U.S. AIR FORCE

February 2021

TINKER AIR FORCE BASE

Air Installations Compatible Use Zones (AICUZ) Study

72d AIR BASE WING

TINKER AIR FORCE BASE, OKLAHOMA

AIR INSTALLATIONS COMPATIBLE USE ZONES (AICUZ) STUDY

FEBRUARY 2021

Prepared for:
72nd Air Base Wing
Civil Engineering Directorate
7535 5th St/Building 400
Tinker Air Force Base, Oklahoma

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 72D AIR BASE WING (AFMC)
TINKER AIR FORCE BASE OKLAHOMA

MEMORANDUM FOR AREA GOVERNMENTS

FROM: 72d Air Base Wing
4385 South Air Depot Boulevard, Suite 111
Tinker AFB OK 73145

SUBJECT: Air Installations Compatible Use Zones (AICUZ) Study

1. The 2021 AICUZ study for Tinker Air Force Base (AFB) is an update of the AICUZ study dated 2006. The Air Force initiated the update to include changes such as the identification of Tinker AFB as a key location for depot maintenance for the KC-46A aircraft and changes in the local land use and zoning since the last AICUZ study was completed. This study is a re-evaluation of aircraft noise and accident potential related to United States Air Force flying operations. The Air Force provides this AICUZ study to aid in the development of local planning mechanisms that will protect the public safety and health, as well as preserve the operational capabilities of Tinker AFB.

2. The AICUZ study contains a description of the affected area around the installation. It outlines the location of runway clear zones (CZs), accident potential zones (APZs), and the operational noise footprint, while providing recommendations for development that is compatible with military flight operations. It is our recommendation that local governments incorporate these recommendations into community plans, zoning ordinances, subdivision regulations, building codes and other related documents.

3. This update provides noise contours based upon the day-night average sound level (DNL) metric and utilizes projected 2021 flight operations. Chapter 4 of the study describes the metric in detail, while Chapter 6 covers land use compatibility. Chapter 7 discusses roles of the Air Force and its neighbors in land use collaboration.

4. We greatly value the positive relationship Tinker AFB has experienced with its neighbors over the years. As a partner in the process, we have attempted to minimize noise disturbances through such actions as minimizing night flying, avoiding flights over heavily populated areas and schools as much as possible, and conducting maintenance activities that generate noise during the day. The Air Force appreciates and values the cooperation of all community stakeholders in the collaborative implementation of the recommendations and guidelines presented in this AICUZ study update.

Sincerely

FILCEK.PAUL.G.1169589751 Digitally signed by FILCEK.PAUL.G.1169589751 Date: 2021.03.12 14:15:12 -06'00'

PAUL G. FILCEK, Colonel, USAF
Commander

TABLE OF CONTENTS

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

ABW	Air Base Wing
ACOG	Association of Central Oklahoma Governments
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFRC	Air Force Reserve Command
AFSC	Air Force Sustainment Center
AICUZ	Air Installations Compatible Use Zones
APZ	Accident Potential Zone
ATC	Air Traffic Control
BASH	Bird/Wildlife Aircraft Strike Hazard
CFR	Code of Federal Regulations
CZ	Clear Zone
dB	Decibel
dBA	A-weighted Decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EIS	Environmental Impact Statement
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
GIS	Geographic Information System
HAFZ	Hazards to Aircraft Flight Zone
Hz	Hertz
JLUS	Joint Land Use Study
LED	Light Emitting Diode
MSL	Mean Sea Level
NLR	Noise Level Reduction
NVG	Night Vision Goggles
REPI	Readiness and Environmental Protection Integration
SLUCM	Standard Land Use Coding Manual
TPSC	Tinker Partnership Steering Committee
UAS	Unmanned Aircraft Systems
USAF	United States Air Force
VR	Visual Route

TINKER AFB

1 INTRODUCTION

The 2021 Tinker Air Force Base (AFB) Air Installations Compatible Use Zones (AICUZ) Study focuses on the flying missions at Tinker AFB. This update presents and documents changes since the previous study released in 2006. It reaffirms the United States Air Force's (USAF) policy of promoting public health, safety, and general welfare in areas surrounding an air installation while seeking development that is compatible with the defense mission. This study presents changes in flight operations since the previous study and provides 2021 noise contours and recommendations for compatible land use.

1.1 AICUZ PROGRAM

Military installations attract development; people who work on the installation want to live nearby, while others want to provide services to installation employees and residents. When incompatible development occurs near an installation or training area, affected parties within the community may seek relief through government channels that could restrict, degrade, or eliminate installation capabilities necessary to perform the defense mission. In the early 1970s, the Department of Defense (DoD) established the AICUZ Program. The goal of the program is to protect the health, safety, and welfare of those living and working near air installations while sustaining the Air Force's operational mission. The Air Force accomplishes this goal by promoting proactive, collaborative planning for compatible development to sustain mission and community objectives.

The AICUZ Program recommends that local land use agencies incorporate noise zones, Clear Zones (CZs), Accident Potential Zones (APZs), and Hazards to Aircraft Flight Zones (HAFZs) associated with military operations into local community planning programs to maintain the airfield's operational requirements while minimizing the impact to residents in the surrounding community. Cooperation between military airfield planners and their community-based counterparts serves to increase public awareness of the importance of air installations and the need to address mission requirements and associated noise and risk factors through the public planning process. As the communities that surround airfields grow and develop, the Air Force has the responsibility to communicate and collaborate with local governments on land use planning, zoning, and similar matters that could affect the installation's operations or missions. Likewise, the Air Force has a responsibility to understand and communicate potential impacts that new and changing missions may have on the local community.

1.2 SCOPE & AUTHORITY

1.2.1 SCOPE

This AICUZ Study presents current and projected air operations for Tinker AFB. The Air Force provides descriptions of Tinker AFB's CZs, APZs, and noise zones associated with the airfield's runways to the local communities, along with recommendations for compatible land use near the installation for incorporation into comprehensive plans, zoning ordinances, subdivision regulations, building codes, and other related land use planning documents.

1.2.2 AUTHORITY

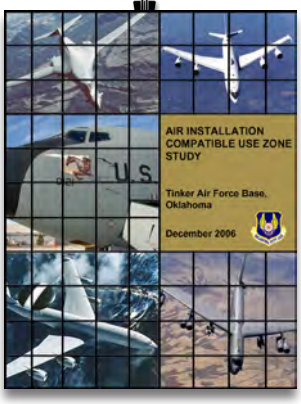
Authority for the Air Force AICUZ Program lies in two documents:

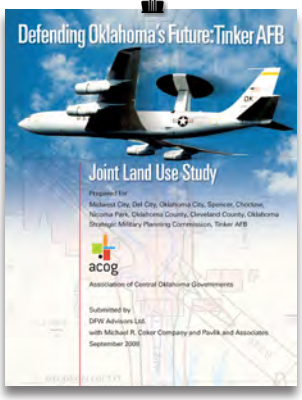
- *Air Force Instruction (AFI) 32-1015, Integrated Installation Planning*, which implements *Department of Defense Instruction 4165.57, Air Installations Compatible Use Zones*, and applies to all Air Force installations with active runways located in the United States and its territories. This AFI establishes the program objectives and responsibilities.
- *Air Force Handbook (AFH) 32-7084, AICUZ Program Manager's Guide*, which provides installation AICUZ program managers with specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ Program. It is written in a "how to" format and includes the land use compatibility tables used in AICUZ studies.

1.3 PREVIOUS AICUZ EFFORTS & RELATED STUDIES

Previous studies relevant to this AICUZ Study include:

- *Tinker AFB Air Installations Compatible Use Zones Study, 2006.*
- *Tinker AFB, Joint Land Use Study, 2008.*
- *Tinker AFB, Environmental Assessment, KC-46A Depot Maintenance Activation, Volume I, 2014.*
- *KC-46A Third Main Operating Base (MOB 3) Beddown Environmental Impact Statement (EIS), 2017.*





1.4 CHANGES THAT REQUIRE AN AICUZ STUDY UPDATE

This 2021 Tinker AFB AICUZ Study replaces the 2006 AICUZ Study. It provides the installation's flight tracks, CZs, APZs, and noise contour information, presenting the most accurate representation of future military activities as projected to 2021. With this information, the AICUZ Program allows surrounding communities to consider both current and potential activities when making land use decisions.

