitigation for unavoidable losses. The specific location (either on-site or mitigation bank in Oklahoma County) and mitigation ratios will also be determined during coordination with the USACE during the permitting process.

Approximately 44 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.

4.2.7.3.3 No-action Alternative

The No-action Alternative would not impact surface water characteristics.

4.2.7.4 Wetlands

Wetland habitats serve a vital role on Tinker AFB as well as the BNSF Railyard property by providing habitat for wildlife. They also promote the health of the CCDB by allowing for natural drainage of water from precipitation and provide biological filtering of waters flowing though the watershed. A large change in the total acreage of wetland areas on Tinker AFB and on the proposed project areas may be considered a significant impact to wetlands.

4.2.7.4.1 Preferred Alternative

Development of the BNSF Railyard property would result in the permanent loss of all 0.60 acres of wetland areas within the BNSF Railyard construction site. These wetlands are believed to be non-jurisdictional based on the results of WESTON's November 2012 survey, and therefore would not need to be permitted or mitigated with the USACE. Impacts to wetlands under the Preferred Alternative would be considered less than significant due to low habitat quality, limited acreage, and the non-jurisdictional nature of these features.

4.2.7.4.2 Alternative 1

As detailed in Table 3-11, development of the DLA Infill site would result in the permanent loss of 3.15 acres of jurisdictional wetlands, approximately 0.67 miles of a jurisdictional intermittent stream, and 0.05 miles of non-jurisdictional intermittent stream, for a total of 3.87 acres of wetland habitat. This loss of 3.82 acres of jurisdictional wetlands represents a significant, but mitigable loss of approximately 10 percent of wetlands on Tinker AFB. Permitting would be required with the USACE for the loss of these jurisdictional Waters of the U.S. under Section 404/401 of the CWA. Permits would be obtained through detailed coordination with the USACE-Tulsa District and would be compliant with all USACE general and project specific requirements. It is

anticipated that the permit process would be completed over 60 to 90 days. It is anticipated that mitigation could include avoidance, minimization, or even compensatory mitigation for unavoidable losses. While the specific location (either on-site or mitigation bank in Oklahoma County) and mitigation ratios will also be determined during coordination with the USACE during the permitting process; it is anticipated that mitigation may be purchased at EXCell Mitigation Center Lincoln County, OK, or a similar facility at a 6:1 ratio with USACE approval. While on-site mitigation is not anticipated, should wetlands mitigation be located on base, the selected location would be greater than 10,000 ft from an active runway, per FAA regulations.

Additionally, the Greenway wetland is located approximately one-mile downstream of the Preferred Alternative. While this wetland would not be directly impacted, increased stormwater and sediment runoff from construction activities may indirectly affect wetlands quality. Therefore, BMPs would be put in place to mitigate potential negative impacts in regard to surface water. Impacts to jurisdictional wetlands and waterbodies would need to be permitted and mitigated under Section 404 of the CWA through the USACE. This loss of wetland and waterbody acreage would be considered less than significant as permanent loss of habitat would include mitigation, such as mitigation banking or other compensatory mitigation to be determined during the permitting process.

4.2.7.4.3 No-action Alternative

The No-action Alternative would result in no effect on wetland habitats (Table 3-11). Wetland acreages would remain the same for the foreseeable future. Wetland areas would be maintained under the same maintenance schedules that currently exist. There would be no impacts to wetlands.

4.2.7.5 Groundwater

Impacts to groundwater as a result of the alternatives may be considered significant if the action would result in an increased water usage from the underlying aquifer and a reduction in water supply to existing users

4.2.7.5.1 Preferred Alternative

As discussed in Section 3.2.7.2.2, shallow groundwater in the Hennessey Group has been encountered at Tinker AFB at depths ranging from a few feet to approximately 70 ft. It is possible that groundwater may be encountered during construction and demolition activities associated with implementation of the Preferred Alternative. 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 ft bgs. Due to the size of the Garber-Wellington Aquifer, negative impacts to groundwater recharge from the increased impervious cover would not be expected. Additionally, despite an increase in impervious cover by 124 percent, soils at the BNSF site have a very low to moderately low capacity to transmit water; therefore;

there would be a negligible change in groundwater recharge. Detention basins associated with the Preferred Alternative would be designed to release stormwater at a rate equal to or less than existing current conditions.

No impacts to the quantity of groundwater produced at Tinker AFB would be expected under the Preferred Alternative. Potential impacts to 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 under the Preferred Alternative are included in Section 4.2.11, Hazardous Materials and Wastes.

4.2.7.5.2 Alternative 1

Impacts to groundwater as a result of Alternative 1 would be similar to those described for the Preferred Alternative and would be considered less than significant.

4.2.7.5.3 No-action Alternative

The No-action Alternative would not impact groundwater quality.

4.2.7.6 Measures to Reduce Impacts

Measures to reduce impacts to stormwater drainage include construction of detention ponds to manage additional volume generated as a result of construction of the KC-46A project. Based on the 2013 Hydraulic and Hydrology Report, existing ponds may be modified and new detention features would be constructed to better manage water levels and increase detention volume. To minimize impacts to floodplains, mitigation measures include establishing an off-site location for flood storage and diverting stormwater flow to downstream of the 507th Apron through use of conveyance features. Erosion control plans may be implemented to reduce soil and sediment from entering surface waters to minimize impacts to surface water quality. A SWPPP should also be implemented to reduce total suspended solids in downstream surface water bodies. Applicable permits would be obtained or amended, as necessary. Wetland losses would require mitigation, such as mitigation banking or other compensatory mitigation determined during the Section 404 CWA permitting process. Since there would be no impacts to groundwater as a result of the alternatives, no mitigation or BMPs are recommended.

4.2.8 Biological Resources

4.2.8.1 Vegetation Communities

Vegetation communities across the Tinker AFB site and on the BNSF Railyard and DLA Infill sites are relatively uniform with small pockets of diversity. An impact to vegetation communities may be considered significant if it would either greatly increase or decrease

vegetation community habitat on Tinker AFB. Table 4-10 shows the acreages for habitat types that will be lost for each proposed project area.

Table 4-10 Vegetation Types Impacted in Each Proposed Project Area

Vegetation Communities	BNSF Railyard (acres)			Total Acres on Tinker AFB [a]	DLA Infill (acres)			
	Pre-Action	Post-Action	Change		Pre-Action	Post-Action	Change (acres)	Percent Change from Baseline [a]
Fescue Non-native SI Grass	59.1	26.9	-32.2	1,044.5	4.8	1.5	-3.3	- 0.3
Floodplain Mixed Forest	0.0	0.0	--	54.8	2.9	0.2	-2.7	- 4.9
Improved Turf	6.72	3.42	-3.3	924.9	35.8	10.1	-25.7	- 2.8
Mixed Elm, Non-native Herbaceous	1.96	1.92	-0.4	85.1	1.2	1.2	--	--
Mixed Native/Non-native Prairie	0.0	0.0	--	122.6	0.4	0.4	--	--
Non-native SI Grass	97.31	47.21	-50.1	392.2	1.9	0.0	-1.9	- 0.5
Open Water	0.0	0.0	--	29.3	5.2[b]	0.0	-5.29[b]	- 17.7
Paved/Built	73.64	159.76	+86.12	1,948.1	54.3	101.0	+46.7	+ 2.4
Sugarberry Mixed Forest	0.5	0	--	19.8	8.2	0.2	-8.0	- 40.4
Subtotal	239.21		--	4,621.2	114.6		--	--

BNSF = Burlington Northern Santa Fe

DLA = Defense Logistics Agency

Notes:

[a] Note that this represents the total acreage included on Tinker AFB, but does not include the BNSF property, as this is not part of Tinker AFB at the time of this EA; therefore the percent change from baseline is not presented for the BNSF Railyard property.

[b] This acreage includes a stormwater retention pond that was reengineered in 2011 to drain after rain events, and is now kept dry.

4.2.8.1.1 Preferred Alternative

The Preferred Alternative involves the development of a portion of the BNSF Railyard site. This would result in the permanent loss of mixed native/non-native SI grassland, improved turf, and mixed elm non-native herbaceous, as detailed in Table 4-10. The majority of the habitat affected (greater than 80 acres) would include native/non-native mix grasses, with only 0.4 acres of mixed elm forest being impacted. Most of the BNSF Railyard site would be developed with taxiways, aircraft parking positions, hangers, supporting facilities, and POV roads and parking areas. Though the engineering has not yet determined the exact acreage, it is anticipated that improved turf habitat would be installed around or on the edges of these features. As described in Section 4.2.5.1 approximately 50 acres of new, higher quality grassland/riparian habitat, would be created on Tinker AFB, which would offset this habitat loss.

BMPs, such as silt fencing, would be utilized to prevent potential erosion and soil loss in this area. This is the preferred action in regards to maintaining GI integrity. As depicted in Figure 3-10, the GI corridor on the BNSF site is located primarily along the northern and western boundaries of the site. As the Preferred Alternative would be developing primarily the eastern portion of the site, a 300-foot GI corridor on the western boundary of the BNSF Railyard site would remain connected to GI in the Draper Lake area by way of the natural buffer maintained south and west of TAC. This would still allow Tinker AFB to develop future biking routes and wildlife corridors with the GI and thereby reduce possible impacts to wildlife habitat. Under the Preferred Alternative there would not be a great increase or decrease in vegetation community habitat on Tinker AFB; therefore, impacts to the total vegetation community habitat would be less than significant.

4.2.8.1.2 Alternative 1

Under Alternative 1, most of the site area would be developed with taxiways, aircraft parking positions, hangers, supporting facilities, and POV roads and parking areas. Though the engineering has not yet determined the exact acreage, it is anticipated that improved turf habitat would be installed around or on the edges of these features. Development of the DLA Infill site would result in the permanent loss of improved turf, sugarberry mixed forest, mixed non-native SI, floodplain mixed forest, and open water habitat, as detailed in Table 4-10. This permanent loss would constitute a moderate, but less than significant impact to vegetation communities on Tinker AFB, and it would result in the loss of approximately 11 acres of native habitat that is less common on Tinker AFB, including the sugarberry mixed forest habitat and floodplain mixed forest habitat. Additionally, should the 507th ramp West detention basin be constructed as part of Alternative 1, an additional 4 acres of riparian woodlands would be affected, totaling 15 acres of riparian woodlands. This would result in a permanent, significant decrease in the diversity of habitat available on Tinker AFB (approximately a 40 percent decrease across the base). Due to continuing development surrounding Tinker AFB, the exact acreages of habitat types in the immediate vicinity of Tinker AFB are unknown. As the area around Tinker AFB continues to develop, the diversity of native habitat is also decreasing outside of the base. As described in Section 4.2.5.1 approximately 50 acres of

new, higher quality grassland/riparian wooded habitat would be created on Tinker AFB, which would mitigate this habitat loss such that impacts would be less than significant.

This alternative would allow for a connection to exist between GI north of the BNSF Railyard site to GI in the Draper Lake area which is a goal of the GI Plan, though it would eliminate some acreage (approximately 44 acres) of an existing GI corridor (Figure 3-10). The impact to vegetation communities under Alternative 1 would be considered less than significant with the addition of 50 acres of higher quality grassland/riparian habitat as mitigation for impacts to GI.

4.2.8.1.3 No-action Alternative

The No-action Alternative would result in no change to vegetation communities on Tinker AFB (Table 3-12) or in the surrounding area as a result of project activities. No construction on or alteration to any of the proposed project areas would occur. Vegetation areas would be maintained under the same maintenance schedules that currently exist. There would be no impacts to vegetation communities under the No-action Alternative.

4.2.8.2 Wildlife

The BNSF Railyard and DLA Infill properties support a wide array of habitat types that sustain a diversity of wildlife species. A significant impact to wildlife may be any impact that would greatly decrease the size of a wildlife population or the overall wildlife diversity of the area.

Viable habitat for fish species within the project area is limited to the surface water features on the BNSF Railyard or DLA Infill sites. Fish species are isolated to aquatic areas that can support their unique habitat needs. Direct impacts to aquatic habitat are discussed in Section 4.2.8.21. A significant impact to fish species may be any activity that greatly decreases available habitat for fish species. Furthermore, a significant impact would also constitute a major increase or decrease in fish abundance or diversity.

Because of the developed nature of Tinker AFB and the BNSF Railyard sites, viable habitat for many avian, mammalian, and herpetofauna species is focused primarily to the undeveloped areas of the base. Diversity of avian, mammalian, and herpetofauna species is highest in undeveloped GI areas, though some species are able to thrive in more developed areas. A significant impact to avian, mammalian, and herpetofauna species may be any change that would result in a major decrease in mammalian abundance or diversity.

4.2.8.2.1 Preferred Alternative

Birds

Impacts to bird species from Preferred Alternative are anticipated to be short-term and minor. Potential habitat for birds that favor grassland areas would be reduced by 80 acres, as discussed in Section 4.2.8.1.1, but similar habitat exists in the immediate

vicinity of the project area, while adjacent habitat would not offset for habitat loss, these mobile species would be able to relocate during construction. Additionally, under E.O. 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be established on Tinker AFB, which would offset this habitat loss. Additionally, a 300-foot wide corridor of GI, grassland habitat, would remain intact and preserved on the north and western boundaries on the BNSF Railyard site. While disturbance from construction activities may displace birds sensitive to noise and human activities from the site and habitat immediately surrounding the project area, these impacts would be short-term and minor as the birds are highly mobile.

Though no bird nests were observed during the November 2012 site visit conducted by WESTON, if clearing activities for the Preferred Alternative are scheduled to occur during the breeding season (April-July), modification of the existing Depredation Permit would be required to authorize hazing of migratory birds and discourage nesting in the project area. It is anticipated that any modifications to the Depredation Permit would take 60 days. Additionally, prior to the start of breeding season, the BNSF Railyard site may be made less attractive to migratory birds for nests by removing any scattered brush/trees, and by routinely mowing (e.g. twice a week during growing season) the ground cover as close to ground level as possible to discourage nesting. A pre-construction nest survey would be conducted prior to developing the BNSF Railyard site as nesting sites for migratory species can vary from year to year. If active breeding birds or nests are identified during the pre-construction survey, a relocation permit would be required from the USFWS by the contractor prior to any construction or clearing activities. It is anticipated that a relocation permit would take 30 days.

If a Migratory Bird Depredation or a Relocation Permit is required, construction activities may be limited in areas by the USFWS for as long as active breeding individuals remain at nesting sites, which could last through July. Impacts to bird species under the Preferred Alternative would not be expected to decrease the size of the bird population or overall bird diversity in the area, and therefore, would be considered less than significant.

Fish

Under the Preferred Alternative, there would be no permanent surface water areas directly affected. The unnamed tributary of Crutcho Creek present on the BNSF Railyard property would fall immediately outside of the Preferred Alternative area. This tributary could serve as aquatic habitat for some fish species as it is considered to be a perennial stream. The wetland areas with the Preferred Alternative area surveyed by WESTON did not have enough standing water in them to support fish species. While, no fish species were observed in the tributary during the November 2012 site visit conducted by WESTON, the Beaver Marsh Filter Pond, a recreational fisheries pond, is located north of the BNSF site. While no direct impacts to the pond would occur as part of the Preferred Alternative, indirect impacts to water quality could affect the aquatic fauna if drainage from the site were not diverted away from pond. Attempts would be made to steer runoff from the Preferred Alternative site location away from the Beaver Marsh Filter Pond. The exact pathway for drainage would be determined during the design

process. BMPs, such as silt fencing described in Section 4.2.7, would be used to preserve water quality and to prevent impacts to the tributary. Therefore, the Preferred Alternative would not be expected to greatly increase or decrease available habitat for fish species or result in a major increase or decrease in fish abundance or diversity. This means that impacts would be less than significant.

Mammals

Impacts to mammal species under the Preferred Alternative are expected to be long-term but minor. Grassland habitat on the BNSF Railyard site proposed for development under the Preferred Alternative that is utilized by mammal species would be lost. However, grassland habitat would remain on the BNSF Railyard property in areas undisturbed by Preferred Alternative construction. A 300-foot corridor of GI, grassland habitat, would remain intact and preserved on the north and western boundaries on the BNSF Railyard site, continuing wildlife connection to Draper Lake. Additionally, there is similar grassland habitat in nearby areas off of BNSF Railyard property and while adjacent habitat would not offset this minor habitat loss, these mobile species would be able to relocate during construction. Additionally, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be created on Tinker AFB, which would offset this habitat loss. In the areas of the BNSF Railyard that are undisturbed by construction activities, short-term habitat disturbance would be expected as a result of rail line removal. The Preferred Alternative would not be expected to result in major increases or decreases in mammalian abundance or diversity and would be anticipated to reflect similar diversity indices as industrial areas (1.88; Hellgren and Bogosian 2009).

Reptiles and Amphibians

Impacts to herpetofauna under the Preferred Alternative are anticipated to be minor and long-term. Grassland habitat on the BNSF Railyard site proposed for development under the Preferred Alternative that could potentially be utilized by reptile and amphibian species would be lost under the Preferred Alternative. However, grassland would remain on the BNSF Railyard property in the area left undeveloped by the Preferred Alternative and there is similar grassland habitat in nearby areas off of BNSF Railyard property. A 300-foot corridor of GI, grassland habitat, would remain intact and preserved on the north and western boundaries on the BNSF Railyard site, continuing wildlife connection to Draper Lake. Furthermore, approximately 0.2 acres of wetland habitat on the BNSF Railyard site that could be utilized by amphibians would also be impacted by the Preferred Alternative. However, similar wetland and surface water habitat on the BNSF Railyard property would remain unaffected, leaving habitat for amphibian species. While adjacent habitat would not offset this habitat loss, mobile herpetofauna would be able to relocate during construction. Additionally, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be created on Tinker AFB, which would offset this habitat loss. Habitat disturbance in the undeveloped area would occur primarily when the rail lines are removed, but this would be short-term. The Preferred Alternative would not be expected to result in major increases or decreases in reptile or amphibian abundance or diversity and would be anticipated to reflect similar

diversity indices as industrial areas (1.88; Hellgren and Bogosian 2009), thereby resulting in less than significant impacts.

4.2.8.2.2 Alternative 1

Birds

Impacts to bird species from Alternative 1 are anticipated to be long-term but minor. The loss of 3.87 acres of wetland habitat from the DLA parcel would exclude species of migratory waterfowl and other aquatic bird species from utilizing the project area, but similar habitat exists on Tinker AFB property approximately 0.8 miles to the northwest. The loss of forest habitat as discussed in Section 4.2.8.1.2 and Table 4-10 would exclude most species of songbirds and other passerines from utilizing the project area after construction, but there is similar forested habitat in the immediate vicinity. While adjacent habitat would not offset this habitat loss, mobile species would be able to relocate during construction. Additionally, under E.O. 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be created on Tinker AFB, which would offset this habitat loss. Disturbance from construction activities may displace some species of birds from habitat immediately surrounding the project area, but these impacts would be short-term. Alternative 1 would not be expected to greatly increase or decrease the size of the bird population or the overall bird diversity of the area. If clearing activities for Alternative 1 are scheduled to occur during the breeding season (April-July) the DLA Infill site may be made less attractive to migratory birds for nests by removing any scattered brush/trees, wooded areas, and by routinely mowing (e.g. twice a week during growing season) the ground cover as close to ground level as possible to discourage nesting. A pre-construction nest survey would be conducted prior to developing the DLA Infill site as nesting sites for migratory species can vary from year to year. If active breeding birds or nests are identified during the pre-construction survey, a relocation permit would be required from the USFWS by the contractor prior to any construction or clearing activities. It is anticipated that a relocation permit would take 30 days.

If clearing activities for Alternative 1 are scheduled to occur during the breeding season (April-July), use of the existing Depredation Permit would be required to authorize hazing of migratory birds and discourage nesting in the project area. It is anticipated that any modifications to the Depredation Permit would take 60 days. If a Migratory Bird Depredation or a Relocation Permit is required, construction activities may be limited in areas by the USFWS for as long as active breeding individuals remain at nesting sites, which could last through July. Impacts to bird species under the Alternative 1 would not be expected to decrease the size of the bird population or overall bird diversity in the area, and therefore, would be considered less than significant.

Fish

Impacts to fish species under Alternative 1 are anticipated to be long-term and minor. The loss of 3.87 acres of total wetland habitat and approximately 0.8 miles of stream habitat would constitute a minor loss of wetland habitat on Tinker AFB. This aquatic

habitat is known to support stable populations of several fish species, as discussed in Section 3.2.8.2.3. Under this alternative, approximately 0.8 miles of the headwaters of Crutcho Creek would be lost, and therefore would have a long term effect and an approximate loss of 20 percent of available aquatic habitat for these species. However, as described in Section 4.2.7.1.2, a portion of Crutcho Creek (approximately 0.8 miles upstream) has been identified for mitigation of riparian corridors. By increasing the riparian corridor, water quality of the creek would also increase, therefore benefitting the existing fish population. Therefore, the loss of aquatic habitat would be considered a long-term, minor impact to fish species. Due to this loss of habitat, the overall abundance of the otherwise stable fish population on Tinker AFB may also decrease from the existing percent similarity index of 0.67 (a percent similarity index of 0.50 is indicative of stable fish assemblage; USAF 2012g). It should be noted that any potential species richness loss has been minimized to the extents practicable by the DLA Infill sites location at the furthest extent upstream on Crutcho Creek as possible.

Mammals

Under Alternative 1, impacts to mammal species are anticipated to be long-term but minor. The majority of this area is already developed with buildings and impermeable surfaces. Areas of improved turf, sugarberry mixed forest, fescue non-native SI grass, and floodplain mixed forest habitat would be lost under this Alternative as discussed in Section 3.2.8.2.2, but the majority of the lost habitat would be of low quality and have little diversity. Aquatic habitat on the DLA Infill site that could be used by aquatic mammals would also be permanently lost. Most mammals that utilize the DLA Infill sites would be permanently displaced, but there is similar habitat immediately adjacent on Tinker AFB property. While adjacent habitat would not offset this habitat loss, mobile species would be able to relocate during construction. Additionally, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be created on Tinker AFB, which would offset this habitat loss. Construction activities in these areas may further displace some species of mammals, but this is anticipated to be a short-term, minor impact. Due to the conversion of habitat, Alternative 1 could be expected to result in a decrease in mammalian diversity from approximately 2.71 (adjacent wildlife reserve 1) to 1.88 (industrial areas). However this change is anticipated to be minor as a portion of the DLA Infill area is already industrial and another portion of the area, the Fire Pond area already has a lower diversity index of 0.94 (Hellgren and Bogosian 2009).

Reptiles and Amphibians

Under Alternative 1, impacts to reptile and amphibian species are anticipated to be long-term but minor. The majority of this area is already developed with buildings and impermeable surfaces. Areas of improved turf, sugarberry mixed forest, fescue non-native SI grass, and floodplain mixed forest habitat would be lost under this Alternative as discussed in Section 3.2.8.2.2. Aquatic habitat on the DLA Infill site that could be used by amphibian species would also be permanently lost. Most herpetofauna species that utilize the DLA Infill sites would be permanently displaced and would be affected by typically lower relocation success rates. While adjacent habitat would not offset this

habitat loss, mobile species would be able to relocate during construction. Additionally, approximately 50 acres of new, higher quality grassland/riparian habitat, described in Section 4.2.5.1, would be created on Tinker AFB, which would offset this habitat loss. Construction activities in these areas may further displace some species of reptiles and amphibians, but this is anticipated to be a short-term, minor impact. Alternative 1 would not be expected to result in major increases or decreases in reptile or amphibian abundance or diversity. Due to the conversion of habitat, Alternative 1 would result in a decrease in herpetofauna diversity from approximately 2.71 (adjacent wildlife reserve 1) to 1.88 (industrial areas). However, this change is anticipated to be minor as a portion of the DLA Infill area is already industrial and another portion of the area, the Fire Pond area already has a lower diversity index of 0.94 (Hellgren and Bogosian 2009).

4.2.8.2.3 No-action Alternative

Birds

Under the No-action Alternative, there would be no impact on bird species utilizing Tinker AFB or BNSF Railyard sites outside of Tinker AFB property. Terrestrial habitat within Tinker AFB would continue to be mowed and maintained under current protocols. Aquatic habitat would continue to be maintained by the currently existing hydrology within the proposed project area. Habitat on Tinker AFB would also be anticipated to improve as it matures and is continued to be managed by the base. Additionally, there would be no anticipated need to revise the BASH program under the No-action Alternative.