As the DoD aircraft fleet mix and training requirements change over time, the resulting flight operations change as well. These changes can affect noise contours and necessitate an AICUZ

Study update. Additionally, non-operational changes, such as noise modeling methods and a local community's land use, may also require the need for an update. The primary changes occurring since the previous (2006) Tinker AFB AICUZ Study that, in part, necessitate this update include:

- **Introduction of new aircraft.** In support of the Air Force's combat capability and mission readiness, Tinker AFB was selected in 2014 as the location for depot maintenance for the KC-46 A Pegasus aircraft. The KC-46A aircraft represent a new era in air-to-air refueling capability, with greater refueling capabilities and the ability to accommodate a mixed load of passengers, aeromedical evacuation, and cargo. The Air Force also completed an EIS in 2017 to evaluate Tinker AFB as a suitable location for beddown of 12 KC-46A. The 2017 EIS study modeled removing eight KC-135 Stratotanker aircraft currently stationed at Tinker AFB and adding 12 KC-46A aircraft. Initial modeling results showed no increase in the noise footprint around Tinker AFB from this action. Therefore, this AICUZ uses contours from the 2006 AICUZ for the 2020 AICUZ study update. Tinker AFB remains a viable location for a beddown of the KC-46A.

- **Changes in off-installation land use and/or projected land use.** In the 15 years since the 2006 AICUZ Study was prepared for Tinker AFB, land use, zoning regulations, and comprehensive planning processes in the surrounding municipalities have evolved. An updated AICUZ Study will enhance understanding of where growth is occurring and identify any current land use compatibility issues and concerns related to more current aircraft operations at Tinker AFB.

- **Changes in AICUZ AFI.** *AFI 32-1015, Integrated Installation Planning, and AFH 32-7084* were published since the previous 2006 AICUZ Study.

2 TINKER AFB OKLAHOMA

2.1 LOCATION

Situated within Oklahoma County, Oklahoma, Tinker AFB is located in Oklahoma City. It is bordered to the north by Midwest City and to the northwest by Del City (See **Figure 2-1**). Tinker AFB encompasses 5,588 acres and is centered ten miles southeast of downtown Oklahoma City. The base is bounded to the north by Interstate 40 and SE 29th Street and to the south by SE 74th Street and I-240. Sooner Road borders the base to the west, and South Douglas Boulevard runs north-south along the eastern base boundary. Oklahoma City is the state capital, county seat, and largest city in the state. It is also a part of the Oklahoma City Metropolitan Area, which includes seven counties: Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma. The 2018 U.S. Census estimates the region's population to be nearly 1.4 million, about 35 percent of the state's total population.

2.2 HISTORY

Major General Clarence L. Tinker was a native Oklahoman who lost his life while on a combat mission over Wake Island in the Pacific, during World War II.

Tinker AFB is named after career Army officer Major General Clarence L. Tinker and was established as an aircraft maintenance depot in 1941. After learning that the U.S. government was seeking to build a central depot for supplies and maintenance in the American Midwest, a group of Oklahoma City entrepreneurs formed the Oklahoma Industries Foundation and offered the U.S. government 960 acres of land at no cost. Throughout World War II, thousands of Oklahomans and military personnel worked at the air depot, laying the foundation for Tinker AFB and its long-standing reputation of excellence in depot repair and maintenance.

In the years after World War II, Tinker AFB hosted a variety of missions, including the 552nd Airborne Warning and Control Wing in the 1970s and the U.S. Navy's STRATCOM WING ONE in the 1990s. By

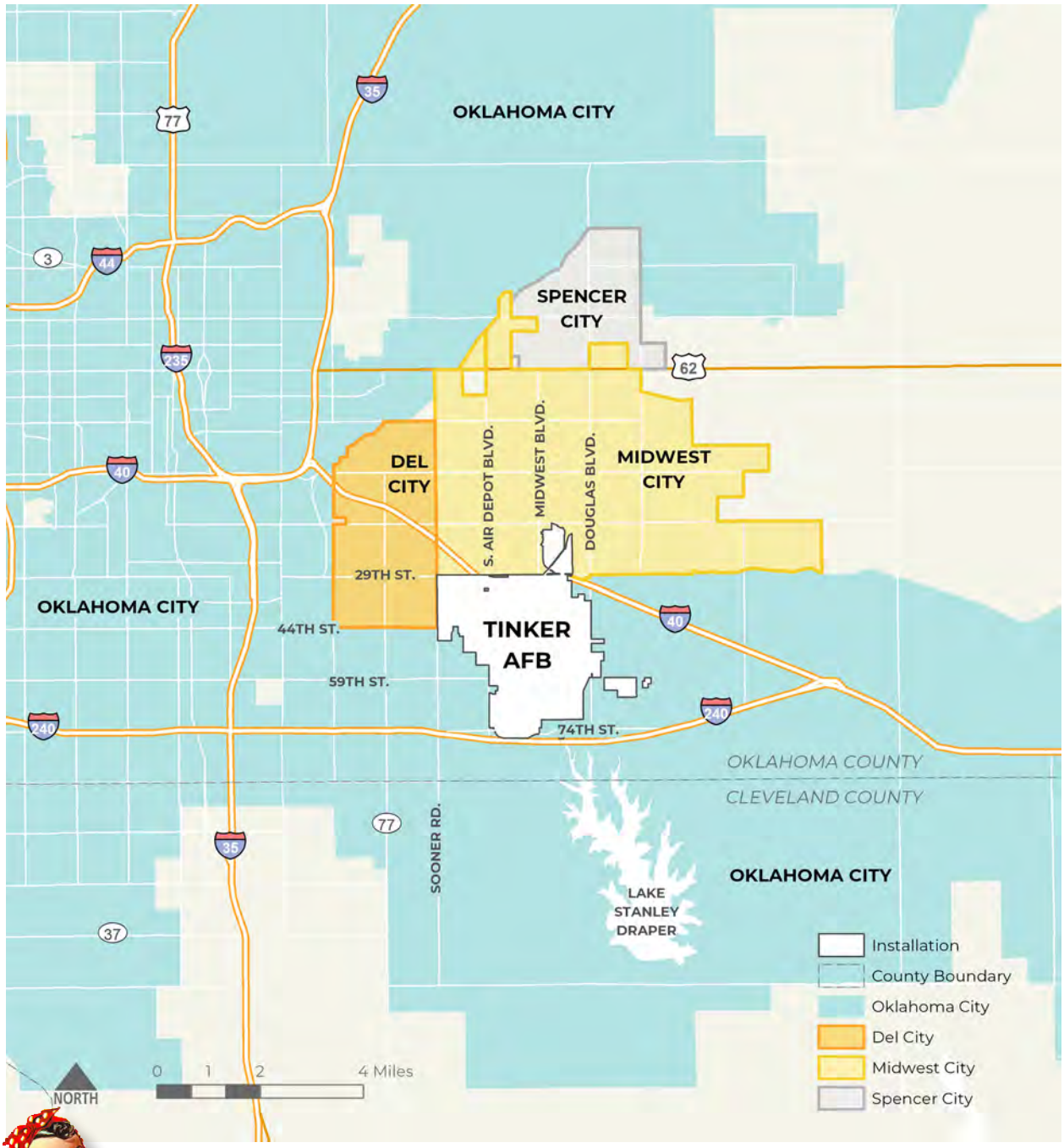


FIGURE 2-1
REGIONAL SETTING

At its peak employment in late 1943, 13,500 people worked at the air depot and another 23,000 worked for Douglas Aircraft. Nearly one-half of these workers were women who exemplified the famed "Rosie-the-Riveter," building over 5,000 C-47s, a key military transport aircraft.

the end of the 20th century, Tinker AFB had survived several rounds of base closures and was one of three remaining Air Logistics Complexes in the U.S.

In the early 2010s, Tinker AFB was activated as the primary logistics complex and airbase within the Air Force Sustainment

Center (AFSC). The AFSC continues to be headquartered at Tinker AFB. Tinker AFB is also home to the Oklahoma City Air Logistics Complex, 72d Air Base Wing, 10th Flight Test, the 552d Air Control Wing, the United States Navy (CSCW-1), and the 507th Air Refueling Wing, among others (described below). The base is currently transitioning to accommodate the Air Force's next generation aerial refueling aircraft, the KC-46A, as well as the existing KC-135 . As missions grow and strengthen, Tinker AFB's client base and specialties continue to broaden across multiple U.S. military branches, as well as private corporations.

2.3 MISSION

The KC-46A is the first phase in recapitalizing the Air Force's aging tanker fleet. With greater refueling, cargo and aeromedical evacuation capabilities compared to the KC-135, the KC-46A will provide next generation aerial refueling support to Air Force, Navy, Marine Corps and partner-nation receivers.

Tinker AFB is the host site for the AFSC. The mission of the AFSC is to sustain weapon system readiness to generate airpower for America and provide war-winning expeditionary capabilities to the warfighter through world-class depot maintenance, supply chain management, and installation support. The AFSC is commanded by a three-star general and consists of more than 32,000 military and civilian personnel. AFSC provides installation support to more than 141 associate units with more than 75,000 personnel.

2.4 HOST & TENANT ORGANIZATIONS

72D AIR BASE WING

As the host organization for Tinker AFB, the 72d Air Base Wing (ABW) provides base installation and support services for the headquarters, AFSC, as well as the Oklahoma City Air Logistics Complex and over 45 associate units assigned to six major commands. The Wing's essential support services cover the nearly 27,000 civilian and military personnel assigned to Tinker AFB and approximately 2,394 contractors, 18,000 dependents, and 36,000 military retirees in the surrounding area. Critical base functions provided by the 72d ABW include security, fire protection, medical services, civil engineering, communications and supply, weather, transportation, and airfield operations.