Fish

Under the No-action Alternative, there would be no impacts to fish species. There would be no loss of or impact to aquatic habitat on Tinker AFB or to the BNSF Railyard property outside of the base from project activities. Aquatic habitats on Tinker AFB would continue to be maintained under currently existing maintenance schedules and would also be anticipated to improve as they mature.

Mammals

Under the No-action Alternative, there would be no impacts to mammalian species. Habitat on Tinker AFB and BNSF Railyard property off-base would remain unaltered by activities related to the Preferred Alternative and Alternative 1. Habitat on Tinker AFB would also be anticipated to improve as it matures and is continued to be managed by the base. There would likewise be no foreseeable changes to management of mammalian populations on-base.

Reptiles and Amphibians

Under the No-action Alternative, there would be no impacts to herpetofauna species related to Preferred Alternative activities. Habitat on Tinker AFB property and BNSF Railyard property off-base would remain unaltered by activities related to the Preferred Alternative and alternatives. Habitat on Tinker AFB would also be anticipated to

improve as it matures and is continued to be managed by the base. There would likewise be no foreseeable changes to management of reptile or amphibian populations on-base.

4.2.8.3 Threatened and Endangered Species and Species of Special Concern

As described in Section 3.2.8.2.4, suitable habitat for protected species exists on Tinker AFB and Stanley Draper Lake approximately one mile to the southeast of Tinker AFB. Furthermore, several species of state species of concern are known to occur on Tinker AFB, and could potentially occur at the BNSF Railyard and DLA Infill sites. A major increase or decrease in suitable habitat for protected species or any action that resulted in a direct take of these species resulting in a significant population decline may be considered a significant impact.

4.2.8.3.1 Preferred Alternative

Under the Preferred Alternative, the development of the BNSF Railyard site would result in the permanent loss of habitat on the base as detailed in Table 4-10. Based on a review of the Tinker AFB INRMP and aerial photos, while the least tern, piping plover, and whooping crane may occur as a transient species, there is no potential habitat available on the BNSF Railyard. Therefore any impacts to these species would be anticipated to be a short-term disturbance during construction. However, as previously described, habitat on the BNSF Railyard site could be utilized by state species of concern, including the Bell's vireo, barn owl, burrowing owl, loggerhead shrike, Swainson's hawk, and Texas horned lizard. While not designated as SAR habitat (because it is located off of Tinker AFB), approximately 80 acres of suitable habitat would be lost. As described in Section 4.2.5.1 approximately 54 to 64 acres of new, higher quality grassland/riparian wooded habitat, would be created on Tinker AFB, which would offset the majority of this habitat loss. Similar habitat located on the western portion of the BNSF Railyard property would remain undeveloped and would only have short-term disturbance during construction of the Preferred Alternative.

While there have been no documented sightings of any of the federal-listed species or the state species of concern on the site, several Texas horned lizards were discovered by Tinker AFB natural resource personnel immediately north of the BNSF Railyard site and also south on TAC. As discussed previously, it is believed that these individuals may have come from adjacent GI habitat. The Preferred Alternative would only affect the eastern portion of the BNSF Railyard property, and the northwestern portion of the property would remain undeveloped, maintaining a connection with the adjacent GI habitat on Tinker AFB property. As Texas horned lizards may wander into developed areas from nearby suitable habitat, individual lizards may enter the BNSF Railyard site, and subsequently maybe taken during the Preferred Alternative. Approximately 80 acres of suitable habitat would be lost. The additional of new, higher quality grassland and riparian wooded habitat would not be considered mitigation for this loss, since the habitat would be located within a floodplain. Due to the loss of 80 acres, approximately 40 individual lizards could be lost during clearing activities since the typical range of the Texas horned lizard is 1-2 acres. However, due to the cryptic nature of this species, proximity to a water source, and recent evidence of species in the area, 35 individuals

should be considered a rough estimate compared to the most recent population size for Tinker AFB 33; Moody 2014), and it is relatively unknown the status of this species off-base on the BNSF site. Of the almost 850 identified Texas horned lizard locations, approximately 21 (less than 3 percent) were identified within 1,000 ft of the BNSF Railyard site. Any unintentional take of the Texas horned lizard would require approval from ODWC, prior to construction activities beginning. Therefore should a Texas horned lizard, or suspected Texas horned lizard, be identified during construction activities, the contractor will notify Tinker AFB natural resources personnel for the relocation of the individual. Therefore, any impacts to these species would be anticipated to be a disturbance during construction and the Preferred Alternative would not be expected to result in a major increase or decrease in suitable habitat for these species due to the on base mitigation, and the pre-construction relocation activities described in Section 4.2.8.4. While no take is anticipated for a federally-listed species, the Preferred Alternative may result in the unintentional take of a SAR, the Texas horned lizards.

4.2.8.3.2 Alternative 1

Under Alternative 1, the development of the DLA Infill site would result in the permanent loss of habitat on the base as detailed in Table 4-10. There are no recorded sightings of threatened and endangered species on the DLA Infill site. Based on a review of the Tinker AFB INRMP and aerial photos, while the least tern, piping plover, and whooping crane may occur as a transient species, there is no potential habitat available on the DLA Infill site. Therefore, any impacts to these species would be anticipated to be a short-term disturbance during construction. However, as previously described, habitat on the DLA Infill site could be utilized by state species of concern; the Swainson's hawk, loggerhead shrike, and Bell's vireo. Approximately 19.0 acres of woodland and grassland habitat that could be utilized by these species would be permanently removed. However, there is similar habitat less than a half mile to the northwest of the DLA Infill site on Tinker AFB property in GI areas. As described in Section 4.2.5.1 approximately 50 acres of new, higher quality grassland/riparian wooded habitat, would be created on Tinker AFB, which would offset the majority of this habitat loss.

In addition, there have been sightings of the state species of concern, the Texas horned lizard, along the southwestern boundary of the DLA Infill site (Moody 2013). This area around the existing buildings is not considered suitable habitat, and known Texas horned lizard habitat is located approximately 0.3 miles to the west of the DLA Infill site on Tinker AFB property (Parsons 2002). As Texas horned lizards may wander into developed areas from nearby suitable habitat, individual lizards may enter the DLA Infill site, and subsequently maybe taken during the Alternative 1. Approximately 42 acres of suitable habitat would be lost; however, as described above, approximately 50 acres of new, higher quality grassland/riparian wooded habitat would be created on Tinker AFB to offset the majority of this habitat loss. Due to the loss of 42 acres, approximately 21 individual lizards could be lost during clearing activities since the typical range of the Texas horned lizard is 1-2 acres. However, due to the cryptic nature of this species, proximity to a water source, and recent evidence of species in the area, 21 individuals should be considered a rough estimate compared to the most recent population size for Tinker AFB (33; Moody 2014). Of the almost 850 identified Texas horned lizard

locations, approximately 19 (less than 3 percent) were identified within 1,000 ft of the DLA Infill site. Any unintentional take of the Texas horned lizard would require approval from ODWC, prior to construction activities could begin. Therefore, 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 individual lizard. Therefore, Alternative 1 would not be expected to result in a major increase or decrease in suitable habitat for these species, and while no take is anticipated for a federally-listed species, the Alternative 1 may result in the unintentional take of a SAR, the Texas horned lizards.

4.2.8.3.3 No-action Alternative

Under the No-action Alternative, there would be no impact to protected species or their habitat. Habitat on Tinker AFB and BNSF Railyard property off-base would remain unaltered by activities related to the Preferred Alternative and Alternative 1. There would likewise be no foreseeable changes to management of protected species on-base.

4.2.8.4 Measures to Reduce Impacts

Measures to reduce impacts for the Preferred Alternative and the two action alternatives all include several BMPs, including conducting surveys for potential protected species and migratory birds before beginning project activities and using silt fences to prevent the erosion of soil in waterbody areas. Though no bird nests were observed during the November 2012 site visit conducted by WESTON, if clearing activities for the Preferred Alternative are scheduled to occur during the breeding season (April-July), use of or modification of existing Depredation Permit would be required to authorize hazing of migratory birds and discourage nesting in the project area. Additionally, prior to the start of breeding season, the BNSF Railyard site may be made less attractive to migratory birds by removing any scattered brush/trees, and by routinely mowing (e.g. twice a week during growing season) the ground cover as close to ground level as possible to discourage nesting. A pre-construction nest survey would be conducted prior to developing the BNSF Railyard site as nesting sites for migratory species can vary from year to year. If active breeding birds or nests are identified during the pre-construction survey, a relocation permit would be required from the USFWS by the contractor prior to any construction or clearing activities. If a Migratory Bird Depredation or a Relocation Permit is required, construction activities may be limited in areas by the USFWS until birds, eggs, and nests are properly removed and all permit requirements are fulfilled.

Emphasis has been placed on the preservation of GI habitat acreage whenever possible to maintain habitat connectivity across the Tinker AFB area. By developing on the eastern portion of the BNSF Railyard site, the northern and western boundaries of the site, and a 300-foot corridor of GI would remain intact and preserved on the BNSF Railyard site. This GI corridor represents an area that could be managed in the future to connect to the remainder of the GI and Stanley Draper Lake, by utilizing the undeveloped areas to the west and south of TAC. Additionally, approximately 50 acres of a former housing area would also be converted to GI. This conversion to GI would serve to mitigate and minimize habitat loss. A housing area, currently under lease to a housing privatization

contractor is slated to be demolished and then conveyed back to Tinker AFB. It is anticipated that the demolition of this housing area and subsequent conveyance will be completed prior to the initiation of the Proposed Action of this EA. It is also anticipated that once conveyed to Tinker AFB, approximately 50 acres of this area would be restored to mixture of wooded riparian/grasslands habitat and become GI. Therefore under both alternatives GI would increase by approximately 50 acres.

To minimize the effects to Texas horned lizards, Tinker AFB will conduct species-specific surveys throughout the breeding season of 2014 to locate, capture, and relocate any identified individuals within the project area. Relocation activities will be conducted with approval and coordination of ODWC, under Tinker AFB's ongoing Texas horned lizard monitoring program. To increase the likelihood of species relocation success, identified Texas horned lizards would be translocated as close to their original location as possible within areas not proposed to be developed on the BNSF site (e.g. proposed 300 foot GI corridor). Depending on the proximity of relocation areas to active construction, stabilized silt fencing, or similar BMPs, may also be placed along the boundary of these areas to prevent relocated individuals from wandering into active construction areas. If available at the time, captured species may also be placed within a monitored and approved ODWC captive breeding program for the Texas horned lizard. Depending on the results of the 2014 surveys and relocation activities, Tinker AFB may also conduct additional pre-construction and relocation surveys if construction activities are to begin after Texas horned lizards emergence from hibernation in 2015.

4.2.9 Bird/Wildlife-Aircraft Strike Hazard

A bird/wildlife-aircraft strike may be significant if it would likely result in an aircraft accident, involve injury either to aircrews or to the public, or damage to property (other than the aircraft).

4.2.9.1 Preferred Alternative

BASH can be assessed using a combination of bird distribution and behavior factors and aircraft operational factors. Some of these factors include:

- The size and behavior of the predominant bird species;
- The presence of specialized habitat or location that favors migration patterns or large concentrations of birds;
- The frequency and location of takeoffs and landings;
- The altitude of flight operations; and,
- The flight characteristics of the aircraft, including size, airspeed, and number of engines.

The KC-46A aircraft design, types of operations (i.e., takeoffs, landings, and closed patterns), and aircraft operating characteristics (*i.e.*, altitudes and airspeeds) would be

very similar / nearly identical to the KC-135. Therefore, the addition of KC-46A operations at Tinker AFB would be expected to have no impact on the bird-aircraft strike rates experienced under the baseline and that the rates/data in Tables 3-15 through 3-18 would continue. As mentioned in Section 4.2.8.1.1, there would be a reduction in grassland areas that serve as potential habitat for birds. There could be fewer birds around the airfield due to the reduction in habitat and, therefore, the potential for fewer bird-aircraft strikes. KC-46A aircrews would follow the guidance in the Tinker AFB BASH Plan to minimize the potential for bird-aircraft strikes.

Features such as the storm water detention basins that would 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 may 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 Air Force aircraft resulted in a serious mishap. Therefore, the Preferred Alternative 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).

4.2.9.2 Alternative 1

The Preferred Alternative and Alternative 1 are identical when considering the type and level of aircraft operations at the Tinker AFB airfield as well as the construction of features such as storm water detention basins. Therefore, the discussion and analysis for the Preferred Alternative also applies to Alternative 1. Alternative 1 would result in negligible impacts resulting from bird/wildlife-aircraft strike incidents.

4.2.9.3 No-action Alternative

The potential for bird/wildlife-aircraft strikes would remain at the baseline conditions; therefore, there would be no impact to bird/wildlife-aircraft strike incidents as a result of the No-action Alternative. It would continue to be unlikely that any of the BASH incidents would involve injury either to aircrews or to the public, or damage to property (other than the aircraft).

4.2.9.4 Measures to Reduce Impacts

The number of bird-aircraft strikes as well as the distribution of strikes by bird species would remain at approximately the existing levels. The risk would continue to be low that an aircraft involved in a BASH incident at or around Tinker AFB would strike a person or structure on the ground. No mitigation would be required.

4.2.10 Cultural Resources

Significant impacts could be those that substantially diminish one or more of a historic property's aspects of integrity, which are defined as location, design, setting, materials, workmanship, feeling, and association.

4.2.10.1 Preferred Alternative

Two archaeological sites are present within the footprint of the Preferred Alternative. These have been designated 34OK146 and 34OK228. The Preferred Alternative would result in the destruction of or serious disturbance to both sites. However, both sites have been assessed as not significant, making them ineligible for listing in the NRHP. The sites are, therefore, not classified as Historic Properties and further management of and consideration of these sites is not warranted.

No non-archaeological Historic Properties are present within the project footprint of the Preferred Alternative. Moreover, no Historic Properties within one-half mile would be subject to indirect effects (Eisenhour 2013). As a result, the Preferred Alternative would have no effect on Historic Properties.

4.2.10.2 Alternative 1

No archaeological sites are present within the footprint of Alternative 1. As a result, Alternative 1 would have no impacts to archaeological Historic Properties.

No non-archaeological Historic Properties are located within one-half mile of Alternative 1. As a result, Alternative 1 would have no effect on non-archaeological Historic Properties.

4.2.10.3 No-action Alternative

The No-action Alternative would have no effects on cultural resources. All resources on Tinker AFB would continue to be managed under the Integrated Cultural Resources Management Plan.

4.2.10.4 Measures to Reduce Impacts

The Preferred Alternative and Alternative 1 would have No Effect on Historic Properties and no mitigation measures are warranted.

4.2.11 Hazardous Materials and Wastes

The degree to which proposed acquisition, construction and demolition activities could affect the existing environmental management practices was considered in evaluating potential impacts to and from hazardous materials and wastes, including ERP sites. Significant impacts could result if non-hazardous/regulated and hazardous substances were collected, stored and/or disposed of improperly.

4.2.11.1 Hazardous Materials

4.2.11.1.1 Preferred Alternative

The use of hazardous materials during the implementation of the Preferred Alternative is expected to be limited to construction vehicle maintenance (fuel, oils, and lubricants) and construction activities (adhesives, sealants, etc.). These materials would be properly contained and managed according to state and federal regulations. In addition, KC-135 aircraft maintenance operations that use Hazardous Materials would be transitioned to the new KC-46A maintenance facility. It is anticipated that with the transition of aircraft, the regular use of Hazardous Materials may fluctuate some. The KC-135 aircraft requires considerable maintenance due to the age of the fleet. When the new KC-46A aircraft is transitioned in, it would require less maintenance and a decreased amount of Hazardous Materials used for that maintenance. However, with the physical size of the KC-46A being larger than the KC-135, more materials may be needed to maintain the new aircraft. Initially, there would be a decrease in the amount of Hazardous Materials used, but over time it is expected that the amount of Hazardous Materials used in daily operations/regular maintenance of the KC-46A would be similar to that currently used in maintenance of the KC-135 aircraft. Impacts to hazardous materials from the Preferred Alternative would be less than significant.

Asbestos

It is anticipated that little to no ACM would be encountered from implementing the Preferred Alternative. If any is found on the BNSF Railyard site, the guidelines present in the Tinker AFB AMP (USAF 2010c) must be followed to abate all ACM from the affected units prior to demolition activities. Given the potential, the negative impacts to the environment from this Preferred Alternative would be short-term and minor, and would be minimized as long as the guidelines outlined in the Tinker AFB Asbestos Management Plan were followed. A long-term beneficial impact would occur, due to the removal of ACM currently present. No ACM would be used in the construction of any new facilities.

Lead-Based Paint

LBP must be considered to be potentially present in all facilities constructed prior to 1980. It is assumed that any structures located within the BNSF Railyard site were constructed before LBP was discontinued. Procedures stated in the Tinker AFB LBP Management Plan (USAF 2010d) must be followed to properly test and manage facilities that have been found to house LBP. Note that areas where LBP has been abated or not found should still be regarded as possibly containing LBP. LBP may be present within the soils surrounding the facilities. If it is necessary to remove soils for off-site disposal, a limited number of random samples would be collected to assess the presence or absence of lead in soil, and to properly categorize the soil for hazardous constituents per applicable state and federal regulations for disposal off-site. Beneficial, long-term impacts resulting from this alternative would be realized in the removing of LBP and LBP-contaminated soils.

Pesticides

Within the BNSF Railyard property, it is assumed that pesticide application was performed around railroad tracks on a routine basis. During sampling events within the BNSF Railyard site, pesticides were not analyzed. If it is necessary to remove soils for off-site disposal, waste characterization sampling would be performed to properly categorize the soil for hazardous constituents per applicable state and federal regulations for disposal off-site. This may include sampling for pesticides depending on disposal facility requirements. Long-term impacts would be beneficial in the removing of pesticide contaminated soils, if contaminated soils are found. Future operations would likely continue the use of pesticides around and in new facilities. All would be used according to manufactures guidelines and follow the Tinker AFB management plan.

4.2.11.1.2 Alternative 1

Hazardous materials would be used during the construction phase of Alternative 1 for construction vehicle maintenance and regular construction activities, as stated for the Preferred Alternative. Since there would be more construction and demolition activities planned for Alternative 1, it is anticipated that more materials would be used. Future operational use of hazardous materials for the maintenance of the KC-135 aircraft being transitioned out and the incoming KC-46A aircraft would be the same as stated for the Preferred Alternative. Impacts to hazardous materials would be less than significant as a result of Alternative 1.

Asbestos

ACM is potentially present in pipe insulation, cement pipe, floor tile, floor tile adhesive, roof patching sealant, wall board in mechanical closets, wall and ceiling texture, and wall board panels of all buildings located on Tinker AFB. With the planned demolition/construction at the DLA Infill area ACM may be encountered. Given the potential, the negative impacts to the environment from this Preferred Alternative would be short-term and minor, and would be minimized as long as the guidelines outlined in the Tinker AFB Asbestos Management Plan were followed. A long-term beneficial impact would occur, due to the removal of ACM currently present. No ACM would be used in the construction of any new facilities.

Lead Based Paint

As stated in the Preferred Alternative, LBP must be considered to be potentially present in all facilities constructed prior to 1980 at Tinker AFB. Prior to demolition/construction at the DLA Infill area, procedures would be followed, as prescribed, in the Tinker AFB LBP Management Plan. If LBP contamination is discovered, the contaminated material would be handled and disposed of properly. Beneficial, long-term impacts resulting from Alternative 1 would be realized in the removing of LBP-contaminated material and soils.

Pesticides

Currently Tinker AFB management applies commercially available pesticides. Tinker AFB records indicate the historical application of several pesticides that are no longer

approved for use. Although these pesticides were used in accordance with manufacturers' guidance and directions, the potential exists for residual concentrations in the soil underlying on-base facilities (USAF 2008). Impacts for Alternative 1 would be the same as those described for Tinker AFB for the Preferred Alternative. Long-term impacts would be beneficial in the removing of pesticide contaminated soils, if contaminated soils are found.

4.2.11.1.3 No-action Alternative

Under the No-action Alternative, there would be no impact to the baseline conditions described in Section 3.2.11.1.1. Installation activities would continue as is; no demolition or construction would occur, and no property would be acquired.

4.2.11.2 Hazardous Waste

4.2.11.2.1 Preferred Alternative

Regulated wastes are not expected to be generated as a result of demolition or construction activities associated with the Preferred Alternative. Any ACM- and LBP-containing materials or other hazardous wastes removed/generated would be managed in accordance with established installation management plans and state and federal regulations. As described in Section 4.3.11.1.1, a limited number of soil samples would be collected to ascertain the presence or absence of known or anticipated contaminants so that any excess soil may be disposed of in accordance with applicable state and federal regulations. The Preferred Alternative may require a modification of the Tinker AFB RCRA Hazardous Waste Permit because accumulation points located in the current KC-135 maintenance facility would be closed, and new accumulation points would be placed in the new facilities. The accumulation points being closed and the new accumulation points being established would be inspected and approved as detailed in the Tinker Air Force Base Instruction 32-7004 Hazardous Waste Management. All new operations would be in compliance with state, federal, and local regulations. Beneficial impacts would include the proper disposal of abated LBP, ACM, and LBP and/or pesticide contaminated soils decreasing potential human contact with those materials on Tinker AFB.

Existing railway at the BSNF property would be dismantled before any new construction could be accomplished. Creosote –soaked railroad ties are not considered a hazardous waste and may be sent to a landfill as a non-hazardous waste (USEPA 1980). However, it is anticipated that the railroad ties would be removed from the property prior to Air Force acquisition of the site.

The KC-135 aircraft require extensive regular maintenance. The maintenance produces some hazardous and non-hazardous waste. The new KC-46A would require less regular maintenance which would be expected to produce less waste. However, the physical size of the KC-46A is larger than the KC-135, which could result in more waste being produced. Initially, there may be a decrease in the amount of waste produced from the maintenance of the new KC-46A, but over time there would be little to no change from

the amount of waste currently generated from KC-135 maintenance. Overall, impacts to hazardous waste from the Preferred Alternative would be less than significant.

4.2.11.2.2 Alternative 1

Impacts for Alternative 1 would be the same as described for the Preferred Alternative. Impacts to hazardous waste from Alternative 1 would be less than significant.

4.2.11.2.3 No-action Alternative

Under the No-action Alternative, there would be no impacts to the baseline conditions described in Section 3.2.11.2.1.

4.2.11.3 Environmental Restoration Program

4.2.11.3.1 Preferred Alternative

Two open ERP sites, Landfill 2 (ERP site code LF012) and Landfill 5 (ERP site code LF015) are located within one half mile of the Preferred Alternative construction and demolition activities area. Both sites are under long-term groundwater monitoring to ensure no release occurs from the historical landfills. It is possible that construction and demolition activities would encounter groundwater as the depth of groundwater ranges from 5 to 70 ft bgs. While not expected (based upon the location of Preferred Alternative activities), if groundwater is encountered during construction and demolition activities related to the Preferred Alternative, care would be taken to ensure that groundwater resources and human health are protected from potentially contaminated groundwater.

The ERP sites do not have soil contamination that could potentially affect the Preferred Alternative construction and demolition activities area. However, it is possible that contaminated soils related to historic or current BNSF operations could be encountered during construction and demolition activities related to the Preferred Alternative. If contact is made with contaminated soils, care would be taken to ensure that human health is protected from potentially contaminated soil. Based on information provided by BNSF and ODEQ in January 2013, there are no known spills or contamination documented in the area of the Preferred Alternative (USAF 2013c). Impacts to or from ERP sites as a result of the Preferred Alternative would be less than significant.

4.2.11.3.2 Alternative 1

The ERP has one potential site that may be affected by the construction and demolition activities. Site OT023 (Facility or Building 1123) was closed and a No Further Action Decision Document was prepared. There is little to no chance of Alternative 1 being impacted by Site OT023. This site/area is contained within the boundary of a groundwater contamination study for Site CG039; however, it was determined that the groundwater contamination is not attributed to Site OT023. The selected remedy for Site CG039 consists of Monitored Natural Attenuation for the contaminated groundwater, along with institutional controls with land use controls and groundwater use restrictions (USAF 2010b). Stormwater management features that are proposed to be modified under

Alternative 1 include the Beaver Pond Detention Basin and Redbud Pond, which are located immediately south of Site LF012 (Landfill 2). Caution should be taken to not affect the Site LF012 during modification of the stormwater features. Construction activities for Alternative 1 are not expected to affect groundwater. The Upper Saturated Zone of the Garber Sandstone is encountered at approximately 25-30 ft bgs in the vicinity of OT023. However, based on a review of Tinker AFB cross-section maps, the PZ of the Garber-Wellington Aquifer, a source of drinking water at Tinker AFB, begins at a depth of approximately 200 ft bgs, and is not expected to be encountered during demolition or construction activities. Therefore, impacts to or from ERP sites as a result of Alternative 1 would be negligible.