OKLAHOMA CITY AIR LOGISTICS COMPLEX

Headquartered on 62 acres at Tinker AFB in the historic Building 3001, the Oklahoma City Air Logistics Complex is Tinker AFB's largest organization and the largest of three depot repair complexes in Air Force Material's Command. The complex, known as the OC-ALC, provides world-class maintenance, repair, and overhaul support to a wide variety of aircraft for the Air Force, Navy, and Marine Corps. The OC-ALC is also the only Air Force depot responsible for system management and logistics support of

the B-2 Spirit, a multi-role stealth bomber capable of delivering both conventional and nuclear munitions, and Air Force One. In total, OC-ALC oversees 23,000 aircraft engines, a multitude of missile systems, and more than 9,400 military and civilian employees.

552ND AIR CONTROL WING (E-3 SENTRY AIRCRAFT)
The 552nd Air Control Wing is a combat wing, ready to defend the U.S. and prepared to rapidly deploy forward. The wing is also a one-of-a-kind training wing with a no-fail mission of producing E-3 Sentry combat crews and unique functional training for the Air Force. The E-3 aircraft is an airborne warning and control system that provides deep-look surveillance, warning, interception control, and airborne battle management. As part of the Air Force's Air Combat Command mobile strike force, the wing provides combat-ready theater battle management forces, and mobile command control and communications radar element.

507TH AIR REFUELING WING (KC-135 STRATOTANKER AIRCRAFT)
The 507th Air Refueling Wing is an Air Force Reserve Command (AFRC) flying unit. As the largest AFRC flying unit in the State of Oklahoma, the wing performs daily missions locally and around the world in support of Air Mobility Command and U.S. Strategic Command's national emergency war order requirements. The 507th Air Refueling Wing also regularly supports overseas deployments in times of peace, war, and national emergency, as well as Federal Aviation Administration (FAA) flight inspection requirements.

513TH AIR CONTROL GROUP (E-3 SENTRY AIRCRAFT)
Serving alongside the 552nd Air Control Wing, the 513ths Air Control Group is comprised of 400 reservists. The group is the AFRC's first Airborne Warning and Control Systems organization.

STRATCOM WING ONE COMMANDER STRATEGIC COMMUNICATIONS WING ONE) (E-6 MERCURY AIRCRAFT) AND ASSOCIATED NAVAL UNITS
STRATCOM Wing One is the nuclear command and control wing of the U.S. Navy and provides an airborne, secure communications link to the submerged fleet of ballistic missile submarines as part of the "Take Charge and Move Out" mission. The primary mission of STRATCOM WING ONE is to receive, verify, and retransmit Emergency Action Messages to U.S. strategic forces.

10TH FLIGHT TEST SQUADRON
The 10th Flight Test Squadron is part of the 413th Flight Test Group of Air Force Materiel Command. It performs acceptance testing on refurbished Rockwell B-1 Lancer, Boeing B-52 Stratofortress, Boeing E-3 Sentry, and Boeing KC-135 Stratotanker aircraft before they are returned to their operational units.

2.5 AIRFIELD ENVIRONMENT

A runway is typically used in both directions and counted as two separate runways, depending on the direction of the departure or arrival. Each direction is labeled as a separate runway and numbered based on its magnetic heading, divided by 10 and rounded to a whole number.

Located on the center portion of the installation, the Tinker AFB airfield (**Figure 2-2**) includes aircraft hangars for maintenance and storage; an Air Traffic Control Tower; aircraft parking ramps and taxiways; two hard surface runways; assorted office buildings; test cells and ramp space for maintenance and engine runs; and other support facilities. The two runways (the main runway and the crosswind runway) are oriented to a magnetic heading. Runway 18/36 is oriented 176 degrees to 356.6 degrees magnetic, and Runway 13/31 is oriented 127 degrees to 307 degrees magnetic. The north-south runway (Runway 18/36) is 200 feet wide and 11,100 feet long. The crosswind runway (Runway 13/31) is 200 feet wide and 10,000 feet long. The overruns at the ends of each runway are 1,000 feet long and 200 feet wide. The airfield elevation is 1,291 feet above mean sea level (MSL).

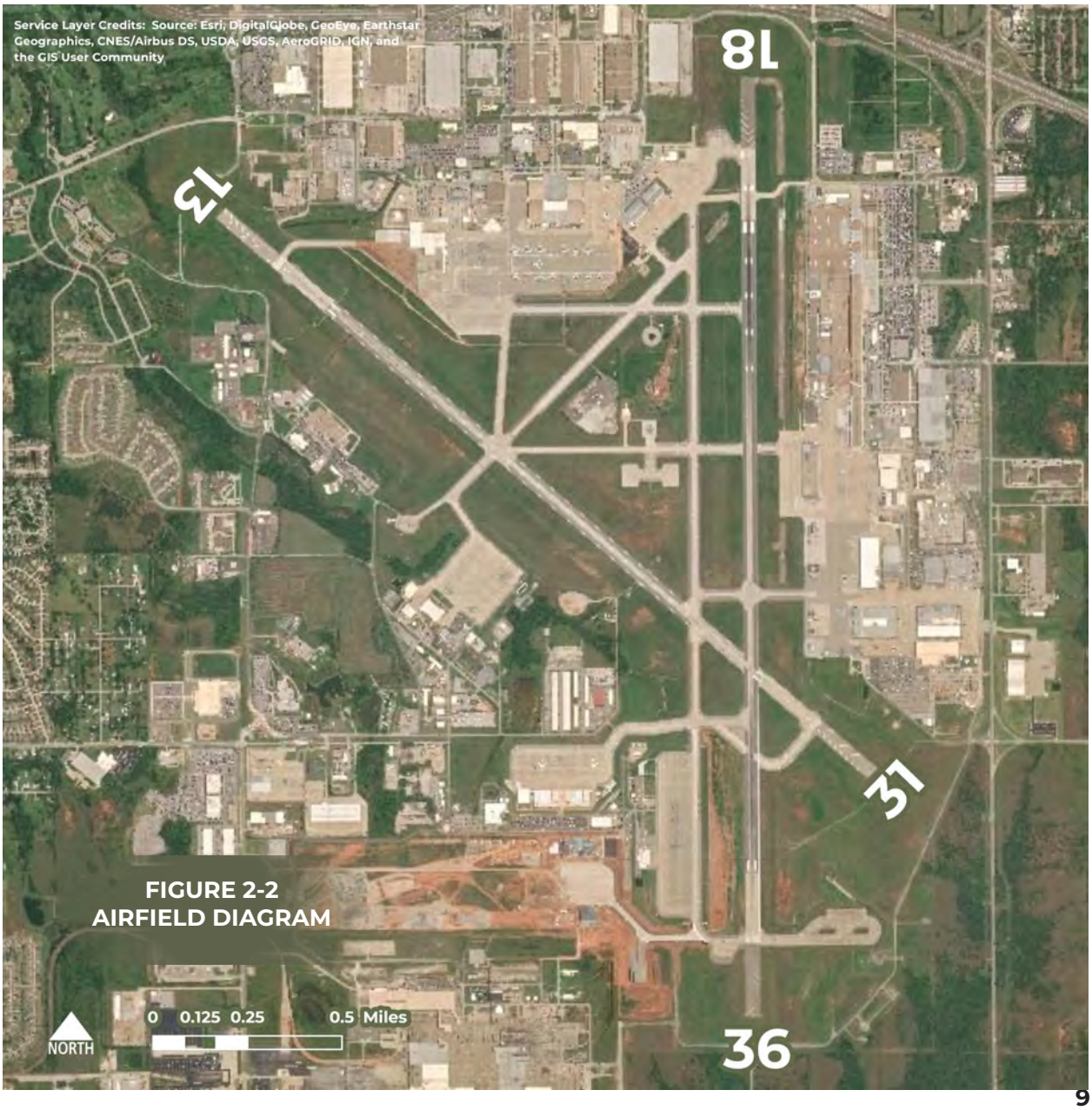


FIGURE 2-2
AIRFIELD DIAGRAM

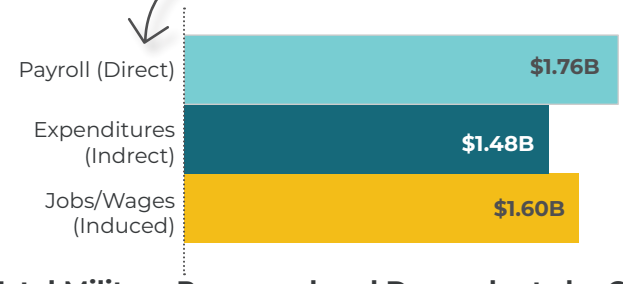
2.6 LOCAL ECONOMIC IMPACTS

Tinker AFB is largest single-site employer in the State of Oklahoma and boasts an annual federal payroll of $1.76 billion and annual expenditures of $1.48 billion. Tinker AFB annually generates approximately $1.6 billion in jobs, with a total of $4.83 billion in total annual economic impact. That makes the base's economic footprint enormously important for both the region and state.

The military provides direct, indirect, and induced economic benefits to local communities through jobs and wages. Benefits include employment opportunities and increases in local business revenue, property sales, and tax revenue.

Total personnel at Tinker AFB
30,689

21% Military
15% Military Dependents
64% Civilians



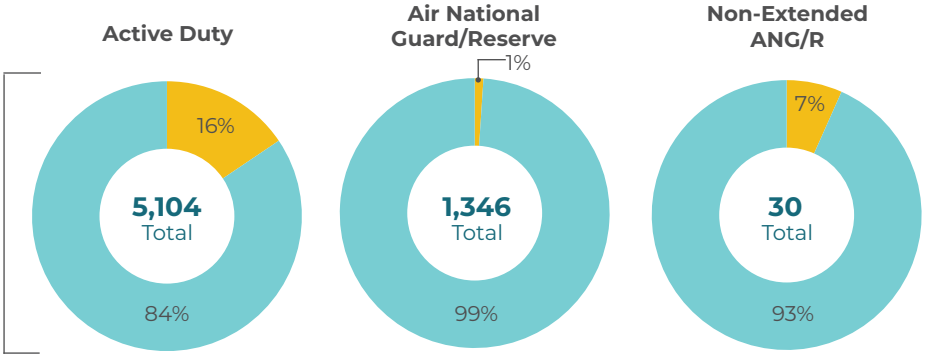
Tinker AFB Total Economic Benefit Fiscal Year 2019
$4.83B
May not total exactly due to rounding.

The economic impact of a military installation is based on annual **payroll** (jobs and salaries), annual **expenditures**, and the estimated annual dollar **value of the jobs** created. The military further contributes to the economic development of communities through increased demand for local goods and services and increased household spending by military and civilian employees.

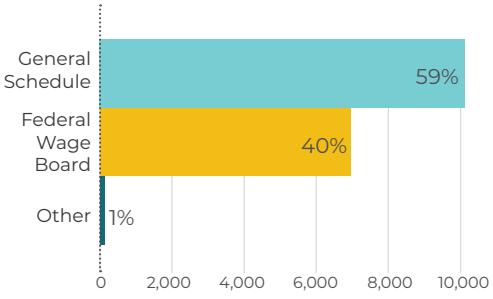
Total Military Personnel and Dependents by Classification and Housing

6,480
Appropriated Fund & Military Personnel

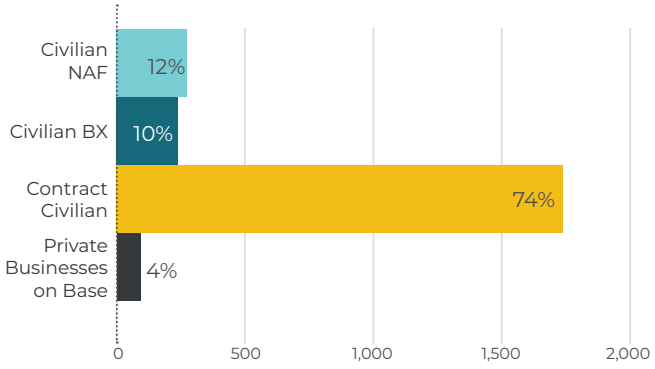
Living Off Base (88%)
Living On Base (12%)



Total Civilian Personnel by Appropriated and Non-appropriated Funds



17,203
Total Appropriated Fund Civilian Personnel

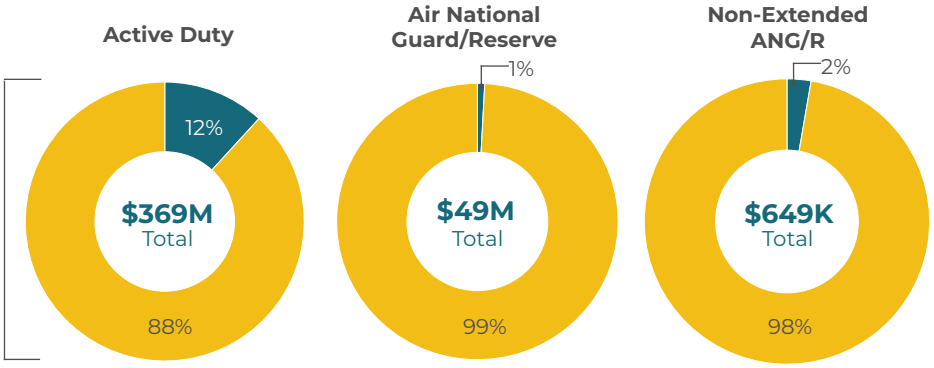


2,346
Total Non-appropriated Fund Contract Civilians & Private Business

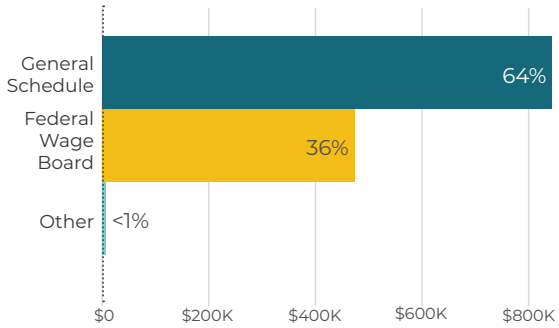
Annual Military Payroll by Category and Housing Location

$419M
Annual Military Payroll

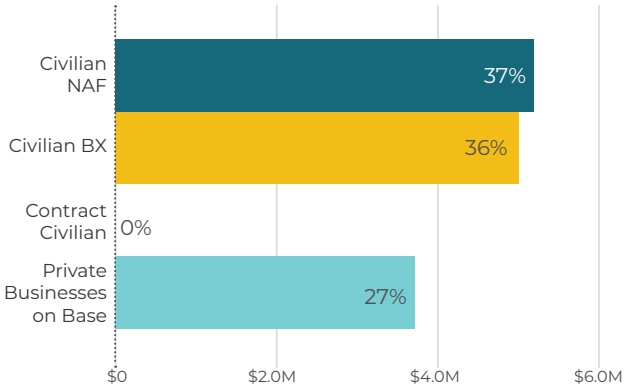
Living Off Base (89%)
Living On Base (11%)



Annual Civilian Payroll by Appropriated and Non-Appropriated Funds



$1.3B
Total Appropriated Annual Civilian Payroll



$14M
Total Non-appropriated Annual Civilian Payroll

Summary of Construction, Contracts, and Expenditures for Materials, Equipment and Supplies.

Expenditures for Construction
$158M

- **88%** Military Construction Program
- **12%** Operations & Maintenance

Expenditures for Services
$1.2B

- **99%** Service Contracts
- **1%** Other Services

Expenditures for procurement of materials, equipment, & supplies
$165M

- **51%** Other Materials, Equipment, Supplies
- **35%** Health
- **7%** Base Exchange
- **5%** Education
- **2%** Temporary Duty Travel
- **<1%** Commissary

Additionally, Tinker's activities and operations also result in a number of important military and related **construction contracts** and **service expenditures** that have a substantial and positive economic impact on the region. This includes expenditure on military and services contracts and major **expenditures for supplies, materials and equipment**.

Source: Tinker AFB, Public Affairs Office – March, 2020

3 AIRCRAFT OPERATIONS

Aircraft operations are the primary source of noise associated with a military air installation. The level of noise exposure is related to a number of variables, including the aircraft type, engine power setting and afterburner use, altitude flown, direction of the aircraft, flight track, temperature, relative humidity, frequency of operations, and time of operation (day vs night). This chapter discusses the aircraft based at, or transient to, Tinker AFB; the types and number of operations conducted at the airfields; and the runways and flight tracks used to conduct the operations.

3.1 AIRCRAFT TYPES

The aircraft operating at Tinker AFB are primarily fixed-wing aircraft, although a limited number of rotary-wing (helicopter) aircraft operations are conducted there as well. Aircraft permanently assigned at Tinker AFB are the aircraft conducting most of the flight operations at the installation. Aircraft that are not permanently assigned to the installation but conduct operations from the installation on an occasional basis are referred to as "transient" aircraft. Below are brief descriptions of assigned aircraft and the most common transient aircraft at Tinker AFB.

3.1.1 PERMANENTLY ASSIGNED AND DEPOT MAINTAINED AIRCRAFT AT TINKER AFB

KC-135 STRATOTANKER (Permanently Assigned and Depot Maintained Aircraft)

For more than 60 years, the KC-135 Stratotanker has provided the core aerial refueling capability for the Air Force to enhance its capability to accomplish its primary mission of global reach. The KC-135 also provides aerial refueling support to Navy, Marine Corps, and allied nation aircraft and is capable of transporting litter and ambulatory patients using patient support pallets during aeromedical evacuations.