4.2.11.3.3 No-action Alternative

Under the No-action Alternative, there would be no impacts to the baseline conditions described in Section 3.2.11.2.2.

4.2.11.4 Other Identified Contamination

4.2.11.4.1 Preferred Alternative

Based on the findings of the Phase I Environmental Baseline Survey conducted in December 2012 and the Phase II Environmental Baseline Survey conducted in October and November 2013, there are reported concentrations of arsenic in the shallow soil and shallow groundwater unit. One soil sample had an arsenic concentration that slightly exceeded the background arsenic concentration but was statistically similar as discussed in 3.2.11.2.3. In two samples, cadmium exceeded the MCLs in groundwater as discussed in 3.2.11.2.3. Through the Installation Development Plan, Tinker AFB will prohibit the use of groundwater at BNSF to prevent exposure to potential contamination. Additionally, construction of a stormwater detention basin (see Section 4.2.7.1.1, BNSF Detention Basin #2) is proposed for an area of the TAC Facility where PAH and arsenic concentrations have been reported in soils. If excess soil is generated from Preferred Alternative construction activities, samples would be collected to properly characterize the waste for off-site disposal. Therefore, impacts from the Preferred Alternative would be less than significant.

4.2.11.4.2 Alternative 1

No other contamination was identified at the DLA Infill site; therefore, there would be no impacts.

4.2.11.4.3 No-action Alternative

Under the No-action Alternative, there would be no impacts to the baseline conditions described in Section 3.2.11.2.3.

4.2.11.5 Measures to Reduce Impacts

Impacts with regard to hazardous materials, wastes and ERP would not be expected from the proposed activities. All hazardous materials and wastes would be managed according to state and federal regulations, as well as the Tinker AFB Hazardous Waste Management Plan and HMMP. During construction activities, as well as during operation of the depot maintenance facility, if potential contamination is identified in soil or groundwater at BNSF, workers should contact Tinker AFB Hazardous Materials and/or Hazardous Waste Program personnel.

All ERP sites in the vicinity of the alternatives are either closed or long term monitoring is being performed on the groundwater. Groundwater is not expected to be encountered for any of the alternatives, therefore no impacts are expected.

4.2.12 Utilities and Infrastructure

Final design of utility systems for Preferred Alternative and Alternative 1 have not been determined; however, potential utilities, as presented in the 2012 KC-46A Master Plan Study were used to evaluate impacts to utilities and infrastructure. Impacts could be considered significant if the demand on the existing resource as a result of development would exceed the current capacity of the resource.

4.2.12.1 Sanitary Sewer

4.2.12.1.1 Preferred Alternative

Under the Preferred Alternative, sanitary sewer infrastructure would connect to the existing 24 inch main on the Tinker AFB property adjacent south of the BNSF Railyard site (TAC). The capacity of the TAC sanitary sewer system is not known. However, the system is believed to have spare capacity and was selected since the existing base sewer system north of the BNSF Railyard could not support additional wastewater generated from the KC-46A complex (USACE 2012). Prior to design or construction, the TAC sanitary sewer system should be fully analyzed to determine capacity. Construction of the KC-46A complex on the BNSF Railyard site would also require installation of a lift station on the BNSF Railyard property to transfer effluent to the TAC sanitary sewer system. Tinker AFB is permitted to discharge directly to the City sanitary lines, and average reported flow for 2012 was reported as 0.5 million gallons per day. Assuming 47,228 gallons sanitary wastewater is generated per person at Tinker AFB per year, an increase of approximately 255 office and maintenance personnel would result in an increase of approximately 10.6 million gallons sanitary wastewater generated per year (0.029 million gallons per day), an increase of less than one percent. Impacts to sanitary sewer generation or to the sanitary sewer system at Tinker AFB would be less than significant as a result of the Preferred Alternative.

4.2.12.1.2 Alternative 1

Impacts under Alternative 1 would be similar to those described for the Preferred Alternative except that existing sanitary sewer system located adjacent to the site would

be utilized. The existing 6-inch force main located on the north side of the current DLA Infill site would be upgraded and a new lift station would be constructed to handle the additional capacity from KC-46A operations (USACE 2012). Impacts to sanitary sewer generation or to the sanitary sewer system at Tinker AFB would be less than significant as a result of Alternative 1.

4.2.12.1.3 No-action Alternative

Under the No-action Alternative, no impacts to the sanitary sewer system would be expected. Operations to support the KC-46A maintenance would not occur, and no construction or demolition of existing infrastructure would be completed.

4.2.12.2 Industrial Wastewater

4.2.12.2.1 Preferred Alternative

The current industrial wastewater system at Tinker AFB does not have sufficient capacity to handle industrial wastewater generated from the KC-46A depot maintenance operations (USACE 2012). Additionally, no infrastructure to support industrial wastewater discharges exist on the BNSF Railyard property. Under the Preferred Alternative, new industrial wastewater lines would need to be constructed to collect and distribute wastewater via lift station and force mains across the Installation to connect to the existing IWTP. Currently there is a mothballed IWTP facility at the TAC Facility capable of processing over 1 million gallons of industrial effluent per day next to and contiguous to the BNSF site. A permit for this facility is already on record with DEQ; however, the TAC IWTP is not currently equipped with multimedia pressure filters or oil/water separators, nor is it capable of removal of organic constituents. Use of this IWTP without upgrades could produce effluent that would exceed permit limits (USAF 2007c). Industrial discharge permits would be updated/amended as necessary, to include the additional discharge from the KC-46A operations. Under the Preferred Alternative, impacts to the industrial wastewater system would be less than significant with construction of new industrial wastewater lines and upgrades to the TAC IWTP.

4.2.12.2.2 Alternative 1

Impacts to the industrial wastewater system under Alternative 1 are expected to be similar to those described for the Preferred Alternative. Under Alternative 1, new industrial wastewater lines would need to be constructed to collect and distribute wastewater via lift station and force mains across the Installation to connect to the existing industrial wastewater treatment plant. Industrial discharge permits would be updated/amended as necessary, to include the additional discharge from the KC-46A operations. Therefore, impacts would be less than significant with infrastructure upgrades resulting in sufficient capacity to handle industrial wastewater generated from the KC-46A operations.

4.2.12.2.3 No-action Alternative

Under the No-action Alternative, no impacts to industrial wastewater would be expected. Operations to support the KC-46A maintenance would not occur, no additional industrial wastewater would be generated, and no construction or demolition of existing infrastructure would be completed.

4.2.12.3 Potable Water

4.2.12.3.1 Preferred Alternative

Under the Preferred Alternative, potable water would be supplied to the BNSF Railyard site by connecting into existing water main and constructing a new water main loop around the BNSF Railyard property that would include cross connects. Assuming 123 gallons of potable water is consumed per person per day at Tinker AFB, an increase of approximately 255 office and maintenance personnel would result in an increase of approximately 31,365 gallons of potable water consumed per day (11.4 million gallons per year), an increase of approximately 1.3 percent. The potable water supply in place on Tinker AFB, as described in Section 3.2.12.2.3, is at 75 percent capacity and is expected to have sufficient capacity to support potable water needs for the KC-46A operations.

Construction of the KC-46A depot maintenance facility on the BNSF property would cross a City water line. The facility would be designed so as to protect the water main that serves the community. Construction of the taxiway under the Preferred Alternative would include appropriate access to the line for any necessary future repairs. The water line would not be relocated or re-routed. The construction design would include necessary features to ensure that the line is protected throughout the construction period and during operation of the taxiway.

Therefore, impacts to potable water as a result of the Preferred Alternative would be less than significant.

4.2.12.3.2 Alternative 1

Impacts to potable water under Alternative 1 are expected to be similar to those described for the Preferred Alternative. The potable water system is expected to have sufficient capacity to support KC-46A operations. Therefore, impacts to potable water as a result of Alternative 1 would be minor.

4.2.12.3.3 No-action Alternative

Under the No-action Alternative, no impacts to potable water would be expected. Operations to support the KC-46A maintenance would not occur, no increase in potable water use would be required, and no construction or demolition of existing infrastructure would be completed.

4.2.12.4 Solid Waste

4.2.12.4.1 Preferred Alternative

The amount of solid waste generated is expected to increase as a result of the Preferred Alternative. Solid waste generated as a result of demolition activities includes approximately 500 linear feet of paved road to be disposed of off-site. Although 40,000 linear feet of railroad would be removed, it is anticipated that the rail tracks and railway ties would be removed from the property prior to Air Force acquisition of the site. If the railway ties are sold prior to Air Force acquisition of the property, disposal of the ties would be the responsibility of the purchaser and it is unknown if they would be disposed in a landfill or reused. Solid waste would also increase as a result of the construction of new facilities. Solid waste generation as a result of demolition and construction activities is summarized in Table 4-11. Solid waste generated as a result of the KC-46A operations is also expected to increase due to the increase of approximately 255 personnel added to the current Tinker AFB employee work force. Since solid waste generated at Tinker AFB poses no significant constraints to operation and development on the installation, impacts to solid waste are expected to be less than significant. The KC-46A operations are expected to be similar to current aircraft maintenance operations; therefore, the nature of the solid waste generated under the Preferred Alternative is expected to be similar to solid waste currently generated at Tinker AFB.

Table 4-11 Construction and Demolition Associated Waste

Project Description	Area Affected (sf)	Rate of Debris (lb/sf)a	Estimated Solid Waste Generated from Action (Tons)
Demolition of S Midwest Boulevard	12,500	155	969
Construction of Primary and Supporting Facilities	887,291	3.89	1.73
		TOTAL	**969.73**

Notes:
lb/sf = pounds per square foot
NA = Not Applicable
sf = square feet
[a] USEPA 1998. Estimated non-residential construction debris rates, as reported in the *Characterization of Building-Related Construction and Demolition Debris in the United States*, are 3.89 lbs/sf, and non-residential demolition rates are estimated to be 155 lbs/sf. Demolition debris rate include concrete slabs. Rate of debris for non-residential demolition is based on demolition of structures and may result in overestimation or debris generated.
[b] Width of existing rail was assumed to be 6 feet. Width of S Midwest Boulevard was assumed to be 25 feet.

4.2.12.4.2 Alternative 1

Solid waste generated from personnel and from KC-46A operations is expected to be similar to that described under the Preferred Alternative. Additionally, solid waste generated as a result of Alternative 1 would include demolition waste from the demolition of several facilities within the current DLA infill site. The current capacity of the landfills utilized for solid waste disposal by Tinker AFB is not known; however,

waste from construction and demolition activities and the KC-46A operation is not expected to exceed current capacities for landfills. Therefore, impacts to solid waste from Alternative 1 would be less than significant.

4.2.12.4.3 No-action Alternative

Under the No-action Alternative, no impacts to solid waste would be expected. Operations to support the KC-46A maintenance would not occur, and no construction or demolition of existing structures or infrastructure would be completed. Therefore, a change to solid waste generation from operations or construction/demolition activities would not occur.

4.2.12.5 Transportation

4.2.12.5.1 Preferred Alternative

Long-term impacts to transportation resources would be expected as a result of the Preferred Alternative. Construction associated with the Preferred Alternative would result in a long-term (10 year) increase in traffic both on- and off-base. Construction vehicles would access the site directly through the relocated Gott Gate (see Section 4.3.1 Other Actions Announced for Tinker AFB and Surrounding Community), which would be located immediately west of the BNSF site. There would be increased traffic congestion at Gott Gate, as other POVs and government-owned vehicles must also utilize this gate for other existing operations. Once KC-46A depot maintenance activities commence, personnel would access the site through the Midwest Boulevard Commercial Entry Control Facility (USACE 2012).

Under the Preferred Alternative, Midwest Boulevard would be removed from Munitions Road to Mercury Road and rerouted. The road would be rerouted along the west side of the proposed KC-46A operations, requiring construction of approximately 0.5 mile of roadway to connect to the existing Devane Avenue. The newly constructed road would be approximately 30 ft in width, equivalent to the width of the existing road.

As discussed in Section 2.4.2, an estimated 1,700 office and maintenance personnel would be required to maintain the KC-46A fleet, as well as continued maintenance on the KC-135 as it is phased out. Of the 1,700 personnel, only 15 percent (255) of the personnel would be hired from outside the Oklahoma City area. The increase of 255 personnel on base as a result of the Preferred Alternative would increase the amount of traffic entering, exiting, and travelling on Tinker AFB roadways. Assuming an additional 255 vehicles could potentially enter and exit Tinker AFB during weekdays, an increase of 510 vehicles (less than one percent) may utilize Tinker AFB access gates on a daily basis.

In addition to increased traffic on Tinker AFB, construction of additional parking features would be necessary to accommodate the increase in personnel. Preliminary layouts of the proposed construction include 845 POV spaces to be constructed under the Preferred Alternative. The number of additional spaces would accommodate the additional 255 personnel; however, the proposed spaces in proximity to the KC-46A maintenance area

would only account for approximately half the 1,700 staff personnel needed to maintain operations. Considering the improvements to the existing transportation system that are proposed under the Preferred Alternative, impacts to the Tinker AFB transportation system would be less than significant.

4.2.12.5.2 Alternative 1

Construction associated with Alternative 1 would result in a long-term (10 year) increase in traffic both on- and off-base. Construction vehicles would access the site through Gott Gate, which is located west of the DLA Infill site, and would travel Patrol Road to reach the DLA Infill site. There would be increased traffic congestion at Gott Gate and along Patrol Road, as other POVs and government-owned vehicles must also utilize Gott Gate and Patrol Road for other existing operations. Since DLA Infill activities would be relocated to the TAC facility, there would not traffic conflicts between DLA Infill operations and construction vehicles.

Under Alternative 1, existing parking lots would be demolished from the 507th area and would be replaced with approximately 565 POV parking spaces. Parking spaces for POVs are planned along the southern and western portions of the proposed development. These additional parking spaces would be sufficient to accommodate the increase of 255 personnel associated with Alternative 1. Access to the DLA Infill site would be provided from the south by Patrol Road. Pond Road, Reserve Road, and Hercules Road would be rerouted as a result of Alternative 1.

Increased traffic due to additional personnel would be expected to be similar to increase resulting from the Preferred Alternative. Although some roads would require rerouting, traffic accessibility would not be expected to decrease. Under Alternative 1, impacts to the transportation system at Tinker AFB would be less than significant.

4.2.12.5.3 No-action Alternative

Under the No-action Alternative, no significant impacts to transportation would be expected. Construction and operation to support the KC-46A maintenance would not occur; therefore, additional workforce would not be needed, and increase of traffic flow from personnel would not be expected.

4.2.12.6 Electricity/Natural Gas

4.2.12.6.1 Preferred Alternative

Long-term impacts to the natural gas system would be expected as a result of the Preferred Alternative. Under the Preferred Alternative, new gas lines would be connected into the existing 6 inch main, currently located north of the BNSF Railyard site, along the south side of Mercury Road. Construction of the gas distribution system would be completed in phases to compliment fiscal year construction phasing (USACE 2012). The new gas lines would connect to existing infrastructure capable of supporting the new lines.

Long-term impacts to the electrical system would be expected as a result of the Preferred Alternative. Construction of the KC-46A site on the BNSF Railyard site would require the addition of a new 15/20/25 megavolt ampere transformer to the existing OG&E substation. Current loads may be shifted to distribute loads among source busses. An underground duct bank will be utilized to distribute loop feeders serving the new facility. The three new power loops serving the new construction will not exceed 400 amperes at 12.47 kV (USACE 2012).

Under the Preferred Alternative, new electrical and natural gas lines would be required for operation of the KC-46A operations; however, these systems would connect to existing distribution lines and would provide sufficient capacity for the new depot maintenance activities. Therefore, impacts to the electrical and natural gas systems would be less than significant.

4.2.12.6.2 Alternative 1

Impacts from Alternative 1 are expected to be similar to those described for the Preferred Alternative. Under Alternative 1, natural gas would be provided to the site by connecting to existing gas lines located on Tinker AFB. The existing gas main that extends along the south side of Patrol Rd and supplies natural gas to the DLA Infill site currently transitions from a 6 inch line to a 3 inch line. Under Alternative 1, the 3 inch main would be replaced with a 6 inch line to support additional capacity. Although the current infrastructure would require upgrades to support the KC-46A operations on the DLA Infill site, impacts to natural gas resources are considered an improvement to infrastructure. Therefore, impacts to the electrical and natural gas systems would be less than significant.

4.2.12.6.3 No-action Alternative

Under the No-action Alternative, no significant impacts to electricity/gas would be expected. Operations to support the KC-46A maintenance would not occur, and no construction or demolition of existing infrastructure would be completed.

4.2.12.7 Measures to Reduce Impacts

No mitigation measures or BMPs are required or recommended.

4.2.13 Socioeconomic Resources

Socioeconomic impacts may be considered significant if long-term employment rates and the amount of local business decreased, or if community services, transportation or infrastructure within the community could not accommodate an increase in population.

4.2.13.1 Preferred Alternative

4.2.13.1.1 Population

Under the Preferred Alternative, an estimated 350 people would be required for the demolition and construction of the maintenance facilities. It is assumed that the estimated 350 people would remain consistent throughout the entire construction and demolition associated with the Preferred Alternative. This would represent approximately a one percent increase in the daily installation population of 31,072 (including active duty, dependents, and civilian workers). This increase would be short term, would only last for the duration of the construction and demolition activities, and would only occur during working hours. It is assumed that the 350 construction personnel would come from the local community and would not affect the local population.

The addition of office and maintenance personnel would be phased in beginning in FY16, with an approximate 1,700 people required at full depot maintenance capabilities in FY28. This would represent a long-term increase in population of approximately one percent at full depot maintenance capability. This increase would only occur during working hours.

It is anticipated that approximately 50 percent of the required 1,700 office and maintenance personnel would be reassigned personnel due to decreased workloads in other areas of the base and 35 percent would be personnel reassigned due to budget cuts. Therefore, it is assumed that the remaining 15 percent (255 people) of the required 1,700 personnel would have specialized skills and would be hired from outside the Oklahoma City area.

Assuming that the 255 personnel relocating to the area would be accompanied by families, using the Oklahoma City average persons per household of 2.5 (USCB 2010a), there would be an increase in population of approximately 638 people. The increase in population under the Preferred Alternative represents a 0.1 percent overall increase, which would not affect the ability of public services, transportation, or infrastructure to effectively support the community. Therefore, impacts from population changes associated with the Preferred Alternative would be less than significant.

4.2.13.1.2 Economic Activity

Under the Preferred Alternative, the local economy would benefit from expenditures incurred from the construction and demolition of facilities. The Preferred Alternative is estimated to cost a total of $471,000,000; a large portion of which is directly related to construction services. Construction materials and goods (e.g., gasoline for equipment and trucks) would be expected to be purchased from the local area, increasing the amount of local business expenditures, which would result in a short-term, positive impact to the local economy.

The depot maintenance of the KC-46A would create a workload increase for Tinker AFB. During construction an estimated 350 people would be required for the demolition and construction of the maintenance facilities. However, it should be noted that employment in the area would not increase as a result of construction since it is expected that the construction companies would utilize their current employees.

The employment of an estimated 1,700 office and maintenance personnel would increase the number of direct jobs that Tinker AFB provides to the community, as well as increasing Tinker AFB's annual payroll and statewide economic impact.

The expenditures and income associated with the Preferred Alternative would result in a long-term, beneficial impact to the local economy.

4.2.13.1.3 Housing

Under the Preferred Alternative, there would be a minor, long-term impact to the demand for off-base housing. The population increase would consist of contractors; therefore, there would be no additional demand for on-base housing. Current housing levels in the greater Oklahoma City area can accommodate the increase in population.

4.2.13.1.4 Education

Under the Preferred Alternative, approximately 255 personnel would be relocating to the Oklahoma City area. Using the average family size of 3.30 (USCB 2012b), and assuming a two-parent household, there would be approximately 200 children relocating to the area and in need of education. Therefore, there would be a long-term increase in area school populations of approximately 200 students due to the enrollment of the children of personnel relocating to the area. Current capacities at Midwest-Del City School District and Moore Public School System would allow for the enrollment of the additional students. Impacts to education under the Preferred Alternative would be less than significant.

4.2.13.2 Alternative 1

Impacts under Alternative 1 would be similar to those described for the Preferred Alternative; however, the estimated total cost would be $495,000,000, directly impacting the local economy. The socioeconomic impacts from Alternative 1 would be less than significant, and in the case of economics, would have long-term benefits.

4.2.13.3 No-action Alternative

Under the No-action Alternative, there would be no impact on the baseline conditions as described in Section 3.2.13.

4.2.13.4 Measures to Reduce Impacts

No mitigation measures or BMPs are required or recommended.

4.2.14 Environmental Justice

As discussed in Section 3.2.14, 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 the Environmental Impact Analysis Process. In order to comply with EO 12898, ethnicity and poverty status in the study area have been analyzed. The ROI for each resource area has been evaluated within the COC in order to identify the presence or absence of environmental justice populations. Additionally, to comply with EO 13045, environmental health and safety risks have been identified to determine if children could be disproportionately affected by the Preferred Alternative. Impacts may be considered significant if the human health or environmental impacts resulting from the Preferred Alternative or alternatives were to disproportionately adversely impact children or minority or low-income populations.

The ROIs for the Preferred Alternative and Alternative 1 are the two census tracts potentially affected by the depot maintenance of the KC-46A. Given the demographic composition of the ROIs, there is one environmental justice community present. There is a minority population present within Census Tracts 1074.03, because there is a higher minority percentage than that of the general population. Since it is unknown which residents within Census Tract 1074.03 are minorities, for purposes of this analysis, it was assumed that all residents are minorities. Census Tract 1074.03 is hereinafter referred to as environmental justice population.

4.2.14.1 Preferred Alternative

Most impacts would be localized to the project site and would not impact surrounding communities. Construction activities would result in a short-term increase in noise levels at residences within Census Tract 1074.03, which contains an environmental justice community; however, the distance of the construction activities to the residences would result in an attenuation of construction noise below baseline noise levels. Demolition activities associated with the Preferred Alternative would cause short-term increases in air and noise emissions for the duration of the proposed demolition activities. However, emissions would attenuate rapidly with distance from the demolition site and would be evenly distributed throughout the project area, thereby not disproportionately affecting a single population. Short-term traffic congestion would increase on the installation and would equally affect all who transit the area. Therefore, no disproportionate impacts to a single population from transportation impacts would be expected.

4.2.14.2 Alternative 1

There are no environmental justice communities present within the ROI; therefore, there would be no disproportionate and adverse impacts to environmental justice populations under Alternative 1.

4.2.14.3 No-action Alternative

Under the No-action Alternative, there would be no change to baseline conditions described in Section 3.2.14.2 and no impacts to environmental justice communities.

4.2.14.4 Measures to Reduce Impacts

Since there would be no disproportionate and adverse impacts to environmental justice communities, no mitigation measures or BMPs are recommended.

4.2.15 Relationship between Short-term Uses and Long-term Productivity

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 for the purposes of this analysis include those impacts occurring over a period of more than 5 years, including permanent resource loss.

Implementation of the Preferred Alternative would not require short-term resources uses that would result in long-term compromises of productivity. Implementation of the Preferred Alternative or Alternative 1 would not represent a significant loss of open space and would primarily affect existing developed area.

4.2.16 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the impacts that the use of these resources will have on future generations. Irreversible impacts primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable timeframe (e.g., energy and minerals). Irreversible and irretrievable impacts include the loss of wetlands and floodplains area primarily associated with the implementation of Alternative 1.

4.3 CUMULATIVE EFFECTS

4.3.1 Other Actions Announced for Tinker AFB and Surrounding Community

This EA also considers the direct and indirect effects of cumulative impacts (40 CFR 1508.7) and concurrent actions (40 CFR 1508.25[1]). A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is 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 which agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Other actions announced for Tinker AFB and the surrounding area that could occur during the same time period as the Preferred Alternative or Alternative 1 are identified below.

- **Gott Gate Relocation**: Gott Gate is located in the South Forty District of the installation, accessible by Air Depot Boulevard. The gate is northwest of the BNSF alternative site and is used for POV base access. If the Preferred Alternative is selected, Gott Gate would be relocated to the west side of the BNSF site along Air Depot Boulevard. If Alternative 1 is selected, Gott Gate would remain in its current location. Additional NEPA analysis for gate relocation will be required if the Preferred Alternative is selected.