E-6 MERCURY
(Permanently Assigned Aircraft)

The E-6 is a derivative of the commercial Boeing 707 aircraft. The E-6 is a long range, air refuellable aircraft equipped with four high bypass ratio fan/jet engines with thrust reversers. The weapon system is electromagnetic pulse hardened. It has an endurance of 15+ hours without refueling and a maximum endurance of 72 hours with in-flight refueling. Mission range is over 6000 Nautical Miles (NM). It carries a crew of five officers, nine enlisted aircrewmen, and up to four trainees for Take Charge and Move Out (TACAMO) missions.

E-3A SENTRY
(Permanently Assigned Aircraft)

The E-3A Sentry is an airborne warning and control system aircraft with an integrated command and control battle management, surveillance, target detection, and tracking platform. The aircraft can provide an accurate, real-time picture of the battlespace, as well as situational awareness of friendly, neutral, and hostile activity; command and control of an area of responsibility; battle management of theater forces; all-altitude and all-weather surveillance of the battle space; and early warning of enemy actions during joint, allied, and coalition operations.

B-1B LANCER
(Depot Maintained Aircraft)

Carrying the largest conventional payload of both guided and unguided weapons in the Air Force inventory, the multi-mission B-1B Lancer is the backbone of America's long-range bomber force. It can rapidly deliver massive quantities of precision and non-precision weapons against any adversary, anywhere in the world, at any time.

B-52H STRATOFORTRESS
(Depot Maintained Aircraft)

The B-52H Stratofortress is a long-range, heavy bomber capable of flying at high subsonic speeds at altitudes of up to 50,000 feet. The B-52H can carry nuclear or precision-guided conventional ordnance with worldwide precision navigation capability.

KC-46A PEGASUS
(Depot Maintained Aircraft)

The KC-46A Pegasus is the first phase in recapitalizing the Air Force's aging tanker fleet. With greater refueling, cargo, and aeromedical evacuation capabilities compared to its predecessor (the KC-135), the KC-46A will provide next generation aerial refueling support to Air Force, Navy, Marine Corps, and partner-nation receivers. The aircraft will be capable of operating in day-night and adverse weather conditions over vast distances to enable deployment, employment, sustainment, and redeployment of U.S., joint, allied, and coalition forces.

3.1.2 COMMON TRANSIENT AIRCRAFT AT TINKER AFB

Common transient aircraft at Tinker AFB include fighter, bomber, transport, refueling, and rotary wing aircraft. While not an exhaustive list, some of the most prevalent transient aircraft present at Tinker AFB are listed below.

T-38A TALON

The T-38A Talon is a twin-engine, high-altitude, supersonic jet trainer known for its versatility due to its design, economy of operations, ease of maintenance, high performance, and exceptional safety record. Air Education and Training Command uses the T-38A for joint specialized undergraduate pilot training. Air Combat Command, Air Force Materiel Command, and the National Aeronautics and Space Administration also use the T-38A in various roles.

T-6 TEXAN

The T-6A Texan II is a single-engine, two-seat primary trainer designed to train Joint Primary Pilot Training, or JPPT, students in basic flying skills common to U.S. Air Force and Navy pilots.

T-1 JAYHAWK

The T-1A Jayhawk is a medium-range, twin-engine jet trainer used in the advanced phase of specialized undergraduate pilot training for students selected to fly airlift or tanker aircraft. It is also used to support navigator training for the U.S. Air Force, Navy, Marine Corps and international services.

3.2 MAINTENANCE OPERATIONS

Mechanics with the 567th Aircraft Maintenance Squadron

Maintenance is an integral part of any flying operation and requires a dedicated team of professionals to ensure that units can meet their flying requirements. Two key tasks in maintaining aircraft are low- and high-powered engine maintenance runs. Tinker AFB may conduct low-power engine maintenance runs on aprons, ramps, or in test cells to functionally check the operation of engines or other aircraft systems.

Aircraft maintenance personnel may conduct engine maintenance run ups at power settings ranging from idle to maximum power. Maintainers typically conduct low- to mid-range-powered engine maintenance runs on aircraft parking ramps or just outside of maintenance hangars. Tinker AFB does not typically conduct maintenance engine runs between 11:00 p.m. and 6:00 a.m.; however, depending on mission necessity, maintenance engine runs could occur during nighttime hours. Engine maintenance runs, including high-power runs, at Tinker AFB are typically conducted in test cells and on designated ramps and taxiways (for idle runs only), including: MAC ramp, Transient Munitions Facility ramp, West ramp, Romeo ramp, ARW ramp, Navy Tango ramp, Transient ramps, 552 ACW North ramp, and Echo ramp, Trim Pads, ALC (east) ramp, and KC-46 ramp. Noise associated with these operations is included in the overall noise profile for the installation.

3.3 FLIGHT OPERATIONS

Flight activities, including the location, altitude, frequency, and time of day aircraft operate, must be fully evaluated to understand the relationship between flight operations and land use. This chapter discusses typical flight operations for aircraft assigned to or visiting Tinker AFB.

Each time an aircraft crosses over a runway threshold (the beginning or ending of a runway's useable surface) to either take off, practice an approach, or land, it is counted as a single flight operation. For example, a departure counts as a single operation as does an arrival. As another example, when an aircraft conducts pattern work (a departure followed by an immediate arrival) it counts as two operations because the aircraft crosses both the approach and departure end of the runway during the pattern.

This AICUZ Study considers operations from Tinker AFB and includes operations from both assigned and transient military aircraft using the installation.

The following list highlights typical operations utilized during normal or increased flight operations. Each flight track utilized is designed to maximize these flight operations and, when possible, minimize the effects of noise.

- **TAKEOFF:** When a pilot positions an aircraft on the runway and the engine power is set to facilitate movement and eventual flight.

- **DEPARTURE:** The period immediately after takeoff and the aircraft takes flight. For the purpose of air traffic sequencing, separation, noise abatement, compliance with avoidance areas, and overall safety of flight, aircraft follow specific ground tracks and altitude restrictions as they depart the airfield's immediate airspace.

- **STRAIGHT-IN ARRIVAL:** An aircraft performing a straight-in arrival aligns with the runway's extended centerline and begins a gradual descent for landing. This type of approach enables an aircraft to maintain a smooth, stable, and steady approach and requires no additional maneuvering.

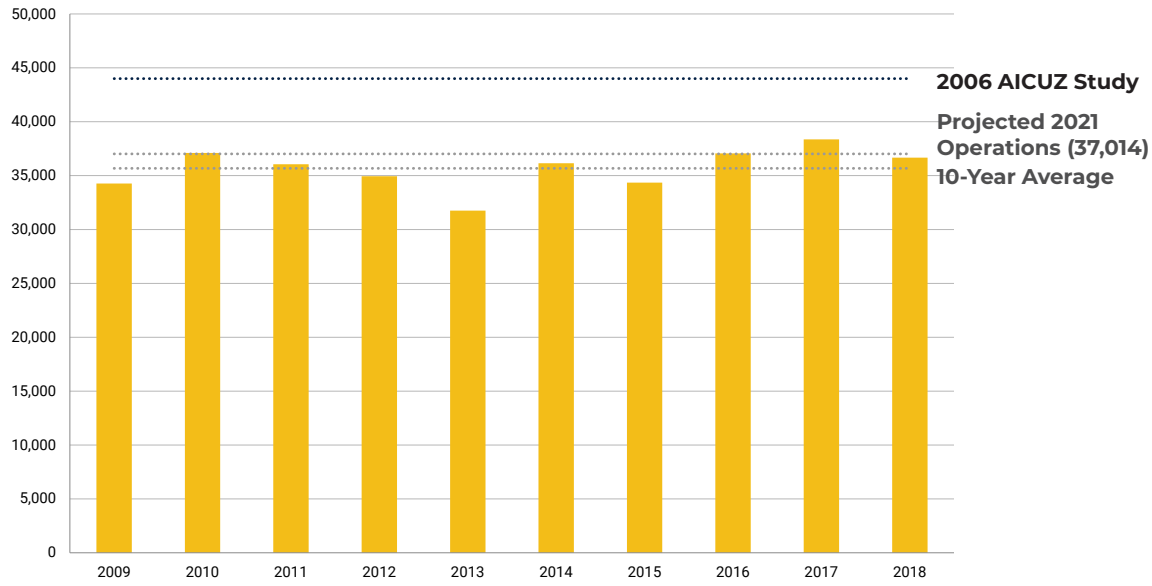
- **PATTERN WORK:** Pattern work refers to traffic pattern training in which the pilot performs takeoffs and landings in quick succession by taking off, flying the pattern, and then landing. A closed pattern consists of two portions, a takeoff/departure and an approach/landing; a complete closed pattern is therefore counted as two operations because the aircraft crosses over a runway threshold twice, once on departure and once on arrival. Traffic pattern training is demanding and utilizes all of the basic flying maneuvers a pilot learns—takeoffs, climbs, turns, climbing turns, descents, descending turns, and straight and level landings.

    - **LOW APPROACH:** A low approach is an approach to a runway that does not result in a landing, but rather a descent towards the runway (usually below 3500 feet above ground level [AGL]) followed by a climb-out away from the airfield. Pilots perform low approaches for a number of reasons, including practicing to avoid potential ground obstructions (e.g., vehicles, debris, stray animals).

3.4 ANNUAL AIRCRAFT OPERATIONS

Total annual operations account for each departure and arrival, including those conducted as part of a pattern operation. **Figure 3-1** provides the number of aircraft operations that have occurred at Tinker AFB over a 10-year period, including assigned and transient aircraft using the installation.

FIGURE 3-1 SUMMARY OF FLIGHT OPERATIONS FOR CALENDAR YEARS 2009 - 2018 FOR TINKER AFB



Source: Tinker AFB ATARS

Data for the 10-year period show aircraft operations at Tinker AFB have remained relatively consistent, with an average of 36,000 operations and no major spikes or dips. A peak in operations occurred in 2017, with over 38,000 operations recorded (about 8 percent more operations than the 10-year average). In 2013, the fewest operations occurred, with just under 32,000 operations recorded (about 10 percent fewer operations than the 10-year average). In comparison to the 2006 Tinker AFB AICUZ Study, projected year operations (2021) decreased by about 15 percent. This includes fewer aircraft operations for both assigned and transient aircraft.

Arrivals

92% Daytime 7am - 10pm

8% Nightime 10pm - 7am

Departures

98% Daytime 7am - 10pm

2% Nightime 10pm - 7am

Closed Pattern

89% Daytime 7am - 10pm

11% Nightime 10pm - 7am

An assessment of the time of day operations occurred at Tinker AFB over the past five years indicates the vast majority (92 percent) took place during daytime (defined as taking place from 7:00 a.m. to 10:00 p.m.) and only 8 percent occurred during nighttime (defined as taking place from 10:00 p.m. to 7:00 a.m.). Only 2 percent of departures at Tinker AFB occurred during nightime, while 11 percent of pattern operations occurred during the defined nightime hours.

3.5 RUNWAY UTILIZATION AND FLIGHT TRACKS

3.5.1 RUNWAY UTILIZATION

The frequency with which aircraft utilize a specific runway involves a variety of factors including, but not limited to:

- Airfield environment (layout, lights, runway length);
- Direction of prevailing winds;
- Location of natural terrain features (rivers, lakes, mountains, and other features);
- Wildlife activity;
- Number of aircraft in the pattern; and/or
- Preference of a runway for the purpose of safety and noise abatement.

ATC personnel establish the runway in use. Aviation planners adjust the pattern procedures accordingly to maximize the efficiency of air traffic flow. **Table 3-1** lists how frequently each runway at Tinker AFB is used.

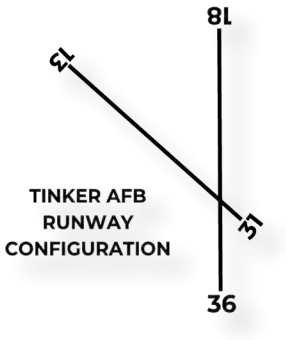


TABLE 3-1. CURRENT RUNWAY USAGE AND FLIGHT ROUTING

TINKER AFB RUNWAY UTILIZATION			
RUNWAY	**ARRIVAL**	**DEPARTURE**	**CLOSED PATTERN**
13 (arriving from the northwest and/ or departing to the southeast)	**1%**	**1%**	**4%**
18 (arriving from the north and/or departing to the south)	**63%**	**62%**	**55%**
31 (arriving from the southeast and/ or departing to the northwest)	**1%**	**1%**	**4%**
36 (arriving from the south and/or departing to the north)	**35%**	**36%**	**37%**

3.5.2 FLIGHT TRACKS

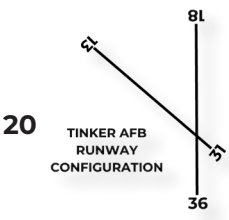
Each runway has designated flight tracks that provide for the safety, consistency, and control of an airfield. Flight tracks depict where aircraft fly in relation to an airfield. They are established for departures, arrivals, and pattern work procedures, and are designated for each runway to facilitate operational safety, noise abatement, aircrew consistency, and the efficient flow of air traffic within the ATC tower-controlled airspace. Aircraft flight tracks are not set "highways in the sky." While flight tracks are depicted as lines on a map, they are actually better thought of as broader "bands" on either side of the track. Aircraft de-confliction, configuration, pilot technique, takeoff weight, and wind all affect the actual path taken on any given flight.

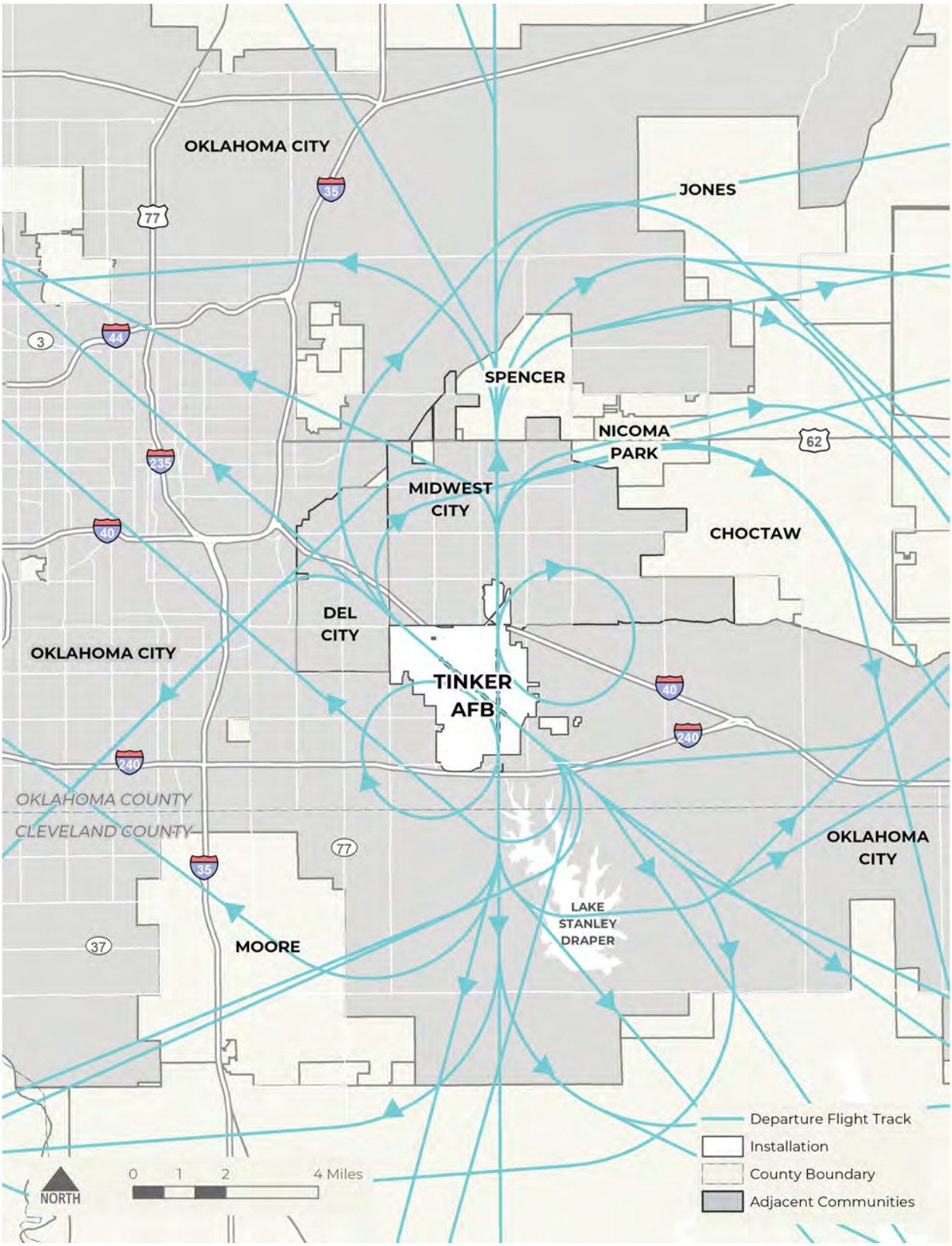
Flight tracks specific to Tinker AFB have been established with several considerations, including:

- Takeoff patterns routed to avoid noise-sensitive areas as much as possible;
- Arrivals and departures routed to avoid restricted airspace;
- Criteria governing the speed, rate of climb, and turning radius for each type of aircraft;
- Efforts to control and schedule missions to keep noise levels low, especially at night; and
- Coordination with the FAA to minimize conflict with civil aircraft operations.

Figures 3-2 through 3-4 present the arrival, departure and closed pattern flight tracks for Tinker AFB.