- **Truck Inspection Gate Relocation:** A truck inspection gate is located on SE 59th Street, north of the BNSF alternative site. This gate serves to inspect commercial vehicles prior to base entry. If the Preferred Alternative is selected and implemented, the truck inspection gate would be relocated to the west side of the BNSF site along Air Depot Boulevard. If Alternative 1 is selected, the truck inspection gate would be relocated to Midwest Boulevard, east of the TAC property. Additional NEPA analysis for gate relocation will be required once an alternative is selected.

- **Liberty Pointe Apartment Homes:** Liberty Pointe is a new, 324-unit luxury apartment community that is currently leasing. The complex is located west of the TAC facility, off Air Depot Boulevard. Construction of this complex began in April 2012 and is complete.

- **Engine Manifold Cleaning System for Building 3907:** The Engine Manifold Cleaning System will be located within the existing Consolidated Fuels Overhaul, Repair and Test Facility, Building 3907. The purpose of the project is to efficiently and effectively clean aircraft engine manifolds by utilizing state of the art, fully-automated cleaning system components and systems. The Engine Manifold Cleaning System generally consists of heat exchangers, charge pumps, transfer pumps, centrifugal separators, mixers, agitators, chemical storage tanks, wash tanks, spent tanks, deionized water units, regenerative blower, centrifugal drum, sump, sump pump, filters, sludge tanks, control office, cranes, multi-axis robot and safety system, preparation stations, sink, programmable logic controller, motor control center, and all associated piping, valves, and instrumentation necessary to make the system fully functional (USACE 2010).

- **B230 Electrical Distribution:** Upgrade of the entire electrical distribution system within Building 230, the Airborne Warning and Control System (AWACS) Maintenance Hangar, to provide a safe and reliable primary electrical system to maintain power for AWACS aircraft maintenance that meets current National Electrical Code standards. The project includes the replacement of transformers, switches, load breakers, energy upgrade of the electrical vault, and removal of existing equipment.

- **Chemical Clean Renovation at Building 3001:** Renovation of the Aircraft Engine Chemical Cleaning Facility within Building 3001 involves installing a new two hour rated wall structure from the new concrete curb to the top of the existing roof structure and new doors to enclose the new Chemical Cleaning area.

It will also include sealing any new concrete floor slabs and placing sealant at the joint.

- **Military Construction (MILCON) AFR, 513 Air Control Group Facility:** Construction of a multi-story, 32,000 sf, consolidated squadron operations and Air Control Group facility. The facility will be located south of Arnold Street, approximately halfway between D Avenue and H Avenue, east of the Air Base Wing Headquarters building. The facility will provide space for flight crews and administrative support personnel for the AWACS Reserves at Tinker AFB.

- **MILCON DLA, Replace Fuel Distribution Facilities:** This project includes the removal and replacement of the fiberglass fuel line from Facility 273 to Facility 995. Ten fuel hydrant outlets will be added and 13 will be replaced. The fuel storage tanks will be refurbished, and the Type II pump house will be replaced. Additionally, a Base Military Service Station will be constructed.

- Renovation for United States Special Operations Command (USSOCOM) and Defense Information Systems Agency (DISA), Building 9201 (Old Paint Facility): Renovation of three floors in Building 9201, which includes approximately 360,000 sf. The renovations are necessary to support the tenant program areas for DISA and USSOCOM. The renovation will provide an administrative area, data center, storage and utility infrastructure that will support approximately 430 additional personnel. Future development includes a planning/conference room and a sleeping/ready room. The facility will serve as a fully operational backup to MacDill AFB Headquarters. Building 9201 is located in the TAC in the southwest portion of Tinker AFB.

- **Construct Air Traffic Control Tower:** Construct a new 11-story Air Traffic Control Tower to replace the current tower that is approximately 40 years old and does not meet FAA size standards for air control and training requirements. Construction will include reinforced concrete piers, control tower cab with tinted double glazing, elevator, flight command and administrative area, supervision and simulation training area as well as fire protection, utilities, back-up power, lighting protection, access road, and any other necessary support for a complete and useable facility. The new tower will be sited in relation to the two runways allowing personnel to conduct critical controller training and conduct operations in a high density environment. The project is to include minimum DoD antiterrorism force protection requirements and demolition of existing control tower and access road. An EA was completed for this project.

4.3.2 Airspace Use and Management

None of the other actions mentioned in Section 4.3.1 include aircraft operations. Therefore, there would be no cumulative impacts for airspace use and management.

4.3.3 Noise

4.3.3.1 Aircraft Noise

None of the actions mentioned in Section 4.3.1 include aircraft operations. Therefore, there would be no cumulative impacts for aircraft noise.

4.3.3.2 Construction Noise

The cumulative projects described in Section 4.3.1 that are close enough to potentially generate cumulative construction noise are the MILCON DLA - Replacement of the Fuel Distribution Facilities; Renovation for USSOCOM and DISA at Building 9201, Gott Gate and Truck Inspection Gate Relocation, and the Liberty Pointe Apartment Community construction. The distance of construction activities from the nearest noise-sensitive receptors is such that construction noise would be reduced to approximately 50 dBA, which is below baseline levels for the Preferred Alternative and Alternative 1.

4.3.4 Ground and Aircraft Safety

Multiple construction, demolition, and renovation projects occurring simultaneously increase the number of non-military personnel on the base adding to traffic congestion, construction and ground safety incidents. Planned construction projects at Tinker AFB that have potential to compound the effects of the KC-46A depot maintenance construction and operation activities include the MILCON DLA - Replacement of the Fuel Distribution Facilities; renovation for USSOCOM and DISA at Building 9201, and possible relocation of Gott Gate and the Truck Inspection Gate. Each project manager would be required to develop and implement a health and safety program that would address all safety concerns, train personnel adequately, and mitigate the chances of any incidents. If multiple construction activities were occurring simultaneously and required an increase in construction vehicle traffic, a traffic plan would be developed and implemented.

The addition of Liberty Pointe Apartment Homes may also impact the traffic on the perimeter roads around Tinker AFB. This additional housing many also increase use of the original Gott Gate and the newly relocated Gott Gate if the Preferred Alternative is chosen. The relocation of the Truck Inspection gate away from Gott Gate may decrease the traffic, and help mitigate the potential for POV versus truck incidents. Additional traffic congestion would be minimized through use of signage for necessary detours. The total number of construction and ground safety incidents occurring on base could increase; however, an individual construction project would not be expected to impact the number of construction and ground safety incidents occurring at a separate project.

None of the other actions mentioned in Section 4.3.1 include aircraft operations. Therefore, there would be no cumulative impacts for aircraft safety.

4.3.5 Air Quality

The Preferred Alternative and Alternative 1 would result in short-term emissions (including fugitive dust) during construction of the depot maintenance facilities. If Alternative 1 were implemented, fugitive dust emissions contributing to cumulative effects would be three times greater than those predicted for the Preferred Alternative. The emissions would be temporary, localized and would be eliminated after the activity is completed. The increase in short-term emissions is not significant when compared to the total 2008 AQCR 184 annual emissions.

The Air Force does not anticipate that any future potential effects of global warming would negatively impact the ability of Tinker AFB to effectively carry out KC-46A depot maintenance operations. If global warming predictions of hotter and drier climatic conditions in the Oklahoma region did occur, operations at Tinker AFB would be projected to continue without disruption. In the event that storm events became more frequent, these events could temporarily impact flying activities at greater frequencies than currently occur and could result in higher levels of storm-related facilities damage.

The increase in potential net long-term emissions is not significant when compared to the total 2008 AQCR 184 annual emissions. The potential net long-term emissions from the Preferred Alternative and Alternative 1 are primarily from mobiles sources (aircraft and POV), stationary natural gas combustion sources, and general solvent use, depainting, and fuel components testing. These emissions quickly dissipate away from the activity source, thereby preventing contribution to cumulative impacts to future potential projects that may be conducted in the area or at Tinker AFB.

The cumulative impacts from the Preferred Alternative, Alternative 1, and other proposed projects are expected to have no significant impact when compared to the total criteria pollutant emissions for Oklahoma County. Given the global nature of climate change and the limitations of accurately predicting climate change effects, it is not possible to link the emissions for the proposed project to a specific change in the global environment. The amount of GHG emissions from the Preferred Alternative and Alternative 1 do not represent a significant increase in GHG emissions, but any emission of GHGs represents an incremental increase in global GHG concentrations. Without accurate predictions on climate change effects, the Air Force will continue to design and construct facilities for the project based on current guidelines and regulations. The Air Force will continue to investigate and utilize new and improved technologies to limit or prevent, to the extent feasible, further emissions that contribute to GHG concentrations.

4.3.6 Land Use

The cumulative effects of the Preferred Alternative and alternative actions along with the other construction, renovation, and upgrade projects on Tinker AFB would be in accordance with Air Force regulations, the installation General and Community Plans, and the Oklahoma City Southeast Sector Plan; therefore, the action alternatives would be expected to result in the long-term benefits of implementing the land-use recommendations contained in the plans.

4.3.7 Physical Resources

The soils in developed areas on Tinker AFB and in the vicinity of the proposed construction projects at Tinker AFB have been altered over time and the project area is permanently disturbed with existing facilities and paved roads. Potential cumulative effects would include an increase in soil disturbance associated with construction activities in areas not yet developed. These impacts would be minimized by the use of BMPs to minimize soil erosion and reduce fugitive dust emissions.

It is anticipated that the demolition and construction activities under the Preferred Alternative and Alternative 1 would result in very little, if any, contribution to soil erosion within Tinker AFB area. Standard BMPs for erosion control and management are used throughout Tinker AFB during any construction activity to prevent impacts to resources, therefore impacts from other nearby projects are minimized, and, cumulatively, the base projects impacts are not significant. There would be no cumulative impacts to physical resources as a result of activities under the Preferred Alternative and Alternative 1.

4.3.8 Water Resources

Potential exists for the compounding of effects from additional construction projects planned for Tinker AFB, as described in Section 4.3.1 that occur in concurrence with the Preferred Alternative. Surface water, floodplains, and storm water impacts would likely be the most impacted by the concurrent construction activities. Planned projects with the likelihood to compound the impacts on water resources for Tinker AFB are as follows:

- MILCON AFR, 513 Air Control Group Facility
- MILCON DLA, Replace Fuel Distribution Facilities
- Construct Air Traffic Control Tower

The additional storm water generated as a result of construction and demolition activities for all concurrent projects would be handled by implementing a SWPPP for all construction areas. In addition, the Unified Facilities Criteria on Low Impact Development (UFC 3-210-10) will be considered during the design of the project. Additional stormwater drainage and conveyance features, including detention basins, rock berms, and other BMPs would be implemented on a site specific basis to accommodate additional stormwater discharge and achieve no net increase in stormwater discharge. Adequate stormwater features will be considered during the design of these projects to avoid significant impacts to floodplains. New construction will also be completed in accordance with E.O. 11988. All necessary permits would be obtained or modified prior to construction, including an ODEQ permit to discharge stormwater associated with construction activities under the OPDES General Permit OKR10.

None of the other projects listed in Section 4.3.1 are expected to impact wetlands; therefore, they would not contribute to cumulative impacts to wetlands.

4.3.9 Biological Resources

Of the projects listed in Section 4.3.1, only the Engine Manifold Cleaning System for Building 3907 would occur within areas designated as GI; however, due to the fact that all project activities would occur within the existing building, no impacts to GI would be expected. As the area around Tinker AFB continues to develop, the diversity of native habitat is also decreasing outside of the base. However, the Preferred Alternative would allow for a connection to exist between GI north of the BNSF Railyard site to GI in the Draper Lake area which is a goal of the GI Plan. Therefore, none of the projects in Section 4.3.1 would contribute to cumulative effects to GI. All outdoors construction, demolition, and renovation activities described in Section 4.3.1 would result in displacement of birds sensitive to noise and human activities from the site and habitat immediately surrounding the project area; however, these impacts would be short-term and minor as the birds are highly mobile. These short term impacts, in conjunction with bird impacts from the Preferred Alternative or Alternative 1 would not be expected to decrease the size of the bird population or overall bird diversity in the area.

No surface water bodies are located near the projects listed in Section 4.3.1; therefore, these projects would not be expected to contribute to cumulative effects to aquatic habitat.

The three projects described in Section 4.3.1 that would involve outdoor construction (MILCON AFR, 513 Air Control Group Facility; MILCON DLA, Replace Fuel Distribution Facilities; and Construct Air Traffic Control Tower) could permanently displace mammals; however, there is similar habitat immediately adjacent on Tinker AFB property. Therefore, these projects, in conjunction with the Preferred Alternative or Alterative 1 would not be expected to result in major increases or decreases in mammalian abundance or diversity.

Detailed in Table 4-10, the small decrease in habitat diversity and potential habitat (less than 0.5 acres of native vegetation, 82.3 acres of native/non-native mix grasses, and 3.3 acres of improved turf) on Tinker AFB and for some species of concern as a result of the Preferred Alternative is a minor impact due to the fact that there have been no recorded sighting of species of concern on the BNSF Railyard or DLA Infill project sites. Additionally, similar habitat types exist in adjacent areas to the property. Known Texas horned lizard habitat falls immediately adjacent to the BNSF Railyard property on its eastern boundary; however, none of the other projects described in Section 4.3.1 appear to be located near areas of Texas horned lizard observations or habitat.

4.3.10 Bird-Aircraft Strike Hazard

None of the other actions mentioned in Section 4.3.1 include aircraft operations. Therefore, there would be no cumulative impacts for BASH.

4.3.11 Cultural Resources

Other actions that have been announced by Tinker AFB that could affect the cultural resources within the APE of the Preferred Alternative and Alternative 1 include: (1) MILCON DLA, Replace Fuel Distribution Facilities. This action will consist of removal and replacement of the fuel line from Facility 273 to Facility 995, refurbishment of fuel storage tanks, replacement of existing pump house, and construction of a new service station. The effect of this action on cultural resources would not be cumulative nor interactive with the Preferred Alternative or Alternative 1. As a result, the Preferred Alternative and Alternative 1 would have no cumulative effects on cultural resources.

4.3.12 Hazardous Materials and Wastes

The Preferred Alternative, Alternative 1, and concurrent actions would require the management of ACM, LBP, and associated hazardous materials and wastes in accordance with existing Tinker AFB management programs and would not result in adverse effects. The potential for the presence and management of pesticide impacted soils beneath existing facilities would also not result in adverse effects. The operational use of hazardous materials and the generation of hazardous waste may actually be decreased as a result of transitioning the new aircraft into use. Therefore, the Preferred Alternative, Alternative 1, and the projects listed in Section 4.3.1 would not result in cumulative impacts to hazardous materials and wastes in or around Tinker AFB and TAC.

4.3.13 Utilities and Infrastructure

Short-term impacts to solid waste generation would be expected from construction activities associated with the additional projects identified in Section 4.3.1; however, it is not expected that this increase would adversely affect waste management practices at the installation or exceed the current landfill's capacity. The additional planned projects would not result in a significant increase in the local population and are not expected to result in a significant increase in utility usage for the area; therefore, they would not be expected to contribute to cumulative impacts to utility systems. Planned construction projects at Tinker AFB that have potential to compound the effects of the KC-46A depot maintenance construction and operation activities include the MILCON DLA - Replacement of the Fuel Distribution Facilities; and Renovation for USSOCOM and DISA at Building 9201. If multiple construction activities were occurring simultaneously and required an increase in construction vehicle traffic, a traffic plan would be developed and implemented. Additionally traffic congestion would be minimized through use of signage for necessary detours. The completion of the Liberty Pointe Apartment Homes located west of TAC would compound the effects of the increased traffic from the KC-46A depot maintenance construction and operation, especially along S. Air Depot Blvd.

4.3.14 Socioeconomic Resources

Projects identified in Section 4.3.1 all have a construction, demolition, or renovation component; therefore, there would be a short-term increase in construction personnel on the installation and in the surrounding areas during daytime hours. It is assumed that the

construction companies would utilize their existing crews, so an increase in population or housing demand due to construction personnel is not expected.

It is anticipated that the majority of residents moving into the Liberty Pointe Apartment Homes would be relocating from the Greater Oklahoma City area, and would not result in a large increase in the local population. There would be an increase in enrollment at local schools as a result of the new apartment community; however, current capacities at Midwest-Del City School District could accommodate the additional students.

Economic expenditures related to the construction, demolition, and relocation projects associated with the Preferred Alternative and Cumulative Projects, listed in Section 4.3.1, would have beneficial economic effects in and around the region. Additionally, the local economy would benefit long-term from the tenants living in the Liberty Pointe Apartment Homes.

4.3.15 Environmental Justice

Most impacts to resources would be localized to the project site and would not impact the surrounding communities. Cumulative construction noise impacts to minority or low-income populations would be temporary and would not exceed baseline conditions. Therefore, cumulative noise impacts would not disproportionately and adversely impact minority or low-income populations identified in close proximity to the project sites.

CHAPTER 5
LIST OF PREPARERS

Name/Organization	Degree	Resource Area	Years of Experience
Brent Ferry, P.G./WESTON	BA, Geology; MS, Hydrogeology	Project Manager	12
Loretta Turner, P.E./WESTON	BS, Chemical Engineering	Team Lead, Document Review	17
Tamara Carroll/WESTON	BS, Bioenvironmental Science	Document Preparation Lead	11
Corey Ricks/WESTON	AAS, Electronics Technology; BS Geography	GIS Analyst	8
Erin Johnson/WESTON	BS, Microbiology; MS, Oceanography	Resource Lead, Biological Resources	9
Kevin Eldridge/WESTON	BS, Meteorology; MS, Atmospheric Sciences	Resource Lead, Air Quality	28
Barry Peterson/WESTON	BS, Meteorology; MS, Atmospheric Sciences	Resource Specialist, Air Quality	14
Kevin Wooster, P.G./WESTON	BS, Geology; MS, Hydrogeology	Resource Lead, Physical Resources	25
Rusty Jones/WESTON	BS, Geology and Geophysics; BS Psychology	Resource Specialist, Physical Resources	6
Ashley Naber/WESTON	BAIS, International Business; MAG, Resource and Environmental Studies	Resource Specialist, Construction noise, Socioeconomics, Environmental Justice	2
Nora McGuire/WESTON	BS, Environmental Science	Resource Specialist, Safety	3
Mary Tibbets/WESTON	BA, Conservation Biology; MS, Wildlife Ecology	Resource Specialist, Biological Resources	4
Colin Meneilly/WESTON	BS, Bioenvironmental Science	Resource Lead, Hazardous Materials/Waste	15
Patrick Fortson, P.G., E.I.T./WESTON	BS, Geosystems Engineering and Hydrogeology	Resource Specialist, Hazardous Materials/Waste	8

LIST OF PREPARERS (CONTINUED)

Name/Organization	Degree	Resource Area	Years of Experience
Natalie Quiet/WESTON	BS, Natural Resource Management	Resource Specialist, Land Use	2
Lori Kalich/WESTON	BS, Bioenvironmental Sciences	Resource Specialist, Water Resources; Utilities and Infrastructure	5
Aimee Kambhu/WESTON	BS, Geology	Quality Assurance/Quality Control Review	20
Katie Mittmann/WESTON	BS, Biology; MS Biology – Aquatic Ecology Emphasis	Technical Review	17
W. Nicholas Trierweiler/Ama Terra	PhD, Anthropology	Resource Lead, Cultural Resources	33
Thomas Eisenhour/Ama Terra	B, Architecture; M, Architecture	Resource Specialist, Cultural Resources	26
John Wallin/WWB Consultants	BA, Biology MA, Management	Resource Lead, Airspace and Airfield Operations, BASH, Aircraft Safety; and Aircraft Noise	43
Doug Botts/WWB Consultants	BS, Government MA, Computer Data Automation	Resource Specialist, Noise Modeling	5
Daniel Robinson P.E. /Wyle	MS, Mechanical Engineering	Aircraft Noise	12
Patrick Kester/Wyle	BS, Mechanical Engineering	Aircraft Noise	7

CHAPTER 6
LIST OF PERSONS AND AGENCIES CONSULTED

The following individuals were consulted during the preparation of this EA:

Federal Agencies/Representatives

Natural Resources Conservation Service, US Department of Agriculture
Gary O'Neill

Tinker AFB
Debra Bahr, Realty Specialist
Scott Bowen, Hydrogeologist
Michael Daly, 72 ABW/CEC
John Krupovage, Natural Resource Biologist
Raymond Moody, Natural Resource Biologist
Brion Ockenfels, 72 ABW/PA
John Truong, Stormwater Program Manager

US Fish and Wildlife Services
Dixie Porter

Federal Emergency Management Association
Ross Richardson

US Army Corps of Engineers, Tulsa District
Carolyn Schultz

US Environmental Protection Agency, Region 6
Rhonda Smith

State Agencies

Oklahoma Water Resource Board
Julie Cunningham

Oklahoma Corporation Commission
Patrice Douglas

Oklahoma Department of Agriculture, Food, and Forestry
George Geissler

Oklahoma Wildlife Service, US Department of Agriculture
Kevin Grant

Oklahoma Department of Wildlife Conservation
Richard Hatcher

Oklahoma Geological Survey
Randy Keller

Oklahoma Department of Transportation
Dawn Sullivan

Oklahoma Department of Environmental Quality
Jennifer Wright
State Historic Preservation Office
Melvena Heisch

Local Agencies

Association of Central Oklahoma Governments
Yvonne Anderson

City of Del City
Monica Cardin, Floodplain Administrator

City of Midwest City
Patrick Menefee, Floodplain Administrator

City of Oklahoma City
Mick Cornett, Mayor
Marsha Slaughter, Oklahoma City Water Utilities Trust
Eric Wenger, Floodplain Administrator
Pete White, Councilman

Greater Oklahoma City Chamber of Commerce
Mark VanLandingham

Oklahoma County
Erik Brandt, Floodplain Administrator

County Representatives

Brian Maughan, County Commissioner, District Two

Tribal Representatives

Caddo Nation of Oklahoma
Robert Cast, THPO

Muscogee (Creek) Nation
Principal Chief George Tiger

Osage Nation
Dr. Andrea A. Hunter, THPO

Seminole Nation
Natalie Harjo, HPO

Wichita & Affiliated Tribes
Terri Parton, President

Public Interest Groups/Individuals

Restoration Advisory Board
Barbara Brantner, Tinker Environmental Library
Susie Beasley, Choctaw Public Library
Jim DePuy, City of Del City
John Harrington, Federal Emergency Management Association
Michael Hebert, Remedial Project Manager, USEPA Region VI (6SF-LP)
William Janacek, City of Midwest City
Tom Leatherbee, City of Del City
Kathy Lippert, Greystone Environmental Services, Inc.
Mark Purcell, USEPA Region 6
Betty Reaties
Richard Reginald, Marketing Data Analyst
Scott Thompson, DEQ Site Assessment Unit

Audubon Society of Central Oklahoma
Bill Diffin, President
Jane McHose

Oklahoma Wildlife Federation
Andy McDaniels

Sierra Club, Oklahoma Chapter
David Okam

(No document text on this page)

CHAPTER 7
REFERENCES

AFSEC. 2012. Air Force Safety Center. US Air Force Wildlife Strikes by Altitude FY1995-FY2013. Available at: http://www.afsec.af.mil/shared/media/document/AFD-080130-043.pdf. Last accessed 18 September 2013.

Automated Housing Referral Network (AHRN). 2013. Automated Housing Referral Network. Available at: http://www.ahrn.com/. Last accessed 17 September 2013.

American National Standards Institute. 1983. *American National Standard Specification for Sound Level Meters*. Available at: http://www.nonoise.org/library/levels74/levels74.htm. Last accessed 28 June 2013.

Anderson, A. D. (ed.). 1975. The Cooperton Mammoth: An Early Man Bone Quarry. *Great Plains Journal*, 14(2): 113-173. Lawton.

Barr, T. P. 1966. The Pruitt Site: A Late Plains Woodland Manifestation in Murray County, Oklahoma. *Archaeological Site Report*, No. 5. Oklahoma River Basin Survey Project. University of Oklahoma Research Institute. Norman.

Bell, R. E. (editor). 1984. *Prehistory of Oklahoma*. Academic Press, New York.

Boeing. 2012. The Boeing Company. KC-46 Tanker Program, Engineering and Manufacturing Development (EMD) Phase: National Environmental Policy Act (NEPA) Facilitation Report, CDRL A043. 12 January 2012.