FIGURE 3-2
TINKER AFB ARRIVAL FLIGHT TRACKS





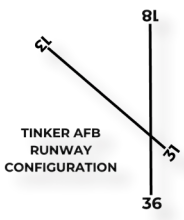


FIGURE 3-3
TINKER AFB DEPARTURE FLIGHT TRACKS

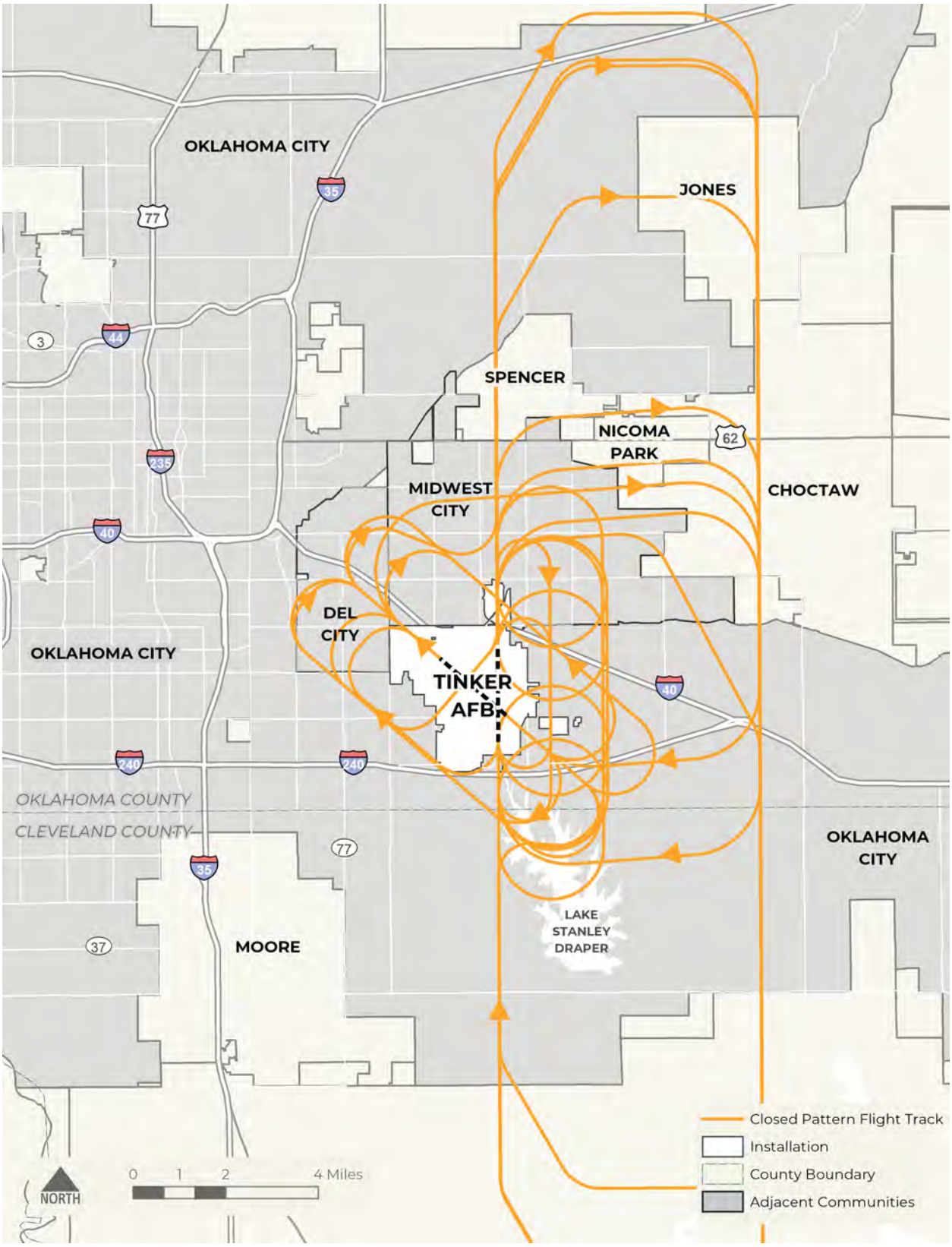
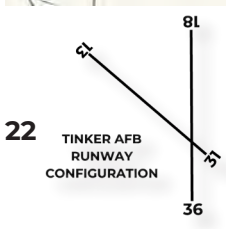


FIGURE 3-4
TINKER AFB CLOSED PATTERN FLIGHT TRACKS



4 AIRCRAFT NOISE

How an installation manages aircraft noise can play a key role in shaping its relationship with neighboring communities. Ideally, aircraft noise and its management should be key factors in local land use planning. Because noise from aircraft may affect areas around the installation, the Air Force has defined noise zones.

While the level of noise produced by aircraft may have a direct effect on communities in proximity to military air installations, other factors also influence the noise impact. An airfield's layout (its buildings, parking ramps, and runways), type of aircraft using it, natural terrain features, weather phenomena, and daily activities all influence the levels of noise that the community experiences.

Terrain features, weather phenomena, man-made structures, and daily life activity contribute to noise exposure.

4.1 WHAT IS SOUND/NOISE?

Sound consists of vibrations in the air. A multitude of sources can generate these vibrations, including roadway traffic, barking dogs, radios—or aircraft operations. These vibrations are called "compression waves." Just as a pebble dropped into a pond generates ripples, the compression waves—formed of air molecules pressed together—radiate out, decreasing with distance. If these vibrations reach a listener's eardrum at a certain rate and intensity, it is perceived as sound. When the sound is unwanted, it is referred to as noise. Generally, sound becomes noise to a listener when it interferes with normal activities. Sound has three components: intensity, frequency, and duration.

- **INTENSITY**, or loudness, relates to sound pressure change. As the vibrations oscillate back and forth, they create a change in pressure on the eardrum. The greater the sound pressure change, the louder it seems.

- **FREQUENCY** determines how a listener perceives the pitch of the sound. Low-frequency sounds are characterized as rumbles or roars, while sirens or screeches typify high-frequency sounds. Sound frequency is measured in cycles per second, or hertz (Hz). While human hearing ranges from 20 to 20,000 Hz, people hear best in the range of 1,000 to 4,000 Hz. For environmental noise, A-weighting, which focuses on this range, is used to best represent human hearing. While A-weighted decibels may be referred to as "dBA," if it is the only weighting being discussed, the "A" is generally dropped.

- **DURATION** is the length of time one can detect the sound.

The loudest sounds the human ear can comfortably hear are a billion times higher in intensity than those of sounds that can barely be heard. Because such large numbers become awkward to use, noise is measured in decibels (dB), which uses a logarithmic scale.

Sound becomes noise when it interferes with normal activities.

Figure 4-1 is a chart of A-weighted sound levels from common sources. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB Sound levels above 120 dB can cause discomfort inside the ear, while sound levels between 130 and 140 dB are felt as pain.