Brown, J. A., R. E. Bell and D. G. Wyckoff. 1975. Caddoan Settlement Patterns in the Arkansas River Drainage. In: *Mississippian Settlement Patterns*, edited by D. D. Smith, Academic Press. New York

CH2MHill. 2010. *RAC Fire Pond Detention Analysis to Control Water within the East Crutcho Creek Floodplain*. Prepared by CH2MHill for Tinker Air Force Base, Oklahoma. 24 February 2010.

City of Oklahoma City. 2007. Southeast Sector Plan: An amendment to the OKC Plan, 2000-2010. 22 February.

Cornell (Cornell Lab of Ornithology). 2012. All About Birds. Available at: http://www.allaboutbirds.org. Accessed: 30 November 2012.

Crowder, J.L. 2012. Encyclopedia of Oklahoma History & Culture. Http://digital.library.okstate.edu/encyclopedia,entries/T/TI004.html.

Darnell, B.A. 2013. *Archeological Survey of a Proposed Expansion of Tinker Air Force Base, Oklahoma County, Oklahoma* (draft). Prepared by AmaTerra Environmental, Inc. for Weston Solutions, Inc.

Drass, R.R. 1979. Roulston-Rogers: A Stratified Plains Woodland Site in the Cross Timbers. *Bulletin of the Oklahoma Anthropological Society*, Vol. 28: 1-136. Muskogee.

Duffield, L.F. 1953. The Brewer Site: A Preliminary Report. *Bulletin of the Oklahoma Anthropological Society*, Vol. 1: 61-68. Oklahoma City.

Eisenhour, T.P. 2013. *Assessment of Effects to Historic Properties: KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma*. Prepared by AmaTerra Environmental, Inc. for Weston Solutions, Inc.

ESRI. 2012. US Census Block Groups shapefile, 5 mile buffer around Tinker AFB. Published by ESRI. 10 February 2012.

Galm, J.R. and P. Flynn. 1978. The Cultural Sequences of the Scott (34LF11) and Wann (34LF27) Sites and Prehistory of the Wister Valley. *Research Series* No. 3. Archaeological Research and Management Center. University of Oklahoma. Norman.

Google Inc. 2013. Google Earth (Version 5.1.3533.1731). [Software] Available at: http://earth.google.com.

Greater Oklahoma City. 2013. __Greater Oklahoma City at a Glance. Available at http://viewer.zmags.com/publication/13eac868#/13eac868/1. Last accessed 11 September 2013.

Hartley, J. D. 1974. The Von Elm Site: An Early Plains Woodland Complex in North-Central Oklahoma. *Archaeological Site Report*, No. 28. Oklahoma River Basin Survey Project. University of Oklahoma. Norman.

Hellgren, E.C. and V. Bogosian III. 2009. Baseline Survey of Presence or Absence of Mammalian, Reptilian, and Amphibian Populations on Tinker Air Force Base, with Estimation of Population Demographics and Size. Cooperative Wildlife Research Laboratory, Southern Illinois University. Carbondale, IL.

Hofman, J. L. 1975. A Study of Custer-Washita River Foci Relationship. *Plains Anthropologist*, 20(76): 41-52.

Hofman, J.L., R.L. Brooks, J.S. Hays, D.W. Owsley, R.L. Jantz, M K. Marks and M.H. Manheim. 1989. From Clovis to Comanchero: Archeological Overview of the Southern Great Plains. *Arkansas Archeological Survey Research Series No. 35*. Fayetteville, Arkansas.

House Armed Services Committee. 2006. Projection Forces Subcommittee. Press Release: Opening Statement of Chairman Roscoe Bartlett – Hearing on the Aerial Refueling Recapitalization Program. 28 February 2006.

Indiana Department of Natural Resources. 2012. Loggerhead Shrike. Reviewed: http://www.in.gov/dnr/fishwild/3370.htm. Accessed November 2012.

Jones, S.L. 2010. Sprague's Pipit (Anthus spragueii) Conservation Plan. US Department of Interior, Fish and Wildlife Service, Washington, D.C [Online] http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/SpraguesJS2010r4.pdf. Accessed: August 2013.

Klinger, T.C. and J.W. Smith. 1992. *Historic Properties Survey of 93 Structures and 1,000 Acres Located in Township 11 North, Range 2 West, Southern Tall Grass Prairie and Cross Timbers, Region 5, Oklahoma County, Oklahoma*. Historic Preservation Associates. Report on file at the Environmental Management Branch at Tinker AFB.

Larson, Kyle B. 2009. Nest Habitat Selection of Burrowing Owls in Relation to Soils, Burrow Availability, and Burrow Temperature. Master's Thesis. Washington State University, Pullman, Washington.

Larson, K.B. and R.D. Sayler. 2011. Life Underground: Burrowing Owls & Soil Texture. Scientific Poster Abstract. Washington State University, Pullman, Washington.

Leonhardy, F. C. 1966. Domebo: A Paleo-Indian Mammoth Kill Site in the Prairie Plains. *Contributions of the Museum of the Great Plains*, No. 1. Lawton.

Lintz, C.L. 1982. Archaeological Testing within the Kickapoo Nations Watershed, Lincoln County, Oklahoma. *Archaeological Research Report* No. 8. Oklahoma Conservation Commission. Oklahoma City.

Marsh-Matthews, E. 2013. *Comparison of Fish Assemblages of the Crutcho Creek Drainage Basin, Oklahoma*. University of Oklahoma. 18 January 2013.

Mid-Del Schools. Welcome to Mid-Del. Available from http://www.mid-del.net/education/school/school.php?sectiondetailid=48426&linkid=nav-menu-container-1-97598. Last accessed 28 August 2013.

Moody, Raymond. 2014. Personal communication with Ray Moody, Natural Resource Biologist, 72nd Air Base Wing Civil Engineer Directorate, Tinker Air Force Base, Oklahoma City, Oklahoma. 22 January 2014.

Moody, Raymond. 2013. Personal communication with Ray Moody, Natural Resource Biologist, 72nd Air Base Wing Civil Engineer Directorate, Tinker Air Force Base, Oklahoma City, Oklahoma. 19 September 2013.

Moody, Raymond. 2012. Conversation between Raymond Moody and John Krupovage, Natural Resource Biologists, 72nd Air Base Wing Civil Engineer Directorate, Tinker Air Force Base, Oklahoma City, Oklahoma, and Erin Johnson, Weston Solutions, Inc. 16 November 2012.

Moore Public Schools. 2013. Moore Public Schools: Our Schools. Available from http://www.mooreschools.com/page/40. Last accessed 28 August 2013.

Neal, L. 1988. Archaeological Survey of Clearcut Areas Along Little River, McCurtain and Pushmataha Counties, Oklahoma. Oklahoma Archeological Survey, Archeological Resource Survey Report No. 32.

NOISEMAP. 2013. NOISEMAP Version 7.2, (BASEOPS Version 7.359). December 2013.

ODEQ. 2010. Oklahoma Department of Environmental Quality. Appendix C: 2010 Oklahoma 303(d) List of Impaired Waters. Taken from the 2010 OK Integrated Report.

ODEQ. 2009. Arsenic and Historic Smelters in Oklahoma. Fact Sheet. May 2009. https://www.deq.state.ok.us/factsheets/land/arsenichistroicsmeltersinOK.pdf. Last accessed 7 January 2014.

ODWC (Oklahoma Department of Wildlife Conservation). 2012a. County by County List of Endangered and Threatened Species. Reviewed: http://www.wildlifedepartment.com/wildlifemgmt/endangered/State_Listed_by_County.pdf. Accessed 24 January 2013.

ODWC. 2012b. Oklahoma's Threatened, Endangered, and Rare Species. Reviewed: http://www.odwc.state.ok.us/wildlifemgmt/endangeredspecies.htm. Accessed October 2012.

ODWC. 2012c. Oklahoma's Most Wanted: The Texas Horned Lizard. Reviewed http://www.wildlifedepartment.com/wildlifemgmt/species/lizard.pdf. Accessed October 2012.

Office of the Assistant Secretary of Defense. 2012. Maintenance Policy and Programs – Maintenance Overview. Available from http://www.acq.osd.mil/log/mpp/maintenance_overview.html. Last updated 7 November 2012.

Oklahoma Forestry Service. 2013. The Ecoregions of Oklahoma. Reviewed: http://forestry.publishpath.com/Websites/forestry/Images/OK%20Ecoregions%2011x17.pdf. Accessed: 21 January 2013.

Oklahoma Office of the Secretary of Environment. 2012. Ecoregion of Oklahoma. Reviewed: http://www.environment.ok.gov/land/ecoregions.html. Accessed: 21 January 2013.

OWRB. 2013. Oklahoma Water Resources Board. Surface Water Data, Standards & Protection for Oklahoma, Online Viewer. Accessed 30 January 2013: http://www.owrb.ok.gov/maps/viewers/BasicViewer/index.html?webmap=97b60ad4960a4bd3933b981af2cad23f

Parsons. 2002. Biological Resources Technical Report for the Tinker Air Force Base Maintenance, Repair, and Overhaul Technology Facilities. Parsons, Austin, TX. October 2002.

Purrington, B. L. 1971. *The Prehistory of Delaware County, Oklahoma: Cultural Continuity and Change on the Western Ozark Periphery*. Ph. D. Dissertation, University of Wisconsin. Madison.

Rohrbaugh, C. L. 1973. Kaw Reservoir – The Central Section. Report of Phase II Research of the Central Plan for Investigation of the Archaeological Resources of Kaw Reservoir, North-Central Oklahoma. *Archaeological Site Report* No. 27. Oklahoma River Basin Survey Project, University of Oklahoma. Norman.

SAIC (Science Applications International Corporation). 2012. Upper Saturated Zone Potentiometric Surface Map – April 2011, Contract Summary Report, 2011 Bridge Basewide Environmental Sampling and Water Level Measurements, Tinker Air Force Base, Oklahoma. February 2012.

Saunders, R. S. and J. T. Penman. 1979. Perry Ranch: A Plainview Bison Kill on the Southern Plains. *Plains Anthropologist* 23(83): 51-65. Topkea.

Schambach, F. F. 1970. *Pre-Caddoan Cultures in the Trans-Mississippi South: A Beginning Sequence*. Ph. D. Dissertation, Harvard University. Cambridge.

Stanley, Thomas M., Standridge, G. Russell. 2008. *Geologic Map Compilation of the Oklahoma City Metro Area, Central Oklahoma*, Oklahoma Geological Survey.

Talbott, K and E. Hellgren. 2012. *Monitoring and Enhancing Populations of the Texas horned Lizard on Tinker Air Force Base, Oklahoma*. Cooperative Wildlife Research Labratory, Southern Illinois University. Carbondale, IL. December 2012.

Tinker AFB. 2013. Tinker Air Force Base Integrated Pest Management Plan. August 2013.

Tinker AFB. 2012. Tinker AFB Submittal to ODEQ. Air Emissions Inventory Turn-Around Document. Tinker Air Force Base, Logistics Center; Facility: Midwest City Air Depot.

Tinker AFB. 2010. Air Force Center for Engineering and Environment. Tinker Air Force Base, 2009 Mobile Source Emission Inventory. August 2010.

USACE. 2013. United States Army Corps of Engineers. KC-46A Depot Maintenance Activation Hydrology and Hydraulic Report: Analysis of Effects of Development to Support the Environmental Assessment; Tinker Air Force Base, Oklahoma City, Oklahoma. August.

USACE. 2012. KC-46A Master Planing Study, Final Study, Tinker AFB, OK. Prepared by Burns & McDonnel. April 2012.

USACE. 2010. Y--Automated Engine Manifold Cleaning System (AEMCS), Tinker AFB, Oklahoma. Available from https://www.fbo.gov/index?s=opportunity&mode=form&id=54dde7e688bb82032781928eb07d9964&tab=core&_cview=0. Last accessed 28 November 2012. 9 June.

USAF. 2014. United States Air Force. *Draft Phase II Environmental Baseline Survey Addendum for BNSF Railyard, Oklahoma City, Oklahoma*, prepared by Weston Solutions for Tinker Air Force Base. January 2014.

USAF. 2013a. E-mail correspondence between Debra Bahr, Realty Specialist, Tinker AFB, and Tamara Carroll, Weston Solutions. 26 June.

USAF. 2013b. Email message from Brandt Fleharty, 72 ABW/CEAN Tinker AFB Hazardous Waste Program Manager to Patrick Fortson, Weston Solutions. 1 February 2013.

USAF. 2013c. United States Air Force. *Draft Environmental Baseline Survey for BNSF Railyard, Oklahoma City, Oklahoma*, prepared by Weston Solutions for Tinker Air Force Base. October 2013.

USAF. 2013d. E-mail correspondence from Brion J. Ockenfels, 72 ABW/PA, Tinker AFB. 9 July.

USAF. 2013e. Email correspondence between Michael Daly, 72 ABW/CEC, and Lori Kalich, Weston Solutions. 23 September 2013.

USAF. 2013f. United States Air Force. Formal Training Unit (FTU) & First Main Operating Base (MOB 1) KC-46A Beddown: Comparison of Current KC-135 Versus KC-46A Performance Capabilities. Available at: http://www.kc-46a-beddown.com/documents/Comparison%20of%20KC-135%20and%20KC-46A%20Capabilities%20Display%20Board.pdf. Last accessed 10 October 2013.

USAF. 2012a. 72nd Air Base Wing, Tinker AFB. Available from http://www.tinker.af.mil/library/factsheets/factsheet.asp?id=16332, Last accessed 7 May 2013.

USAF. 2012b. AF IMT 813 Request for Environmental Impact Analysis. – KC-46A Depot Maintenance Activation at Tinker AFB. 7 February.

USAF. 2012c. Tinker planning session focuses on tanker maintenance. Posted 13 July 2012. Available at http://www.tinker.af.mil/news/story.asp?id=123309782. Last accessed 8 November 2012.

USAF. 2012d. Oklahoma City Air Logistics Complex Fact Sheet. Available at: http://www.tinker.af.mil/library/factsheets/factsheet.asp?id=8552. Last accessed 19 October 2012.

USAF. 2012e. United States Air Force. C-135 Flight Mishap History data, http://www.afsec.af.mil/organizations/aviation/aircraftstatistics/index.asp, January 20, 2013.

USAF. 2012f. United States Air Force. Fiscal Year 2012 Accident Statistics Spreadsheet.

USAF. 2012g. Preliminary Draft of the Integrated Natural Resource Management Plan for Tinker Air Force Base. Civil Engineering Directorate, 72 ABW/CEANO, Inter Air Force Base, Oklahoma.

USAF. 2012h. Conversation between Scott Bowen, Tinker AFB Hydrogeologist, and Patrick Fortson and Ashley Naber, Weston Solutions. 16 October 2012.

USAF. 2012i. 72d Air Base Wing, Bird Hazard Working Group Update. 19 October 2012.

USAF. 2012j. Personal communication with John Truong of Tinker AFB and Ashley Naber (WESTON). Email dated 18 October 2012.

USAF. 2012k. 2012 Water Quality Report, Annual Consumer Confidence Report on the Quality of Drinking Water at Tinker AFB for the Year 2011. Accessed 04 February 2013: http://www.tinker.af.mil/shared/media/document/AFD-120502-078.pdf.

USAF. 2011a. KC-135 Stratotanker Factsheet. Posted 29 December 2011. Available at: http://www.af.mil/information/factsheets/factsheet.asp?id=110. Last accessed 5 November 2012.

USAF. 2011b. Memorandum, Subject: Joint Service Depot Source of Repair (DSOR) Decision on KC-46A Tanker Engine. 4 November.

USAF. 2011c. *Integrated Cultural Resources Management Plan for Tinker Air Force Base, Oklahoma City, Oklahoma, 2011-2015* (final). Prepared by Hardlines Design Company for 72 ABW/CEAN, HQ AFMC/A6/7Air Force Materiel Command, United States Air Force.

USAF. 2011d. *Tinker Air Force Base Instruction 32-7004, Hazardous Waste Management, Oklahoma.* 4 March 2011.

USAF. 2011e. Air Force Instruction 32-7086: Tinker Air Force Base Hazardous Materials Management. December.

USAF. 2011f. FY11 Economic Impact Analysis Summary Sheet.

USAF. 2010a. Department of the Air Force Safety, Health, and Environmental Standard: Mishap Investigation and Reporting Standard A2, 07/16/2010. [On-line]. Available from http://www.aerospacetestingalliance.com/SHE/A2std.pdf. Accessed 1 April 2013.

USAF. 2010b. United States Air Force. Final OC-ALC Plan 19-2: Spill Prevention and Emergency Response Plan for Hazardous and Extremely Hazardous Material and Spill Prevention Control and Countermeasures Plan: Tinker Air Force Base, Oklahoma.

USAF. 2010c. *Asbestos Management Plan, Tinker Air Force Base, Oklahoma.* February 2010.

USAF. 2010d. *Lead Based Paint Management Plan, Tinker Air Force Base, Oklahoma.* February 2010.

USAF. 2010e. *Community Relations Plan, Installation Restoration Program and Resource Conservation and Recovery Act, Tinker Air Force Base, Oklahoma,* prepared by Parsons Infrastructure and Technology Group, Inc. November 2010.

USAF. 2010f, *Air Force Energy Plan 2010*. Available at: http://www.safie.hq.af.mil/shared/media/document/AFD-091208-027.pdf USAF2010

USAF. 2008. United States Air Force. *Environmental Assessment for Tinker Aerospace Complex.* Tinker Air Force Base, Oklahoma. May 2008.

USAF. 2007a.United States Air Force. Strategic Source of Repair Determination (SSOR) for KC-135 Replacement Tanker Aircraft (RTA). 16 November.

USAF. 2007b. United States Air Force. *General Plan and Installation Summary for Tinker Air Force Base.* 17 July.

USAF. 2007c. United States Air Force. General Motors Industrial Wastewater Treatment Plant. 25 October.

USAF. 2007d. United States Air Force. Housing Requirement and Market Analysis 2006-2011, Tinker Air Force Base. January.

USAF. 2006. Air Installation Compatible Use Zone Study. December.

USAF. 2005. Air Force Fleet Viability Board Update. DOD Maintenance Symposium. 24 October.

USAF. 2003. United States Air Force. IERA-RS-BR-SR-2001-0010, *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations,* January 2002 (Revised December 2003), AFIERA/RSEQ, Brooks AFB, TX.

USCB. 2012a. United States Census Bureau. Population and Housing Narrative Profile: 2012 American Community Survey 1-Year Estimates. Available from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_NP01&prodType=narrative_profile. Last accessed 19 September 2013.

USCB. 2012b. United States Census Bureau. Household and Families: 2012 American Community Survey 1-Year Estimates. Available from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_12_1YR_S1101&prodType=table. Last accessed 19 September 2013.

USCB. 2010a. United States Census Bureau. State & County Quickfacts. Available from http://quickfacts.census.gov/qfd/states/40/4055000.html. Last accessed 1 February 2013.

USCB. 2010b. United States Census Bureau. DP03-Selected Economic Characteristics: 2007-2011 American Community Survey 5-Year Estimates. Available from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table. Last accessed 28 January 2013.

USCB. 2010c. United States Census Bureau. DP05-ACS Demographic and Housing Estimates: 2007-2011 American Community Survey 5-Year Estimates. Available from http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table. Last accessed 28 January 2013.

USDA. 2013. United States Department of Agriculture. Natural Resources Conservation Service. Oklahoma County Soil Survey. Available at: http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

USDOT. 2006. US Department of Transportation Federal Highway Administration. Construction Noise Handbook – 9.0 Construction Equipment Noise Levels and Ranges, Table 9.1 – RCNM Default Noise Emission Reference Levels and Usage Factors. August. Available at http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook00.cfm. Last accessed 20 February 2012.USEPA. 2013a. US Environmental Protection Agency (USEPA). Air Permits – Definitions of Selected Permitting Terms. Available at: http://www.epa.gov/region9/air/permit/defn.html. Last accessed 27 September 2013.

USEPA. 2013a. US Environmental Protection Agency (USEPA), Pacific Southwest, Region 9. Definitions of Selected Permitting Terms. Available at: http://www.epa.gov/region9/air/permit/defn.html. Last accessed on 8 October 2013.

USEPA. 2013b. US Environmental Protection Agency (USEPA), 2013, *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2011*, EPA 430-R-13-001, April 2013.

USEPA. 2012a. Technology Transfer Network Clearinghouse for Inventories & Emissions Factors. The National Emissions Inventory – 2008 Data. Available at: http://www.epa.gov/ttn/chief/net/2008inventory.html. 2 April

USEPA. 2005. US Environmental Protection Agency, 2005, Climate Leaders Greenhouse Gas Inventory Protocol, *Design Principles*, EPA430-K-05-005, May.

USEPA. 2003. Determining Conformity of General Federal Actions to State or Federal Implementation Plans." *Code of Federal Regulations,* 40(93, Subpart B: 93.150-93.160 and 51, Subpart W: 51.850-51.860). US Government Printing Office, Washington DC.

USEPA. 1998. United States Environmental Protection Agency. *Characterization of Building-Related Construction and Demolition Debris in the United States.* June.

USEPA.1980. Railroad Ties as Hazardous Waste Under the Mixture Rule (Directive Number 9441.04(80)). National Service Center for Environmental Publications.17 November 1980.

USEPA. 1977. United States Environmental Protection Agency Office of Noise Abatement and Control. Noise Emission Standards for Surface Transportation Equipment. Information In Support of the Proposed Regulation for Truck-Mounted Solid Waste Compactors. August.

USEPA. 1974. United States Environmental Protection Agency. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, Report EPA550/9-74-004. Washington, D.C.: US Environmental Protection Agency, Office of Noise Abatement and Control. Available at: http://www.nonoise.org/library/levels74/levels74.htm. Last accessed 28 June 2013. March.

USFWS. 2012a. The Central Flyways. [Online] Reveiwed: http://central.flyways.us/. Accessed: 21 June, 2012.

USFWS. 2012b. Natural Resources of Concern: Oklahoma County. Reviewed: http://www.fws.gov/southwest/es/Oklahoma. Accessed: 04 October 2012.

USGS. 2013. Ground water Atlas of the United States, Oklahoma and Texas, HA 730-E. Accessed 30 January 2013. Available at: http://pubs.usgs.gov/ha/ha730/ch_e/E-text9.html.

USGS. 2008. Stanley, Thomas M., Standridge, G. Russell. 2008. *Geologic Map Compilation of the Oklahoma City Metro Area, Central Oklahoma*, Oklahoma Geological Survey.

USGS. 2000. *Midwest City Quadrangle, Oklahoma*. 1:24,000. 7.5 minute Series. Denver, Colorado. United States Department of the Interior, USGS.

US Navy. 2005. Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations. Available at: http://www.fican.org/pdf/Wyle_Sound_Insulation.pdf. Last accessed 14 March 2012.

Wilson, L. 2012. Encyclopedia of Oklahoma History & Culture. Http://digital.library.okstate.edu/encyclopedia/entries/O/OK039.html.

Wyckoff, D.G. and R.L. Brooks. 1983. Oklahoma Archeology: A 1981 Perspective of the State's Archeological Resources, Their Significance, Their Problems and Some Proposed Solutions. *Archeological Resource Survey Report, Number 16.* Oklahoma Archeological Survey, Norman.

Young, W. C. 1977. *The Hammons Site (34KA20), A Plains Woodland Site in North-Central Oklahoma*. Unpublished M. S. Thesis, Department of Anthropology, University of Oklahoma. Norman.

(No document text on this page)

General Scoping Letter

(No document text on this page)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

11 SEP 2013

Colonel Christopher P. Azzano
Commander
7460 Arnold Street
Tinker AFB, OK 73145

Ms. Betty Reaties
Restoration Advisory Board
425 Blue Spruce Drive
Midwest City, Ok 73130

Dear Ms. Reaties,

The 72nd Air Base Wing and Headquarters Air Force Materiel Command are preparing an Environmental Assessment (EA) under the National Environmental Policy Act to evaluate the environmental impacts associated with the establishment of the KC-46A Maintenance Depot at Tinker Air Force Base (AFB). This project is needed to support maintenance activities for the KC-46A aircraft, which is the Replacement Tanker Aircraft (RTA) for the aging KC-135 fleet. The EA considers siting the KC-46A facilities and operations at two primary sites, the BNSF Railyard and the DLA Infill site, which are carried forward as alternatives.

The KC-46A depot maintenance activities will eventually support the operations of approximately 179 aircraft, with the first aircrafts arriving at Tinker AFB beginning in 2018. The AF plans to retire 20 KC-135 aircraft by 2016, with the remaining aircraft being retired on a one-to-one drawdown with the KC-46A. Approximately 90 aircraft per year could be serviced at full depot maintenance capabilities. Facilities required to support the KC-46A fleet include: 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, privately-owned vehicle (POV) access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an Information Transfer Node (ITN), and a Defense Logistics Agency (DLA) kitting facility (staging area for parts used during maintenance activities).

Additionally, the KC-46A maintenance operations would increase labor and workload requirements at Tinker AFB. During construction, an estimated 350 people would be required for the demolition and construction of the maintenance facilities. At full depot maintenance capabilities, an additional 1,700 office and maintenance personnel would be required to maintain the KC-46A fleet while the KC-135 as it is being phased out.

The Proposed Action would locate the KC-46A depot maintenance at the BNSF Railyard located south of Tinker AFB. Although the BNSF property is off-base, it is just north of Building 9001, a key center for supplies and aircraft logistics, and is immediately adjacent to Tinker AFB property. The acquisition of the 156-acre property would be required in order to locate the KC-46A depot maintenance at the BNSF site.

Alternative 1 would locate the KC-46A depot maintenance facilities on the DLA Infill site, which is located on the current DLA warehouse campus and adjoining area on Tinker AFB. The DLA Infill contains existing facilities which would need to be demolished and potentially relocated.

This letter is intended to inform you of the intent to prepare an EA for this action. A copy of the Draft EA will be made available to you for your review and comment at a later date.

Thank you for your assistance in this matter. If there are any questions, please contact Ms. Debra Bahr, 72 ABW/CEA, 405-734-4563. If there are any questions regarding conservation matters, please contact Mr. John Krupovage, 72 ABW/CEAN, 405-739-7074, or Mr. Ray Moody, 72 ABW/CEAN, 405-739-7065.

Sincerely

AZZANO.CHRISTOPHER.P.1097702191

Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:00:35 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

2 Attachments:
1. Summary of Proposed Action and Alternative
2. List of Agencies Contacted

Enclosures for General Scoping Letter

(No document text on this page)

DISTRIBUTION LIST

Ms. Yvonne Anderson, Program Manager
Central Oklahoma Clean Cities
Association of Central Oklahoma
Governments
21 East Main, Suite 100
Oklahoma City, OK 73104-2405

Ms. Barbara Brantner
Restoration Advisory Board
Tinker Environmetal Library
6120 Arnold Street, Bldg 5702
Tinker AFB, OK 73145

Mr. Mick Cornett, Mayor
City of Oklahoma City
200 N Walker, 3rd Floor
Oklahoma City, OK 73102

Ms. Jane Cunningham, President
Audubon Society of Central Oklahoma
4228 NW 59th St.
Oklahoma City, OK 73112

Ms. Julie Cunningham, Chief
Planning & Management Division
Oklahoma Water Resource Board
3800 N. Classen
Oklahoma City, OK 73118

Ms. Patrice Douglas, Chairman
Oklahoma Corporation Commission
P.O. Box 52000
Oklahoma City, OK 73152-2000

Mr. George Geissler, State Forester
Oklahoma Department of Agriculture, Food
and Forestry
Forestry Services
2800 N Lincoln Boulevard
Oklahoma City, OK 73105

Mr. Kevin Grant, State Director
Oklahoma Wildlife Service
Animal and Plant Health Inspection Service,
US Department of Agriculture
PO Box 528804
Oklahoma City, OK 73152

Mr. John Harrington
Restoration Advisory Board
Federal Emergency Management
Association (FEMA)
21 E Main, Suite 100
Oklahoma City, OK 73104-2405

Mr. Richard Hatcher, Director
Oklahoma Department of Wildlife
Conservation
P.O. Box 53465
Oklahoma City, OK 73152

Mr. Earl Hatley
Restoration Advisory Board
OK Toxics Campaign
3000 United Founders Blvd, #125
Northeast, OK 73112

Mr. William Janacek
Restoration Advisory Board
City of Midwest City
8730 SE 15th Street
Midwest City, OK 73110

Dr. Randy Keller, Director
Oklahoma Geological Survey
100 East Boyd St., Suite N131
Norman, OK 73019

Mr. Gary O'Neill, State Conservationist
Natural Resources Conservation Service
US Department of Agriculture
100 USDA, Suite 206
Stillwater, OK 74074-2655

Mr. Tom Leatherbee
Restoration Advisory Board
City of Del City
3701 SE 15th Street
Del City, OK 73115

Ms. Dixie Porter
Division of Ecological Services
US Fish and Wildlife Services
9014 E. 21st Street
Tulsa, OK 74129

Ms. Kathy Lippert
Restoration Advisory Board
Greystone Environmental Services, Inc
1000 W Wilshire, Suite 340
Oklahoma City, OK 73116

Mr. Mark Purcell
Restoration Advisory Board
USEPA-REGION 6 (6SF-LP) #1200
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Mr. Brian Maughanm
County Commissioner
District Two
Oklahoma County
320 Robert S. Kerr, Room 101
Oklahoma City, OK 73102-3441

Ms. Betty Reaties
Restoration Advisory Board
425 Blue Spruce Drive
Midwest City, Ok 73130

Mr. Andy McDaniels, Executive Director
Oklahoma Wildlife Federation
PO Box 60126
Oklahoma City, OK 73146

Mr. Richard Reginald
Restoration Advisory Board
Marketing Data Analyst
1821 Oaks Way
Oklahoma City, OK 73131

Mr. David Okam, Chapter Director
Sierra Club, Oklahoma Chapter
P.O. Box 60644
Oklahoma City, OK 73146-0644

Mr. Ross Richardson
Mitigation Division
Federal Emergency Management
Association (FEMA)
800 North Loop 288
Denton, TX 76209

Ms. Carolyn Schultz
Planning & Environmental Division
US Army Corps of Engineers, Tulsa District
1645 S. 101 East Avenue
Tulsa, OK 74128-4609

Mr. Pete White, Councilman
Ward Four
City of Oklahoma City
200 N Walker, 3rd Floor
Oklahoma City, OK 73102

Ms. Marsha Slaughter, Director
Oklahoma City Water Utilities Trust
City of Oklahoma City
420 West Main
Oklahoma City, OK 73102

Ms. Jennifer Wright
Customer Services Division
Oklahoma Department of Environmental Quality
P.O. Box 1677
Oklahoma City, OK 73101-1677

Ms. Rhonda Smith, Chief
Compliance Assurance and Enforcement Division (6EN-XP)
EPA Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Ms. Dawn Sullivan, Environmental Director
Planning & Research Division
Oklahoma Department of Transportation
200 NE 21st Street, Room 3D2a
Oklahoma City, OK 73105

Mr. Scott Thompson
Restoration Advisory Board
DEQ Site Assessment Unit
P.O Box 1677
Oklahoma City, OK 73101

Mr. Mark VanLandingham, Vice President
Government Relations
Greater Oklahoma City Chamber of Commerce
123 Park Avenue
Oklahoma City, OK 73102

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

BACKGROUND AND DECISION HISTORY

The KC-135 Stratotanker is an aerial refueling military aircraft that provides support to Air Force bomber, fighter, cargo, and reconnaissance forces, as well as Navy, Marine Corps, and allied nation aircraft (USAF 2011b). The Air Force maintains a fleet of 530 KC-135 aircraft (USAF 2007a) and currently, the OC-ALC services approximately 60 KC-135 aircraft in an average year. The average age of the KC-135 aircraft is 44 years old (USAF 2007a) and typical maintenance problems with the aircraft include timeworn wiring, landing gear failure, engine strut corrosion, fuel tank topcoat peeling, and necessary aircraft skin replacement. Due to the age of the KC-135 aircraft, increases in necessary maintenance and the cost of replacement parts, as well as difficulty in obtaining replacement parts, have resulted in challenges in maintaining the KC-135 fleet (USAF 2005). Additionally, due to an increase in operations, the KC-135 fleet is currently flying double its planned yearly flying hour program to meet airborne refueling requirements, which have resulted in higher than forecasted usage and sustainment costs (House Armed Services Committee 2006). In January 2007, the Air Force issued a request for proposal to develop a Replacement Tanker Aircraft (RTA) for the aging KC-135.

In November 2007, the Air Force, through a Strategic Source of Repair (SSOR) determination, established that organic depot maintenance capability for the KC-46A would be pursued at one of the installations currently performing depot maintenance work in support of the KC-135: Oklahoma City Air Logistics Complex (OC-ALC), Tinker AFB; Ogden Air Logistics Complex (OO-ALC), Hill AFB; or Warner Robins Air Logistics Complex (WR-ALC), Robins AFB. The determination supported Title 10 United States Code Section 2464, Core depot-level maintenance and repair capabilities, and Section 2466, Limitations on the Performance of Depot-level Maintenance of Materiel (50/50) requirements. This means that the selected depot would provide core capability for all the KC-46A depot repairable components and would support a government owned, government operated facility with the government providing 50 percent of the workforce.

In February 2011, the Boeing KC-767 aircraft was selected by the Air Force to replace the KC-135 Stratotanker. This aircraft has been given the designation KC-46A. In addition to the primary refueling role, the KC-46A will also be capable of performing other assignments, such as aeromedical evacuation activities and cargo and troop transport (Boeing 2012).

On 4 November 2011, the Air Force Materiel Command Commander (AFMC/CC) approved organic repair for the RTA at OC-ALC, Tinker AFB through the issuance of a Joint Service DSOR determination memorandum. The DSOR decision process ensures effective use of commercial and organic depot maintenance resources while meeting statutory requirements. The DSOR process further ensures the required depot maintenance capability and capacity are not unnecessarily duplicated. A goal of the DSOR process is to optimize use established depot capabilities to reduce program costs. Upon receiving the DSOR determination, OC-ALC began the planning process for identifying suitable locations within the proximity of the installation to support the KC-46A mission.

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

PURPOSE OF AND NEED FOR ACTION

KC-46A aircraft are projected to begin arriving at Tinker AFB for maintenance beginning in 2018 and the current KC-135 depot maintenance facilities are inadequate to meet the maintenance needs for the KC-46A aircraft. The KC-46A is physically larger than the KC-135 in all dimensions, and it would be cost prohibitive to renovate the existing KC-135 facilities to meet KC-46A requirements (USAF 2012a). Additionally, the KC-135 maintenance will be phased out, meaning concurrent maintenance of the new KC-46A and existing KC-135 aircraft will need to occur for a minimum of five years.

The purpose of the project is to establish facilities and logistics support for KC-46A depot maintenance operations at Tinker AFB, OK to support approximately 179 aircraft that will be established as the USAF KC-46A aircraft fleet. Currently, facilities are not available at Tinker AFB to support maintenance of the KC-46A fleet. Tinker AFB is considering suitable locations for the activation of the KC-46A maintenance operations. Facilities required to support the KC-46A fleet include: 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, privately-owned vehicle (POV) access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an Information Transfer Node (ITN), and a Defense Logistics Agency (DLA) kitting facility (staging area for parts used during maintenance activities) (USACE 2012).

PROJECT LOCATION

Tinker AFB is located within Oklahoma City, Oklahoma. All of the alternative sites are located within the incorporated city limits of Oklahoma City and are either on Tinker AFB property, or immediately adjacent thereto. Centered ten miles southeast of downtown, Tinker AFB is bordered to the north by Interstate 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 (Tinker AFB 2011).

DETAILED DESCRIPTION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative is to support facilities construction and depot maintenance operations of the KC-46A at the Burlington Northern Santa Fe Railyard (BNSF site). KC-46A maintenance operations would be sited at the BNSF site located south of Tinker AFB (Figure 1). Although the BNSF site is currently off-base, it is just north of Building 9001 and is immediately adjacent to Tinker AFB property. Acquisition of the approximately 156-acre property would be required in order to locate the KC-46A depot maintenance at the BNSF site. This alternative would also include a new access road on Tinker AFB, just north of the BNSF site, and utility access and construction on the Tinker Aerospace Complex (TAC) facility as discussed further in Construction and Demolition Elements.

The Preferred Alternative involves four phases of construction starting in FY 2014 through FY 2028. The AF would retire 20 KC-135 aircraft by 2016, with the remaining aircraft being retired on a one-to-one drawdown with the KC-46A. The draw-down of the KC-135 would be

contemporaneous with activation of the KC-46A; therefore, there will be overlap maintenance with both aircraft (USAF 2012a). The KC-46A depot maintenance consists of approximately 179 aircraft, with the first aircraft to arrive at Tinker AFB beginning in 2018. Approximately 90 KC-46A aircraft per year could be serviced at full depot maintenance capabilities.

The KC-46A repair schedule is based on Maintenance Steering Group 3 (MSG-3) recommendations, which have been developed to provide a logical framework for creating initial scheduled maintenance plans. The KC-46A depot maintenance operations would be designed to accommodate an extensive check of individual systems of the aircraft, known as C-Check inspections, periodically on a two-year cycle. The first C-Check on the KC-46A would be completed in about five to seven days; however, each biennial C-Check will take more time as the components and parts age. The longest and most comprehensive inspection period, referred to as a D-Check, would be 45 days. Comparatively, it takes about 127 days to overhaul a KC-135 (USAF 2012b). The shorter duration required to complete the required maintenance operations on the KC-46A will allow the depot to service more aircraft during the year. Current facility requirements for the KC-46A depot maintenance operations include: approximately 840,000 SF of facilities to include 14 aircraft bays, a 10 meter engine test cell, a software integration lab, warehouse space, support facilities such as central chiller plant and fire pump house, taxiways, 14 aircraft parking positions, an engine run area and approximately 1,250 personal vehicle parking spots at 300 SF/spot. The minimum acreage required is 93 acres of roof and paved surface. Sufficient setbacks and fencing requirements increase the total acreage to approximately 120 acres.

The KC-46A depot maintenance consists of two components: Construction/Demolition and Personnel Increases.

Construction and Demolition Elements

The existing BNSF Railyard site is a large train marshaling railyard that would have to be removed to accommodate KC-46A maintenance facilities. Not all the rail lines would be removed by this project. Additionally, Midwest Blvd would be partially closed and portions of the road would be removed from Munitions Road to the south to Mercury Road to the north. The road removal would be required for the run up ramp positions to the south and for the main dock and ramp space to the north located on the BNSF Railyard site (USACE 2012). Furthermore, various utility lines and small structures would need to be addressed as part of this project (USACE 2012).

The BNSF Railyard site provides sufficient space to site the KC-46A current facility requirements.

Personnel Changes

The depot maintenance of the KC-46A maintenance operations at the OC-ALC would create a workload increase for Tinker AFB. During construction, an estimated 350 people would be required for the demolition and construction of the maintenance facilities. At full depot maintenance capabilities, an estimated additional 1,700 office and maintenance personnel would

be required to maintain the KC-46A fleet, as well as continued maintenance on the KC-135 as it is being phased out. The amount of maintenance personnel working on the KC-135 fleet will be reduced as the aircrafts are phased out; therefore, it is assumed that maintenance personnel maintaining the KC-135 would transfer to maintenance of the KC-46A.

Personnel skill sets include contracting, human resources, security personnel, management, and general administrative work in addition to mechanics and contractor support. While most personnel may be located in the general vicinity of Tinker AFB, there may be a nominal increase in the local population due to individuals with specialized skill sets relocating to the area to support the KC-46A mission.

An estimated 1.23 percent of the additional office and maintenance personnel necessary for depot maintenance of the KC-46A would be required in FY16, with the remainder phasing in through FY28.

DESCRIPTION OF ALTERNATIVE 1

Defense Logistics Agency Infill

Alternative 1 would locate the KC-46A depot maintenance facilities on the DLA Infill, which is located on the current DLA warehouse campus and adjoining area (Figure 2).

Construction and Demolition Elements

The DLA Infill is sited on Tinker AFB property that already contains existing facilities that would need to be demolished and potentially relocated. Alternative 1 would require the removal and relocation of the existing DLA warehouse campus and the Base Civil Engineer (CE) maintenance yard. The existing Tinker RV storage lot would also require relocation. An existing fire detention pond would need to be filled and relocated. Additionally, a portion of the 507th parking area would be relocated, and miscellaneous utility lines and small structures would be removed as part of Alternative 1.

The DLA Infill campus would house the majority of the KC-46A program including 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, POV access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an ITN, and a DLA kitting facility (USACE 2012). Alternative 1 would also include the construction schedule of an Air Traffic Control Tower to be advance, which is further discussed in Cumulative Effects.

Personnel Changes

Personnel changes for Alternative 1 would be the same as those described for the Preferred Alternative.

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

DESCRIPTION OF THE NO-ACTION ALTERNATIVE

Under the No-action Alternative, the KC-46A aircraft would not be brought to Tinker AFB to support depot level maintenance operations of the aircraft. The Air Force would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any additional property acquisitions occur to accommodate the new mission requirement for the KC-46A maintenance operations. In the case of the KC-46A bed down, the No-Action analysis will provide a baseline of the environmental conditions existing at Tinker AFB and provide a benchmark, enabling the Air Force decision maker to compare the magnitude of environmental effects between the alternatives.

BIOLOGICAL RESOURCES

The BNSF site and DLA Infill sites support a variety of habitat types and wildlife species. Though most of these areas are at least partially developed if not almost fully developed, some suitable habitat for wildlife species still exists though no known threatened or endangered (T&E) species exist on the Tinker AFB property.

Federally-listed T&E species are protected under Section 7 of the ESA of 1973 (16 U.S.C. § 1531 et seq.). The USFWS Southwest Region website lists two threatened and two endangered species for Oklahoma County. There has been one observation of a Federally-listed species on Tinker AFB, the piping plover (Charadrius melodus), as the result of a bird aircraft strike. Tinker AFB reported the incident and this is believed to be an isolated incident as Tinker AFB does not provide the preferred habitat of the piping plover. There have been no other observations of that species or any other Federally-listed species on Tinker AFB. There are currently no State-listed endangered or threatened species identified by the Oklahoma Department of Wildlife Conservation (ODWC) as occurring in Oklahoma County.

CULTURAL RESOURCES

The Area of Potential Effects (APE) for cultural resources is defined by 36 CFR 800.16(d) as "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." The APE includes all locations where the undertaking may result in disturbance of the ground, all locations from which elements of the undertaking may be visible, and all locations where the undertaking may result in changes in traffic pattern, land use, public access, etc. Tinker AFB, in consultation with the Oklahoma State Historic Preservation Office (SHPO), has defined the APE for the proposed construction of the KC-46A Depot Maintenance facilities as extending one-half mile (2,640 feet) from the boundary of each construction site and/or land acquisition site.

Proposed Action – BNSF Site

Of the approximately 200 acres that are within the footprints of the Preferred Alternative, about 40 acres are already owned by Tinker AFB and 160 acres would be acquired. The area of the Proposed Action currently within Tinker AFB, has been inventoried for archaeological resources (Tinker 2011) and one archaeological site is present. Site 34OK146 is located immediately to the

east of the BNSF Railyard site on a portion of the Preferred Alternative currently owned by Tinker AFB. The site was recorded in 1992 as the remains of a mid-twentieth century farmstead and associated trash dump (Klinger and Smith 1992). The site was recommended as not eligible for listing in the National Register of Historic Places (NRHP) and the Oklahoma SHPO has concurred with this recommendation (Tinker 2011).

The portion of the Preferred Alternative that is currently owned by BNSF Railyard was inventoried for archaeological resources in November 2012 (Darnell 2013). Of the 81 excavated subsurface shovel tests, the one positive test was within the boundaries of the single newly discovered archaeological site, designated 34OK228. Site 34OK228 is located at the northern edge of the BNSF Railyard property and consists of one small outbuilding. Due to the dilapidated condition of the structure, its vernacular construction, the lack of subsurface cultural resources and the general lack of significant historical context, site 34OK228 has no research value and cannot be considered significant. Site 34OK228 was assessed by AmaTerra as not eligible for listing in the NRHP. No other archaeological sites are present within the BNSF Railyard site.

No non-archaeological Historic Properties are located within the proposed footprint of the Preferred Alternative. In addition, none are located within the APE for indirect effects (Tinker 2011; Eisenhour 2013).

Alternative 1 – DLA Infill Site

Alternative 1 is located wholly within Tinker AFB and all archaeological and non-archaeological cultural resources have been inventoried (Tinker 2011). No archaeological resources are located within the APE for direct effects of Alternative 1. No non-archaeological Historic Properties are located within the Alternative 1 footprint or within the APE for direct effects of Alternative 1.

(No document text on this page)

Tribal/SHPO Scoping IICEP Letters

(No document text on this page)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR STATE HISTORIC PRESERVATION OFFICE
ATTN: MS MELVENA HEISCH
2401 NORTH LAIRD AVENUE
OKLAHOMA CITY, OK 73105

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Section 106 Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment (EA) for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Oklahoma State Historic Preservation Office (SHPO) for a Section 106 review of the aforementioned document as required by the National Historic preservation Act (NHPA). All Tribal Nations connected with Tinker AFB have been sent a copy of the summary for their review. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. For additional information please contact Mr. Tim Taylor, 72 ABW/CEANO, at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:01:54 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR CADDO NATION OF OKLAHOMA
ATTN: ROBERT CAST, THPO
P.O. BOX 487
BINGER, OK 73009

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment (EA) for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Caddo Nation to review the aforementioned document. This project has been submitted to the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) for their review and comment as required by the NHPA. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. There are three alternatives Tinker AFB is looking at for the activation of the KC-46A Depot Maintenance. The first alternative is to acquire the Burlington Northern Santa Fe Rail Yard to develop the maintenance area. The second alternative is to develop a site on base near the runway. The last alternative is the no-action alternative.

3. Tinker AFB looks forward to your comments. Our point of contact for additional information is Mr. Tim Taylor at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:02:48 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR MUSCOGEE (CREEK) NATION
ATTN: PRINCIPAL CHIEF GEORGE TIGER
P.O. BOX 580
OKMULGEE, OK 74447

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment (EA) for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Muskogee (Creek) Nation to review the aforementioned document. This project has been submitted to the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) for their review and comment as required by the NHPA. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. There are three alternatives Tinker AFB is looking at for the activation of the KC-46A Depot Maintenance. The first alternative is to acquire the Burlington Northern Santa Fe Rail Yard to develop the maintenance area. The second alternative is to develop a site on base near the runway. The last alternative is the no-action alternative.

3. Tinker AFB looks forward to your comments. Our point of contact for additional information is Mr. Tim Taylor at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:03:47 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR OSAGE NATION
ATTN: DR. ANDREA A. HUNTER, THPO
P.O. BOX 779
PAWHUSKA, OK 74056

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment (EA) for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Osage Nation to review the aforementioned document. This project has been submitted to the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) for their review and comment as required by the NHPA. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. There are three alternatives Tinker AFB is looking at for the activation of the KC-46A Depot Maintenance. The first alternative is to acquire the Burlington Northern Santa Fe Rail Yard to develop the maintenance area. The second alternative is to develop a site on base near the runway. The last alternative is the no-action alternative.

3. Tinker AFB looks forward to your comments. Our point of contact for additional information is Mr. Tim Taylor at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:04:51 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR SEMINOLE NATION
ATTN: NATALIE HARJO, HPO
P.O. BOX 1498
WEWOKA, OK 74884

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment (EA) for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Seminole Nation to review the aforementioned document. This project has been submitted to the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) for their review and comment as required by the NHPA. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. There are three alternatives Tinker AFB is looking at for the activation of the KC-46A Depot Maintenance. The first alternative is to acquire the Burlington Northern Santa Fe Rail Yard to develop the maintenance area. The second alternative is to develop a site on base near the runway. The last alternative is the no-action alternative.

3. Tinker AFB looks forward to your comments. Our point of contact for additional information is Mr. Tim Taylor at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:06:01 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR WICHITA & AFFILIATED TRIBES
ATTN: TERRI PARTON, PRESIDENT
P.O. BOX 729
ANADARKO, OK 73005

FROM: 72 ABW/CC
7460 Arnold Street
Tinker AFB, OK 73145

SUBJECT: Review of the Summary U.S. Air Force Environmental Assessment of KC-46A Depot Maintenance Activation, Tinker Air Force Base, Oklahoma

1. Tinker Air Force Base (AFB) is currently conducting an Environmental Assessment for the activation of the KC-46A Depot Maintenance at Tinker AFB. Tinker AFB is asking the Wichita & Affiliated Tribes to review the aforementioned document. This project has been submitted to the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) for their review and comment as required by the NHPA. A copy of the Draft EA will be made available to you for your review and comment at a later date.

2. There are three alternatives Tinker AFB is looking at for the activation of the KC-46A Depot Maintenance. The first alternative is to acquire the Burlington Northern Santa Fe Rail Yard to develop the maintenance area. The second alternative is to develop a site on base near the runway. The last alternative is the no-action alternative.

3. Tinker AFB looks forward to your comments. Our point of contact for additional information is Mr. Tim Taylor at 734-4579.

AZZANO.CHRISTOPHER.P.1097702191
Digitally signed by AZZANO.CHRISTOPHER.P.1097702191
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=AZZANO.CHRISTOPHER.P.1097702191
Date: 2013.09.11 21:07:18 -05'00'

CHRISTOPHER P. AZZANO, Colonel, USAF
Commander

Attachment:
Summary of Proposed Action and Alternative

Enclosure for Tribal/SHPO Scoping IICEP Letters

(No document text on this page)

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

BACKGROUND AND DECISION HISTORY

The KC-135 Stratotanker is an aerial refueling military aircraft that provides support to Air Force bomber, fighter, cargo, and reconnaissance forces, as well as Navy, Marine Corps, and allied nation aircraft (USAF 2011b). The Air Force maintains a fleet of 530 KC-135 aircraft (USAF 2007a) and currently, the OC-ALC services approximately 60 KC-135 aircraft in an average year. The average age of the KC-135 aircraft is 44 years old (USAF 2007a) and typical maintenance problems with the aircraft include timeworn wiring, landing gear failure, engine strut corrosion, fuel tank topcoat peeling, and necessary aircraft skin replacement. Due to the age of the KC-135 aircraft, increases in necessary maintenance and the cost of replacement parts, as well as difficulty in obtaining replacement parts, have resulted in challenges in maintaining the KC-135 fleet (USAF 2005). Additionally, due to an increase in operations, the KC-135 fleet is currently flying double its planned yearly flying hour program to meet airborne refueling requirements, which have resulted in higher than forecasted usage and sustainment costs (House Armed Services Committee 2006). In January 2007, the Air Force issued a request for proposal to develop a Replacement Tanker Aircraft (RTA) for the aging KC-135.

In November 2007, the Air Force, through a Strategic Source of Repair (SSOR) determination, established that organic depot maintenance capability for the KC-46A would be pursued at one of the installations currently performing depot maintenance work in support of the KC-135: Oklahoma City Air Logistics Complex (OC-ALC), Tinker AFB; Ogden Air Logistics Complex (OO-ALC), Hill AFB; or Warner Robins Air Logistics Complex (WR-ALC), Robins AFB. The determination supported Title 10 United States Code Section 2464, Core depot-level maintenance and repair capabilities, and Section 2466, Limitations on the Performance of Depot-level Maintenance of Materiel (50/50) requirements. This means that the selected depot would provide core capability for all the KC-46A depot repairable components and would support a government owned, government operated facility with the government providing 50 percent of the workforce.

In February 2011, the Boeing KC-767 aircraft was selected by the Air Force to replace the KC-135 Stratotanker. This aircraft has been given the designation KC-46A. In addition to the primary refueling role, the KC-46A will also be capable of performing other assignments, such as aeromedical evacuation activities and cargo and troop transport (Boeing 2012).

On 4 November 2011, the Air Force Materiel Command Commander (AFMC/CC) approved organic repair for the RTA at OC-ALC, Tinker AFB through the issuance of a Joint Service DSOR determination memorandum. The DSOR decision process ensures effective use of commercial and organic depot maintenance resources while meeting statutory requirements. The DSOR process further ensures the required depot maintenance capability and capacity are not unnecessarily duplicated. A goal of the DSOR process is to optimize use established depot capabilities to reduce program costs. Upon receiving the DSOR determination, OC-ALC began the planning process for identifying suitable locations within the proximity of the installation to support the KC-46A mission.

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

PURPOSE OF AND NEED FOR ACTION

KC-46A aircraft are projected to begin arriving at Tinker AFB for maintenance beginning in 2018 and the current KC-135 depot maintenance facilities are inadequate to meet the maintenance needs for the KC-46A aircraft. The KC-46A is physically larger than the KC-135 in all dimensions, and it would be cost prohibitive to renovate the existing KC-135 facilities to meet KC-46A requirements (USAF 2012a). Additionally, the KC-135 maintenance will be phased out, meaning concurrent maintenance of the new KC-46A and existing KC-135 aircraft will need to occur for a minimum of five years.

The purpose of the project is to establish facilities and logistics support for KC-46A depot maintenance operations at Tinker AFB, OK to support approximately 179 aircraft that will be established as the USAF KC-46A aircraft fleet. Currently, facilities are not available at Tinker AFB to support maintenance of the KC-46A fleet. Tinker AFB is considering suitable locations for the activation of the KC-46A maintenance operations. Facilities required to support the KC-46A fleet include: 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, privately-owned vehicle (POV) access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an Information Transfer Node (ITN), and a Defense Logistics Agency (DLA) kitting facility (staging area for parts used during maintenance activities) (USACE 2012).

PROJECT LOCATION

Tinker AFB is located within Oklahoma City, Oklahoma. All of the alternative sites are located within the incorporated city limits of Oklahoma City and are either on Tinker AFB property, or immediately adjacent thereto. Centered ten miles southeast of downtown, Tinker AFB is bordered to the north by Interstate 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 (Tinker AFB 2011).

DETAILED DESCRIPTION OF THE PREFERRED ALTERNATIVE

The Preferred Alternative is to support facilities construction and depot maintenance operations of the KC-46A at the Burlington Northern Santa Fe Railyard (BNSF site). KC-46A maintenance operations would be sited at the BNSF site located south of Tinker AFB (Figure 1). Although the BNSF site is currently off-base, it is just north of Building 9001 and is immediately adjacent to Tinker AFB property. Acquisition of the approximately 156-acre property would be required in order to locate the KC-46A depot maintenance at the BNSF site. This alternative would also include a new access road on Tinker AFB, just north of the BNSF site, and utility access and construction on the Tinker Aerospace Complex (TAC) facility as discussed further in Construction and Demolition Elements.

The Preferred Alternative involves four phases of construction starting in FY 2014 through FY 2028. The AF would retire 20 KC-135 aircraft by 2016, with the remaining aircraft being retired on a one-to-one drawdown with the KC-46A. The draw-down of the KC-135 would be

contemporaneous with activation of the KC-46A; therefore, there will be overlap maintenance with both aircraft (USAF 2012a). The KC-46A depot maintenance consists of approximately 179 aircraft, with the first aircraft to arrive at Tinker AFB beginning in 2018. Approximately 90 KC-46A aircraft per year could be serviced at full depot maintenance capabilities.

The KC-46A repair schedule is based on Maintenance Steering Group 3 (MSG-3) recommendations, which have been developed to provide a logical framework for creating initial scheduled maintenance plans. The KC-46A depot maintenance operations would be designed to accommodate an extensive check of individual systems of the aircraft, known as C-Check inspections, periodically on a two-year cycle. The first C-Check on the KC-46A would be completed in about five to seven days; however, each biennial C-Check will take more time as the components and parts age. The longest and most comprehensive inspection period, referred to as a D-Check, would be 45 days. Comparatively, it takes about 127 days to overhaul a KC-135 (USAF 2012b). The shorter duration required to complete the required maintenance operations on the KC-46A will allow the depot to service more aircraft during the year. Current facility requirements for the KC-46A depot maintenance operations include: approximately 840,000 SF of facilities to include 14 aircraft bays, a 10 meter engine test cell, a software integration lab, warehouse space, support facilities such as central chiller plant and fire pump house, taxiways, 14 aircraft parking positions, an engine run area and approximately 1,250 personal vehicle parking spots at 300 SF/spot. The minimum acreage required is 93 acres of roof and paved surface. Sufficient setbacks and fencing requirements increase the total acreage to approximately 120 acres.

The KC-46A depot maintenance consists of two components: Construction/Demolition and Personnel Increases.

Construction and Demolition Elements

The existing BNSF Railyard site is a large train marshaling railyard that would have to be removed to accommodate KC-46A maintenance facilities. Not all the rail lines would be removed by this project. Additionally, Midwest Blvd would be partially closed and portions of the road would be removed from Munitions Road to the south to Mercury Road to the north. The road removal would be required for the run up ramp positions to the south and for the main dock and ramp space to the north located on the BNSF Railyard site (USACE 2012). Furthermore, various utility lines and small structures would need to be addressed as part of this project (USACE 2012).

The BNSF Railyard site provides sufficient space to site the KC-46A current facility requirements.

Personnel Changes

The depot maintenance of the KC-46A maintenance operations at the OC-ALC would create a workload increase for Tinker AFB. During construction, an estimated 350 people would be required for the demolition and construction of the maintenance facilities. At full depot maintenance capabilities, an estimated additional 1,700 office and maintenance personnel would

be required to maintain the KC-46A fleet, as well as continued maintenance on the KC-135 as it is being phased out. The amount of maintenance personnel working on the KC-135 fleet will be reduced as the aircrafts are phased out; therefore, it is assumed that maintenance personnel maintaining the KC-135 would transfer to maintenance of the KC-46A.

Personnel skill sets include contracting, human resources, security personnel, management, and general administrative work in addition to mechanics and contractor support. While most personnel may be located in the general vicinity of Tinker AFB, there may be a nominal increase in the local population due to individuals with specialized skill sets relocating to the area to support the KC-46A mission.

An estimated 1.23 percent of the additional office and maintenance personnel necessary for depot maintenance of the KC-46A would be required in FY16, with the remainder phasing in through FY28.

DESCRIPTION OF ALTERNATIVE 1

Defense Logistics Agency Infill

Alternative 1 would locate the KC-46A depot maintenance facilities on the DLA Infill, which is located on the current DLA warehouse campus and adjoining area (Figure 2).

Construction and Demolition Elements

The DLA Infill is sited on Tinker AFB property that already contains existing facilities that would need to be demolished and potentially relocated. Alternative 1 would require the removal and relocation of the existing DLA warehouse campus and the Base Civil Engineer (CE) maintenance yard. The existing Tinker RV storage lot would also require relocation. An existing fire detention pond would need to be filled and relocated. Additionally, a portion of the 507th parking area would be relocated, and miscellaneous utility lines and small structures would be removed as part of Alternative 1.

The DLA Infill campus would house the majority of the KC-46A program including 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, POV access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an ITN, and a DLA kitting facility (USACE 2012). Alternative 1 would also include the construction schedule of an Air Traffic Control Tower to be advance, which is further discussed in Cumulative Effects.

Personnel Changes

Personnel changes for Alternative 1 would be the same as those described for the Preferred Alternative.

KC-46A ENVIRONMENTAL ASSESSMENT SUMMARY FOR INTERAGENCY/INTERGOVERNMENTAL COORDINATION FOR ENVIRONMENTAL PLANNING

DESCRIPTION OF THE NO-ACTION ALTERNATIVE

Under the No-action Alternative, the KC-46A aircraft would not be brought to Tinker AFB to support depot level maintenance operations of the aircraft. The Air Force would not construct or demolish any facilities or infrastructure at Tinker AFB, nor would any additional property acquisitions occur to accommodate the new mission requirement for the KC-46A maintenance operations. In the case of the KC-46A bed down, the No-Action analysis will provide a baseline of the environmental conditions existing at Tinker AFB and provide a benchmark, enabling the Air Force decision maker to compare the magnitude of environmental effects between the alternatives.

BIOLOGICAL RESOURCES

The BNSF site and DLA Infill sites support a variety of habitat types and wildlife species. Though most of these areas are at least partially developed if not almost fully developed, some suitable habitat for wildlife species still exists though no known threatened or endangered (T&E) species exist on the Tinker AFB property.

Federally-listed T&E species are protected under Section 7 of the ESA of 1973 (16 U.S.C. § 1531 et seq.). The USFWS Southwest Region website lists two threatened and two endangered species for Oklahoma County. There has been one observation of a Federally-listed species on Tinker AFB, the piping plover (Charadrius melodus), as the result of a bird aircraft strike. Tinker AFB reported the incident and this is believed to be an isolated incident as Tinker AFB does not provide the preferred habitat of the piping plover. There have been no other observations of that species or any other Federally-listed species on Tinker AFB. There are currently no State-listed endangered or threatened species identified by the Oklahoma Department of Wildlife Conservation (ODWC) as occurring in Oklahoma County.

CULTURAL RESOURCES

The Area of Potential Effects (APE) for cultural resources is defined by 36 CFR 800.16(d) as "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." The APE includes all locations where the undertaking may result in disturbance of the ground, all locations from which elements of the undertaking may be visible, and all locations where the undertaking may result in changes in traffic pattern, land use, public access, etc. Tinker AFB, in consultation with the Oklahoma State Historic Preservation Office (SHPO), has defined the APE for the proposed construction of the KC-46A Depot Maintenance facilities as extending one-half mile (2,640 feet) from the boundary of each construction site and/or land acquisition site.

Proposed Action – BNSF Site

Of the approximately 200 acres that are within the footprints of the Preferred Alternative, about 40 acres are already owned by Tinker AFB and 160 acres would be acquired. The area of the Proposed Action currently within Tinker AFB, has been inventoried for archaeological resources (Tinker 2011) and one archaeological site is present. Site 34OK146 is located immediately to the

east of the BNSF Railyard site on a portion of the Preferred Alternative currently owned by Tinker AFB. The site was recorded in 1992 as the remains of a mid-twentieth century farmstead and associated trash dump (Klinger and Smith 1992). The site was recommended as not eligible for listing in the National Register of Historic Places (NRHP) and the Oklahoma SHPO has concurred with this recommendation (Tinker 2011).

The portion of the Preferred Alternative that is currently owned by BNSF Railyard was inventoried for archaeological resources in November 2012 (Darnell 2013). Of the 81 excavated subsurface shovel tests, the one positive test was within the boundaries of the single newly discovered archaeological site, designated 34OK228. Site 34OK228 is located at the northern edge of the BNSF Railyard property and consists of one small outbuilding. Due to the dilapidated condition of the structure, its vernacular construction, the lack of subsurface cultural resources and the general lack of significant historical context, site 34OK228 has no research value and cannot be considered significant. Site 34OK228 was assessed by AmaTerra as not eligible for listing in the NRHP. No other archaeological sites are present within the BNSF Railyard site.

No non-archaeological Historic Properties are located within the proposed footprint of the Preferred Alternative. In addition, none are located within the APE for indirect effects (Tinker 2011; Eisenhour 2013).

Alternative 1 – DLA Infill Site

Alternative 1 is located wholly within Tinker AFB and all archaeological and non-archaeological cultural resources have been inventoried (Tinker 2011). No archaeological resources are located within the APE for direct effects of Alternative 1. No non-archaeological Historic Properties are located within the Alternative 1 footprint or within the APE for direct effects of Alternative 1.

Tribal/SHPO Scoping IICEP Mailing List

(No document text on this page)

DISTRIBUTION LIST

Ms. Melvena Heisch
State Historic Preservation Office
2401 North Laird Avenue
Oklahoma City, OK 73105

Robert Cast, THPO
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Principal Chief George Tiger
Moscogee (Creek) Nation
P.O. Box 580
Okmulgee, OK 74447

Dr. Andrea A. Hunter, THPO
Osage Nation
P.O. Box 779
Pawhuska, OK 74056

Natalie Harjo, HPO
Seminole Nation
P.O. Box 1498
Wewoka, OK 74884

Terri Parton, President
Wichita & Affiliated Tribes
P.O. Box 729
Anadarko, OK 73005

(No document text on this page)

Scoping Responses

(No document text on this page)

September 30, 2013

ECLS Comments

re- Department of the Air Force-KC-46A Maintenance Depot at Tinker Air Force Base

This project will require construction storm water authoriztion under the General Permit OKR10. This is obtained by submitting to DEQ a Notice of Intent (NOI) along with the required fees.

If you have any further questions please call our ECLS Division @ (405) 702-6100 Thanks!

J. D. STRONG
EXECUTIVE DIRECTOR

MARY FALLIN
GOVERNOR

STATE OF OKLAHOMA
WATER RESOURCES BOARD
www.owrb.ok.gov

OKLAHOMA WATER RESOURCES BOARD
Planning & Management Division
Oklahoma City, OK

PUBLIC NOTICE REVIEW

___ We have no comments to offer. _X_ We offer the following comments.

WE RECOMMEND THAT YOU CONTACT THE LOCAL FLOODPLAIN ADMINISTRATOR FOR POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. THE OWRB WEB SITE, www.owrb.ok.gov, contains a directory of floodplain administrators and is located under forms/floodplain management/floodplain administrators, listed alphabetically by name of community. **If this development would fall on STATE OWNED or operated property, a floodplain development permit is required from OWRB.** The Chapter 55 Rules and permit application for this requirement can be found on the OWRB web site listed above. If this project is proposed in a non-participating community, try to ensure that this project is completed so that it is reasonably safe from flooding and so that it does not flood adjacent property if at all possible.

Reviewer: Cathy Poage, CFM **Date:** 10/11/2013

Project Name: Proposed Establishment of the KC-46A Maintenance Depot at Tinker AFB, Located in Two possible locations: the BNSF Railyard or the DLA Infill site, Tinker AFB, OK

FIRM Name: Tinker Air Force Base, Colonel Christopher P. Azzano, Commander

* Oklahoma City and County participates in the NFIP and has a floodplain development permitting system. Please see paragraph above.

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

October 17, 2013

Mr. Tim Taylor
72ABW/CEANO
7535 5th Street
Tinker AFB, OK 73145

RE: File 0019-14; Tinker AFB Expansion & KC-46A Depot Maintenance Activation Project

Dear Mr. Taylor:

We have received and reviewed the documentation regarding the three site alternatives on the referenced project in Oklahoma County which include the proposed preferred action: Burlington Northern Santa Fe (BNSF) Rail Yard; Alternative #1: Defense Logistics Agency (DLA) Infill; and Alternative #2: Maintenance Repair-Overhaul and Technology Center (MROTC).

For the proposed preferred action at the BNSF Rail Yard, we concur that site 34OK228 is not eligible for the National Register of Historic Places.

For the proposed actions at Alternative #1 DLA and Alternative #2 MROTC, we concur with your opinion that the following properties have previously been determined eligible for the National Register of Historic Places: Facilities #1, #208, #230, #240, #3001, #3105, #3113, #3202, #3203, #3204, #3303 and #4029.

However, if the APE is extended beyond the eastern boundary of Tinker Air Force Base for Alternative #1 or Alternative #2, where Mishak Cemetery and a residential area are located, then additional evaluation of the residential area's eligibility for the National Register of Historic Places will need to be conducted. With regard to Mishak Cemetery, we would like to emphasize the importance of adhering to the Oklahoma statutes governing cemeteries that includes Title 21, Chapter 47, Section 1167: *Punishment for Destruction or Removal of Tomb, Gravestone or Other Cemetery Ornament*, Title 21, Chapter 47, Section 1168.4: *Duty to Report Discovered Remains* and Title 21, Chapter 47, Section 1168.7: *Government Agencies' Discovery of Remains-Duties*.

We appreciate the opportunity to comment on this project and look forward to working with you in the future. Should further correspondence pertaining to this project be necessary, the above underlined file number must be referenced. If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

(No document text on this page)

General Draft EA IICEP Letter

(No document text on this page)

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

30 JAN 2014

Colonel Christopher P. Azzano
Commander
7460 Arnold Street
Tinker AFB, OK 73145

Yvonne Anderson, Program Manager
Association of Central Oklahoma Governments
Central Oklahoma Clean Cities
21 East Main
Suite 100
Oklahoma City, OK 73104-2405

Dear Ms. Anderson,

Enclosed for your review and comment is the Draft Environmental Assessment (EA) and proposed Finding of No Significant Impact (FONSI)/ Finding of No Practicable Alternative (FONPA) for the KC-46A Depot Maintenance Activation at Tinker Air Force Base (AFB). The overall purpose of the project is to support depot-level maintenance activities for the KC-46A aircraft, which is the Replacement Tanker Aircraft (RTA) for the aging KC-135 fleet.

KC-46A maintenance activities will eventually support the operations of approximately 180 aircraft, with the first aircrafts arriving at Tinker AFB beginning in 2018. The AF plans to retire 20 KC-135 aircraft by 2016, with a portion of the remaining aircraft being retired on a one-to-one drawdown with the KC-46A. The KC-46A will not replace the entire KC-135 fleet and KC-135 depot maintenance will remain a requirement and activity of the Oklahoma City-Air Logistics Complex at Tinker AFB. Approximately 90 KC-46A aircraft per year could be serviced at full depot maintenance capabilities. Facilities required to support the KC-46A fleet include: 14 aircraft bays, taxiways, taxilanes, aircraft parking positions, aircraft fuel/defuel parking positions, aircraft run up parking positions, privately-owned vehicle (POV) access/parking, and several supporting facilities such as a fire pump house, central chiller plant, an Information Transfer Node (ITN), and a Defense Logistics Agency (DLA) kitting facility (staging area for parts used during maintenance activities).

The EA considers siting the KC-46A facilities and operations at two primary sites, the BNSF Railyard and the DLA Infill site, which are carried forward as alternatives. As part of the BNSF Railyard alternative, Tinker AFB would acquire the property which is adjacent to the base. The DLA Infill alternative is located on existing Tinker AFB property. A No-action Alternative has also been examined which involves not bringing the KC-46A aircraft to Tinker AFB for depot level maintenance operations. As part of the No-action Alternative, the Air Force would not construct or demolish facilities or infrastructure at Tinker AFB, nor would any additional property acquisitions occur. Based on the EA, the Air Force has prepared a proposed FONSI and FONPA.

Copies of the Draft EA and FONSI/FONPA are maintained at the Midwest City Public Library, 8143 E Reno Ave., Oklahoma City, OK 73110, (405) 732-4828. Electronic copies of the documents can also be found on the Tinker AFB website at http://www.tinker.af.mil/library/environment/index.asp.

In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, we request your participation in the process, and solicit any comments or concerns you may have on the Draft EA and proposed FONSI/FONPA. Comments may be submitted no later than 30 days from receipt of this letter and should be provided to Mr. Tim Taylor, 72 ABW/CEIEC, 7535 5th Street, Tinker AFB, OK 73145, by telephone at 405-734-4579, or by email to Timothy.taylor.5@us.af.mil.

Sincerely

CHRISTOPHER P. AZZANO, Colonel, USAF

Attachments:
Draft EA and FONSI/FONPA

Draft EA IICEP Mailing List

(No document text on this page)

AGENCY	DEPARTMENT	TITLE	TITLE-1	FIRST NAME	LAST NAME	CITY	STATE	ZIP
Association of Central Oklahoma Governments	Central Oklahoma Clean Cities	Program Manager	Ms.	Yvonne	Anderson	Oklahoma City	OK	73104-2405
Choctaw Public Library	Restoration Advisory Board		Ms.	Susie	Beasley	Choctaw	OK	73020-0549
Tinker Environmental Library	Restoration Advisory Board		Ms.	Barbara	Brantner	Tinker AFB	OK	73145
City of Oklahoma City		Mayor	Mayor	Mick	Cornett	Oklahoma City	OK	73102
The Oklahoma City Audubon Society		President	Mr.	Bill	Diffin	Oklahoma City	OK	73162-1511
Oklahoma Water Resource Board	Planning & Management Division	Chief	Ms.	Julie	Cunningham	Oklahoma City	OK	73118
City of Del City	Restoration Advisory Board	Assistant City Manager	Mr.	Jim	DePuy	Del City	OK	73155
Oklahoma Corporation Commission		Chairman	Ms.	Patrice	Douglas	Oklahoma City	OK	73152-2000
Oklahoma Department of Agriculture, Food and Forestry	Forestry Services	State Forester	Mr.	George	Geissler	Oklahoma City	OK	73105
US Department of Agriculture, Animal and Plant Health Inspection Service	Oklahoma Wildlife Service	State Director	Mr.	Kevin	Grant	Oklahoma City	OK	73152
Association of Central Oklahoma Governments	Restoration Advisory Board		Mr.	John	Harrington	Oklahoma City	OK	73104-2405
Oklahoma Department of Wildlife Conservation		Director	Mr.	Richard	Hatcher	Oklahoma City	OK	73152
Remedial Project Manager USEPA Region VI (6SF-LP)	Restoration Advisory Board	Remedial Project Manager	Mr.	Michael	Hebert	Dallas	TX	75202-2733
City of Midwest City	Restoration Advisory Board	Environmental Services Director	Mr.	William	Janacek	Midwest City	OK	73110
Oklahoma Geological Survey		Director	Dr.	Randy	Keller	Norman	OK	73019
Greystone Environmental Services, Inc	Restoration Advisory Board		Ms.	Kathy	Lippert	Oklahoma City	OK	73116
Oklahoma County	District Two	County Commissioner	Mr.	Brian	Maughan	Oklahoma City	OK	73102-3441
Sierra Club, Oklahoma Chapter		Chapter Director	Mr.	David	Okam	Oklahoma City	OK	73146-0644
US Department of Agriculture	Natural Resources Conservation Service	State Conservationist	Mr.	Gary	O'Neill	Stillwater	OK	74074-2655
US Fish and Wildlife Services	Division of Ecological Services		Ms.	Dixie	Porter	Tulsa	OK	74129
Oklahoma DEQ	Restoration Advisory Board		Ms.	Betty	Reaties	Midwest City	OK	73130
Federal Emergency Management Association (FEMA)	Mitigation Division		Mr.	Ross	Richardson	Denton	TX	76209
US Army Corps of Engineers, Tulsa District	Planning & Environmental Division		Ms.	Carolyn	Schultz	Tulsa	OK	74128-4609
City of Oklahoma City	Oklahoma City Water Utilities Trust	Director	Ms.	Marsha	Slaughter	Oklahoma City	OK	73102
EPA Region VI	Division (6EN-XP)	Chief	Ms.	Rhonda	Smith	Dallas	TX	75202
Oklahoma Department of Transportation	Planning & Research Division	Environmental Director	Ms.	Dawn	Sullivan	Oklahoma City	OK	73105
Greater Oklahoma City Chamber of Commerce	Government Relations	Vice President	Mr.	Mark	VanLandingham	Oklahoma City	OK	73102
City of Oklahoma City	Ward Four	Councilman	Mr.	Pete	White	Oklahoma City	OK	73102
Oklahoma Department of Environmental Quality	Customer Services Division		Ms.	Jennifer	Wright	Oklahoma City	OK	73101-1677
City of Del City		Floodplain Administrator	Ms.	Monica	Cardin	Del City	OK	73115-5177
City of Midwest City		Floodplain Administrator	Mr.	Patrick	Menefee	Midwest City	OK	73110-4327
City of Oklahoma City		Floodplain Administrator	Mr.	Eric	Wenger	Oklahoma City	OK	73102
Oklahoma County		Floodplain Administrator	Mr.	Erik	Brandt	Oklahoma City	OK	73102-3441

(No document text on this page)

Draft EA IICEP Responses

(No document text on this page)

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

February 13, 2014

Mr. Tim Taylor
72ABW/CEANO
7535 5th Street
Tinker AFB, OK 73145

RE: File 0019-14; Tinker AFB Expansion & KC-46A Depot Maintenance Activation Project

Dear Mr. Taylor:

We have received and reviewed the *Draft Environmental Assessment KC-46A, Depot Maintenance Activation, Tinker Air Force Base, Oklahoma Volume 1*, dated January 2014.

For the proposed preferred alternatives, all standing buildings or structures within the Area of Potential Effect that are 45 years old or older must be evaluated for their National Register of Historic Places eligibility. Per previous communication regarding this project, the following properties have been determined eligible for the National Register of Historic Places: Facilities #1, #208, #230, #240, #3001, #3105, #3113, #3202, #3203, #3204, #3303 and #4029. Also for clarification, we have attached a list of all properties on Tinker Air Force Base that have been determined eligible. Please provide documentation of those resources for which evaluation or re-evaluation is necessary and follow the guidance provided in the SHPO's *Review and Compliance Manual*.

Additionally, we would like to note that the archaeological site, 34OK146, has not been assessed for eligibility for the National Register of Historic Places by our office as stated in the Draft EA on Pages 3-61 and 3-62. Please provide a copy of the 1992 site record for 34OK146 and a copy of the updated site record that includes a map depicting the Shovel Test Pits (STPs) that were excavated to delineate the boundaries of the site. We also would like to ask for a copy of the site record and Historic Preservation Resource Identification Form (HPRIF) that was completed for 34OK228.

We appreciate the opportunity to comment on this project and look forward to working with you in the future. Should further correspondence pertaining to this project be necessary, the above underlined file number must be referenced. If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381.

Sincerely,

Melvena Heisch

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

Attachment

DEPARTMENT OF THE AIR FORCE
72 AIR BASE WING (AFMC)
TINKER AIR FORCE BASE, OKLAHOMA

MEMORANDUM FOR STATE HISTORIC PRESERVATION OFFICE 5 March 2014
ATTN: MS MELVENA HEISCH
2401 NORTH LAIRD AVENUE
OKLAHOMA CITY, OK 73105

FROM: 72 ABW/CEIEC
7535 5th Street
Tinker AFB, OK 73145-9010

SUBJECT: Response to File 0019-14 Letter on Tinker Expansion & KC-46A Depot Maintenance Activation Project

1. Tinker Air Force Base (AFB) is submitting the requested information and supplemental information on the aforementioned subject. This is response to your letter dated February 13, 2014.

2. Tinker AFB apologizes for the confusion of the two requests we submitted. An Environmental Baseline Survey must be accomplished when the Air Force is acquiring a property in accordance with (IAW) Air Force Instruction (AFI) 32-7066, Environmental Baseline Surveys in Real Estate Transactions, (attachment 5). An Environmental Assessment (EA) or an Environmental Impact Statement (EIS) must be accomplished when MILCON money is involved and/or when there is an adverse environmental impact (floodplain, wetlands, IRP site, etc…) IAW 32 CFR 989, Environmental Impact Analysis Process(EIAP), (attachment 6). Altus AFB, Vance AFB, and Tinker AFB must comply with these regulations. Within 32 CFR 989 it requires the Air Force to provide all federal, state, local agencies with the opportunity to comment on the EA or EIS.

3. Your letter dated October 17, 2013 (attachment 1) was in response to our request to review two documents; Assessment of Effects to Historic Properties KC-46A Depot Maintenance Activation Tinker Air Force Base, Oklahoma and Archeological Survey of aProposed Expansion of Tinker Air Force Base, OklahomaCounty, Oklahoma. These documents were prepared for the Phase I Environmental Baseline Survey for the Burlington Northern Santa Fe BNSF Railyard. At that time Tinker was considering three locations for the KC-46A Depot maintenance Activation. The three locations were the BNSF railyard, the DLA Infill, and the MRO-TC. However the MRO-TC and Building 2210 and 2211 Infill sites were eliminated as an alternatives. Therefore the Environmental Assessment EA only had three alternatives, the BNSF site, the DLA Infill site and the No Action Alternative. In the reports conducted Ama Terra Environmental Inc., they concluded that the APE for both the BNSF site and DLA Infill site did not affect any of the historical facilities on base. You concurred with that assumption in the letter. Also in your letter you determined that 34OK228 is not eligible for the National Register of Historic Places. I have attached the Oklahoma Archaeological Site Survey Form (attachment 7).

4. I have attached a letter dated August 15, 1995 from Dr. Robert Brooks, Oklahoma Archeological Survey, (attachement 2), stating that 34OK146 does not have the quality for the National Register. Also I have a letter dated March 8, 1996 from Dr. Robert Brooks, Oklahoma Archeological Survey, (attachement 3), stating that he and Marshall Gettys, Historic Archaeologist for the State Historic Preservation Office visited the 34OK146 site and determined that it did not hold the necessary content or context to make it worthy of consideration for the National Register of Historic Places. I have attached the original survey dated April 1992 by Historic Preservation Associates (attachment 4) and the survey map (attachment 8). In the document it identifies Area 30 as having site 34OK146 and it is identified on the map.

5. Again Tinker AFB apologizes for the confusion. We hope the attached information will satisfy your request. For additional information please contact Tim Taylor, 72 CEG/CEIEC, at 734-4579.

TRUDI LOGAN, Chief
Environmental Compliance Section
Environmental Management Branch

Attachments:
1. SHPO letter dated 17 October 2013
2. Oklahoma Archeological Survey letter dated 15 August 1995
3. Oklahoma Archeological Survey letter dated 8 March 1996
4. Archeological Survey dated April 1992
5. AFI 32-7066, Environmental Baseline Surveys in Real Estate Transactions
6. 32 CFR 989, Environmental Impact Analysis Process(EIAP)
7. Oklahoma Archaeological Site Survey Form
8. Archaeological Survey Map for Tinker AFB Feb 1991

Oklahoma Historical Society *Founded May 27, 1893*
State Historic Preservation Office
Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

March 24, 2014

Mr. Tim Taylor
72ABW/CEANO
7535 5th Street
Tinker AFB, OK 73145

RE: File 0019-14; Tinker AFB Expansion & KC-46A Depot Maintenance Activation Project

Dear Mr. Taylor:

We have received and reviewed the additional documentation submitted on the referenced project. Thank you for clarifying the issue regarding the two requests for review of the Environmental Assessment for the Tinker Expansion and KC-46A Depot projects received on October 7, 2013 and January 31, 2014.

From your letter of March 5, 2014, it is our understanding that of the three locations that had originally been submitted for review for the KC-46A Depot Maintenance Activation, the BNSF Rail Yard, the Defense Logistics Agency (DLA) Infill and the Maintenance Repair Overhaul and Technology Center (MRO-TC), that the MRO-TC and Buildings #2210 and #2211 Infill sites have been eliminated as alternatives and that currently, the remaining alternatives include the BNSF site, the DLA Infill site and the No Action Alternative. Based on this clarification, we withdraw our February 13, 2014 request for additional information regarding historic properties, and as stated in our letter of October 17, 2013, we maintain our assessment of National Register of Historic Places eligibility of the archaeological site 34OK228 and of Facilities #1, #208, #230, #240, #3001, #3105, #3113, #3202, #3203, #3204, #3303 and #4029.

Thank you for the opportunity to review this project. Please reference the above underlined file number when responding. If you have any questions, please contact Catharine M. Wood, Historical Archaeologist, at 405/521-6381. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

Carroll, Tamara

From: TAYLOR, TIMOTHY T CIV USAF AFMC 72 ABW/CEIEC <timothy.taylor.5@us.af.mil>
Sent: Thursday, February 20, 2014 8:15 AM
To: BAHR, DEBRA J CIV USAF AFMC 72 ABW/CEIA; Turner, Loretta; Carroll, Tamara; FORREST, JAMES T CIV USAF AFMC 72 ABW/JAV; ACKERMAN, MICHAEL D GS-13 USAF HAF AFCEC/CZN; FORT, SHARI D GS-13 USAF AFMC HQ AFMC/A7NX; Allinder, Ashley SWT (Ashley.J.Allinder@usace.army.mil)
Subject: FW: KC-46A Depot Maintenance Activation

Follow Up Flag: Follow up
Flag Status: Flagged

Everyone

Here is the response from ODEQ on the KC 46A Draft EA. Thanks.

Tim

-----Original Message-----
From: Fields, Quiana [mailto:quiana.fields@deq.ok.gov]
Sent: Wednesday, February 19, 2014 1:58 PM
To: TAYLOR, TIMOTHY T CIV USAF AFMC 72 ABW/CEIEC
Subject: FW: KC-46A Depot Maintenance Activation

Mr. Taylor,

Our Department reviewed your request for the KC-46A Depot Maintenance Activation at Tinker Air Force Base.

The area where the proposed action is being taken is near a classified brownfield location. According to the certificate of completion for this former General Motors site, there is a requirement to test soil for contamination before excavation. If it does not meet EPA standards, it must be properly disposed of.

The link attached is the Brownfields permit which lists the specific restrictions on page 2.

http://www.deq.state.ok.us/LPDnew/LPD%20Institutional%20Control/Superfund/TinkerAerospaceComplex_GM.pdf

If you have further questions regarding the comment please do not hesitate to contact Matthew Wormus at 405-702-5100.

Thanks,

Quiana

Quiana Fields, Administrative Programs Officer

Office of the Executive Director

Oklahoma Department of Environmental Quality

Phone: (405) 702-7152

Fax: (405) 702-7101

quiana.fields@deq.ok.gov

March 14, 2014

Mr. Bill Diffin, President
The Oklahoma City Audubon Society
7308 NW 119th St
Oklahoma City, OK 73162-1511

Mr. Timothy Taylor
72 ABW/CEIEC
7535 5th Street
Tinker AFB, OK 73145

Dear Mr. Taylor,

The Oklahoma City Audubon Society agrees with the Finding of No Significant Impact/Finding of No Practicable Alternative based on the document identified as Draft Environmental Assessment KC-46A Depot Maintenance Activation Tinker Air Force Base, Oklahoma (January 2014). In a survey of our membership, agreement with the FONSI/FONPA received 80% approval of the respondents.

As we are a birding club, we feel it is reasonable for us to make some suggestions regarding bird habitat. Our agreement with the FONSI/FONPA and support of the expansion is in no way contingent on acceptance of our suggestions below. The suggestions are offered in the hope that they may be helpful. They should be ignored if they are unsuited or irrelevant to Tinker. We recognize that Tinker is approximately 3 X 3 miles in area, that it has two 2-mile long runways, that severe habitat restrictions rightly apply in Clear Zones and other areas adjacent to the runways, that most of the base area is necessarily dedicated to intensive human use of some kind, that space is at a premium and that biological diversity should not be a priority that poses a risk or hindrance to the base's missions, the comfort, health and safety of base personnel or defense readiness. Ultimately one of the most important supports for birds and nature in the greater Oklahoma City area is a healthy economy. Therefore sustaining the workload at Tinker is important to sustaining wild bird populations.

The survey allowed our members to rank suggestions for the vegetation types to be planted in the habitat mitigation areas (ref Figure 4-5, Habitat Mitigation Areas, EA Vol. 1, pg. 4-25), with the qualification that vegetation should be compliant with BASH guidelines and recreational needs. The same ranking applies to the vegetation to be used in the new Green Infrastructure corridor on the west and north of the BNSF rail yard should the Preferred Alternative for the expansion be selected, again compliant with BASH and recreational needs. The four vegetation types presented as options were ranked in the following order from most preferred to least preferred:

1. Short grass prairie
2. Native vegetation natural to the locations
3. Vegetation according to the plan presented in the EA
4. Sterile surfaces designed to be unattractive to birds

The model for our suggestion of short grass prairie is the Wiley Post Airport in northwest Oklahoma City. The airfield outside of the paved areas at Wiley Post is a grassland with some large areas of mixed native species. It is cut, actually hayed, periodically.

We have a second model which applies to man-made surface drainage in grassland habitat. It is a north-south channel in a large field north of SW 54th St and south of Newcastle Rd about 1000 feet east of the

MacArthur section line. The drainage consists of a wide swale with a narrow, flat, concrete bottom along the central channel. At the discharge end just south of Newcastle Rd there is a narrow border of cattails leading to a small cattail marsh. The surrounding prairie habitat is maintained with periodic cutting.

We believe that compared to turf, native short grass prairie, or any native prairie, is less attractive to large flocking birds or birds which band together in large flocks like geese, crows, gulls, shorebirds, grackles, blackbirds and starlings. Turf is particularly attractive after rain or irrigation when puddles are formed, the ground is softened, and worms and arthropods are flooded to the surface.

Native short grass prairie would have its own set of bird life. Possible species in summer are Swainson's Hawks, Grasshopper Sparrows and Lark Sparrows, in winter, Savannah Sparrows, Smith's Longspurs, Sprague's Pipits, LeConte's Sparrows, Northern Harriers and Short-eared Owls, and year round, Red-tailed Hawks (more numerous in winter than summer), American Kestrels, Loggerhead Shrikes and Meadowlarks.

Other survey responses indicate our members support the use of natural landscaping and drainage features, and that they would make use of access to the natural areas on the base if it were convenient to provide it.

Thank you for allowing OKC Audubon to review the FONSI/FONPA and Environmental Assessment and offer our comments and concerns.

Sincerely,

William P. Diffin

The Oklahoma City Audubon Society
Bill Diffin, President

NB: The Oklahoma City Audubon Society is not a chapter of nor is it affiliated with the National Audubon Society.

The City of
OKLAHOMA CITY
Department of Public Works

April 4, 2014

Colonel Christopher P. Azzano
Commander
7460 Arnold Street
Tinker AFB, OK 73145

Re: Draft Environmental Assessment (EA) and Proposed FONSI/ FONPA for the KC-46A Depot Maintenance Activation at Tinker Air Force Base

Dear Colonel Azzano:

We have reviewed the documents for the maintenance facilities as shown on the attached maps. Included below are comments related to each site for your review and consideration:

Site 1: Preferred BNSF Facility:

a) Detailed review of the H&H (Hydrology & Hydraulic) of Crutcho and East Crutcho Creek flood study will be required for compliance with Oklahoma City Drainage and Flood Control ordinance, and NFIP (National Flood Insurance Program) requirements are included in the ordinance by reference.
b) The City requires detention in this basin. The project includes a provision for a detention basin. The City will require design calculations for review and compliance with Oklahoma City Drainage and Flood Control ordinance.
c) Your proposal does address impacts to the regulatory floodplain, however, it appears that the SW corner of the project area was not addressed and could possibly impact a floodplain with the development of the BNSF site. The proposed taxi way and redevelopment of the Tinker facilities on the adjacent property south of BNSF site may have impact on this floodplain. We believe that any impacts could be mitigated and desire to inform you of this now so that you may incorporate the mitigation in your design development. The location of this flood plain is east of Midwest Blvd and slightly north of SE 74th. It is an unnamed tributary to East Elm Creek which drains to Lake Stanley Draper

Site 2: DLA Infill Alternate Site:

a) The DLA infill site will have a direct impact on the 100 year and 500 year floodplain area. Should the DLA infill site be selected, we shall require development to comply with our Floodplain Development Ordinance.
b) For your information, there is also a regulatory Flood Plain on the SE corner of the Preferred BNSF Site that was not addressed and could possibly be impacted with development of the BNSF site. The proposed taxi way and redevelopment of the Tinker

420 West Main, Suite 700, Oklahoma City, OK • 405/297-2581 • FAX 405/297-2117

facilities on the adjacent property south of BNSF site may have impact on this floodplain. We believe that impacts could be mitigated and desire to inform you of this now so that you may incorporate the mitigation in your design development. The location of this flood plain is east of Midwest Blvd and slightly north of SE 74th. It is an unnamed tributary to East Elm Creek which drains to Lake Stanley Draper.

c) When the design development of the new KC-46A facility begins, any potential development within the basin tributary to this floodplain shall need to be evaluated in addition to the final Hydrology and Hydraulic Study for the proposed site development impacting East Crutcho and Crutcho Creeks.

We do not have any other comments or concerns with the FONSI determination for this EA pertaining to the impacts of regulatory floodplains. If you have any questions regarding the review, please contact Ron Cardwell at (405) 297-2494 or at email ron.cardwell@okc.gov, or Adhir Agrawal at (405) 297-3126, or at email adhir.agrwal@okc.gov.

Sincerely,

Eric J. Wenger, P.E., Director
Public Works/City Engineer

Attachments

Pc: Adhir Agrawal - Public Works Department
Ron Cardwell - Public Works Department

J. D. STRONG
EXECUTIVE DIRECTOR

MARY FALLIN
GOVERNOR

STATE OF OKLAHOMA
WATER RESOURCES BOARD
www.owrb.ok.gov

OKLAHOMA WATER RESOURCES BOARD
Planning & Management Division
Oklahoma City, OK

PUBLIC NOTICE REVIEW

___ We have no comments to offer. _X_ We offer the following comments.

WE RECOMMEND THAT YOU CONTACT THE LOCAL FLOODPLAIN ADMINISTRATOR FOR POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. THE OWRB WEB SITE, www.owrb.ok.gov, contains a directory of floodplain administrators and is located under forms/floodplain management/floodplain administrators, listed alphabetically by name of community. **If this development would fall on STATE OWNED or operated property, a floodplain development permit is required from OWRB.** The Chapter 55 Rules and permit application for this requirement can be found on the OWRB web site listed above. If this project is proposed in a non-participating community, try to ensure that this project is completed so that it is reasonably safe from flooding and so that it does not flood adjacent property if at all possible.

Reviewer: Cathy Poage, CFM **Date:** 04/11/2014

Project Name: Proposed Maintenance Activation, Located at Tinker AFB, Oklahoma County, OK

FIRM Name: US Air Force – Tinker AFB Oklahoma, Christopher P. Azzano, Colonel, USAF

* Oklahoma County participates in the NFIP and has a floodplain development permitting system. Please see paragraph above.

State of Oklahoma OWRB WATER RESOURCES BOARD the water agency

3800 N. CLASSEN BOULEVARD • OKLAHOMA CITY, OKLAHOMA 73118
TELEPHONE (405) 530-8800 • FAX (405) 530-8900

From:	SCHEIRMAN, CATHY R GS-15 USAF AFMC 72 ABW/CE
To:	ron.cardwell@okc.gov; adhir.agrwal@okc.gov
Cc:	BAHR, DEBRA J CIV USAF AFMC 72 ABW/CEIA; TAYLOR, TIMOTHY T CIV USAF AFMC 72 ABW/CEIEC; HART, GERI L GS-14 USAF AFMC 72 ABW/CEI
Subject:	Draft EA and Proposed FONSI/FONPA for KC-46A Depot Maintence Activation (OKC DPW letter, 4 Apr 14)
Date:	Thursday, May 01, 2014 12:48:18 PM

Sirs,

Thank you for your comments associated with the Draft Environmental Assessment (EA) and Proposed FONSI/FONPA for the KC-46A Depot Maintenance Activation at Tinker AFB.

We have reviewed your comments and noted the possible impacts to the floodplain area noted in the SE corner of the BNSF project area. We will ensure construction at either site addresses drainage and flood control requirements and the design process includes the required mitigation when the floodplain is impacted.

If you have any further comments or concerns related to the Draft EA and Proposed FONSI/FONPA for the KC-46A, please contact Mr. Tim Taylor at (405) 734-4579 (timothy.taylor.5@us.af.mil) or Ms. Debra Bahr at (405) 734-4563 (debra.bahr@us.af.mil).

//signed//
CATHY SCHEIRMAN, P.E.
Base Civil Engineer

Tinker AFB Follow Up THPO Call Log

POC	Phone #	Tribe	Date	Time	Actual Contact	Comments
Natalie Harjo	405-234-5218	Seminole	2 May 2, 2014	2:03 pm		Received Seminole answering machine. Left a message.
Emman Spain	918-732-7733	Muscogee	2 May 2, 2014	2:42 pm	Emman Spain, THPO	Mr. Spain had no concerns. The area is not conducive for burial or ritual grounds.
Rebecca Brave	918-287-5328	Osage	2 May 2, 2014	2:27 pm		MS. Brave was out of the office today.
Polly Edwards	405-656-2344	Caddo	2 May 2, 2014	2:13 pm		Mr. Cast is no longer employed by the Caddo Nation. Polly Edwards is the new THPO; unable to reach her.
Gary McAdams	405-247-2425	Wichita & Affiliated Tribes	2 May 2, 2014	2:18 pm		Received environmental answering machine. Left a message.

POC	Phone #	Tribe	Date	Time	Actual Contact	Comments
Natalie Harjo	405-234-5218	Seminole	6 May, 2014	9:54 am		She was not in at the present time according to the receptionist.
Emman Spain	918-894-8690	Muscogee	N/A	N/A	N/A	See comments from first contact.
Rebecca Brave	918-287-5328	Osage	6 May, 2014	10:02 am		Received voicemail and left a message.
Polly Edwards	405-656-2344	Caddo	6 May, 2014	10:06 am		Receptionist said Polly Edwards was not in today.
Gary McAdams	405-247-2425	Wichita & Affiliated Tribes	6 May, 2014	10:11 am		Referred to Gary McAdams, THPO, by the environmental section. Unable to reach Mr. McAdams by phone.

Tinker AFB Follow Up THPO Call Log

POC	Phone #	Tribe	Date	Time	Actual Contact	Comments
Natalie Harjo	405-234-5218	Seminole	8 May, 2014	9:55 am		Received voicemail. Left a message.
Emman Spain	918-894-8690	Muscogee	N/A	N/A	N/A	See comments from first contact.
Rebecca Brave	918-287-5328	Osage	8 May, 2014	10:05 am		Received voicemail and left a message.
Polly Edwards	405-656-2344	Caddo	8 May, 2014	12:47 pm		Spoke with receptionist. Polly was not in at the present time. Left a message.
Gary McAdams	405-247-2425	Wichita & Affiliated Tribes	8 May, 2014	10:02 am		Unable to reach Mr. McAdams by phone.