FIGURE 4-1
TYPICAL A-WEIGHTED SOUND LEVELS OF COMMON SOUNDS

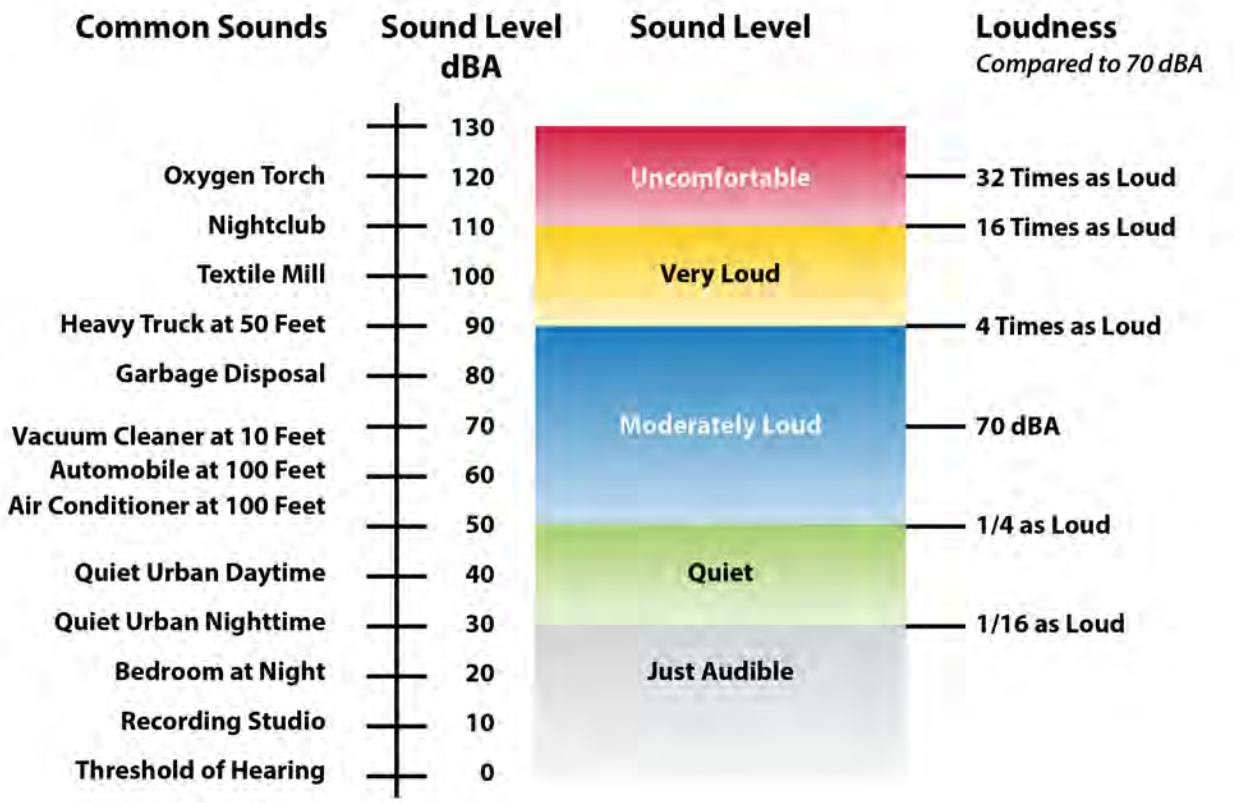


Table 4-1 shows the subjective responses (perceived "loudness") to changes in sound level. While noise energy doubles or halves with every 3-dB change, humans do not perceive all this noise energy. It takes a 10-dB increase or decrease for human ears to perceive a doubling or halving of loudness.

TABLE 4-1
SUBJECTIVE RESPONSE TO CHANGES IN SOUND LEVEL

CHANGE IN SOUND LEVEL	CHANGE IN LOUDNESS
10 dB	Twice or Half as Loud
5 dB	Quite Noticeable
3 dB	Barely Perceptible
1 dB	No Noticeable Change

4.2 THE DAY-NIGHT AVERAGE SOUND LEVEL

When people hear an aircraft fly overhead, they may ask, "How loud was that?" While people may often find ourselves concerned over the loudness of a sound, there are other dimensions to the sound event that draw their interest. For instance, does one overflight draw the same interest as two separate overflights—or 20? Also, does the 30-second run-up of engines prior to takeoff draw the same interest as a 30-minute maintenance run? Additionally, is an overflight more noticeable at 2:00 p.m. or at 2:00 a.m., when the ambient noise is low and most people are sleeping?

The length and number of events—the total noise energy—combined with the time of day that a noise event takes place play key roles in our perception of noise. To reflect these concerns, the Air Force uses a metric called the "Day-night Average Sound Level" (DNL). The United States Environmental Protection Agency created DNL for use throughout the United States.

DNL, when used as a metric for aircraft noise, represents the accumulation of noise energy from all aircraft noise events in a 24-hour period. Additionally, for all operations between 10:00 p.m. and 7:00 a.m., DNL adds a 10-dB penalty to each event to account for the intrusiveness of nighttime operations. As is implied in its name, DNL represents the noise energy present in a daily period. However, because aircraft operations at military airfields fluctuate from day to day, the Air Force typically bases DNL on a year's worth of operations and represents the annual average daily aircraft events.

DNL is not a level of sound heard at any given time but instead represents long-term exposure. Scientific studies have found a correlation between the percentages of groups of people highly annoyed by sounds and the level of average noise exposure measured in DNL.

The noise environment at Tinker AFB includes noise sources that can be classified as continuous. Continuous noise refers to noise events that have a gradual onset, such as an aircraft taking off, and not necessarily noise that is occurring at a constant level at all times.

4.2.1 NOISE CONTOURS

The DoD develops noise contours to assess the compatibility of aircraft operations with surrounding land uses. Noise contours connect points of equal value, just as contours on topographic maps connect points of equal elevation. The Air Force utilizes NOISEMAP, the DoD standard model for assessing noise exposure from military aircraft operations at air installations. Noise contours, when overlaid on local land use maps, can help to identify areas of incompatible land use and assist communities in planning for future development around an air installation.

An AICUZ Study typically provides future year planning noise contours. Long-range planning by local land use authorities involves strategies that influence present and future uses of land. Due to the long-range nature of this planning, the Air Force provides planning contours—noise contours based on reasonable projections of future missions and operations. AICUZ studies using planning contours provide a description of the long-term (5- to 10-year) aircraft noise environment for projected aircraft operations that is more consistent with the planning horizon used by state, tribal, regional, and local planning bodies.

This AICUZ Study retains the noise contours from the 2006 AICUZ Study as the present-day contours to support the potential for future new missions at Tinker AFB. For example, Tinker AFB has been chosen to coordinate maintenance and sustainment for the B-21 Raider mission. If the B-21 mission—or another new mission—is brought to Tinker AFB more rapidly than anticipated, the existing noise zones, provide flexibility to support installation planners and local land use authorities in planning, addressing and promoting land use compatibility within these noise zones without initiating an AICUZ Study update.

Table 4-2 details known and anticipated operations at Tinker AFB through 2021. The Air Force forecasts there will be about 37,014 annual flight operations at Tinker AFB in 2021—about 15 percent fewer operations than the annual flight operations documented in the 2006 Tinker AFB AICUZ Study.

4.2.2 TINKER AFB NOISE CONTOURS

The 2021 Tinker AFB AICUZ Study noise contours are presented in **Figure 4-2.** As previously noted, this AICUZ Study maintains the noise contours from the 2006 AICUZ Study as the planning contours to support the potential for future new missions at Tinker AFB.

To the north and south of the main runway, the 65 dB DNL contours extend well beyond the base boundary by approximately four miles in either direction. The northernmost boundary of the noise contours stretches through Midwest City into the city of Spencer, Oklahoma. Within two miles of the northern and southern base boundary, noise exposure levels are between 70 and 75 dB DNL. The crosswind runway has less land off-base exposed to noise contours greater than 65 dB DNL. Exposure is limited in the northwest while land to the southeast has greater exposure due to closed pattern operations that occur on the east side of the main runway.

Table 4-3 presents the off-installation land acreage and estimated population within the noise zones. The Air Force generated population estimates based on 2014-2018 American Community Survey 5-year Estimates from the Census Bureau. This is done using data at a census-block-level using a geometric proportion method to determine the estimated population within the noise zones. This method assigns population based on the portion of a census block that falls within a given noise zone and assumes the population across census blocks to be evenly distributed. It is important to note that sound associated with aircraft operations extend beyond the plotted 65 dB DNL noise contours. **Figure 4-2** shows, through gradient shading, areas affected by aircraft noise exposure down to 50 dB DNL.

TABLE 4-2. PROJECTED ANNUAL AIRCRAFT FLIGHT OPERATIONS FOR TINKER AFB 2021 AICUZ

TINKER AFB	ARRIVAL	DEPARTURE	CLOSED PATTERN	TOTALS
PERMANENTLY ASSIGNED AIRCRAFT AND DEPOT MAINTAINED AIRCRAFT				
B-1 (Depot Maintained)	55	55	66	242
B-52H (Depot Maintained)	94	94	171	530
E-3A (Permanently Based)	1,542	1,542	4,692	12,468
E-6 (Permanently Based)	40	40	80	240
KC-135R (Permanently Based and Depot Maintained)	1,260	1,260	4,074	10,668
KC-46A (Depot Maintained)	1,423	1,423	3,609	10,064
TRANSIENT AIRCRAFT TYPES				
Attack/Fighter	544	544	516	2,120
Bomber/Transport	239	239	0	478
Helicopter Operations	73	73	0	146
Miscellaneous Aircraft	29	29	0	58
TOTAL				
Permanently Based/Depot Maintained Operations	4,414	4,414	12,692	34,212
Transient Operations	885	885	516	2,802
Combined Aircraft Operations	5,299	5,299	13,208	37,014

Note: Each "closed pattern operation" consists of two total operations: one arrival and one departure.
Source: AFCEC 2020, 2006 AICUZ

TABLE 4-3. OFF-INSTALLATION LAND AREA AND ESTIMATED POPULATION WITHIN NOISE ZONES FOR THE 2021 AICUZ STUDY NOISE CONTOURS AT TINKER AFB

NOISE ZONE (dB DNL)	ACRES	POPULATION
65-69	3,580	5,944
70-74	1,199	2,799
75-79	552	786
80+	78	0
Total (65+)	5,409	9,529

Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates

The off-base area exposed to a minimum of 65 dB DNL totals 5,409 acres (See **Table 4-3**). This includes approximately 3,580 acres in the 65-69 dB DNL noise zone and, as expected, includes the largest number of residents--5,944. This area accounts for approximately 66 percent of the off-base area exposed to greater than 65 dB DNL. A total of 1,199 acres (22 percent) and 2,799 citizens fall within the 70-74 dB DNL noise zone, and 552 acres (less than one percent) and 786 individuals are within the 75-79 dB DNL noise zone.

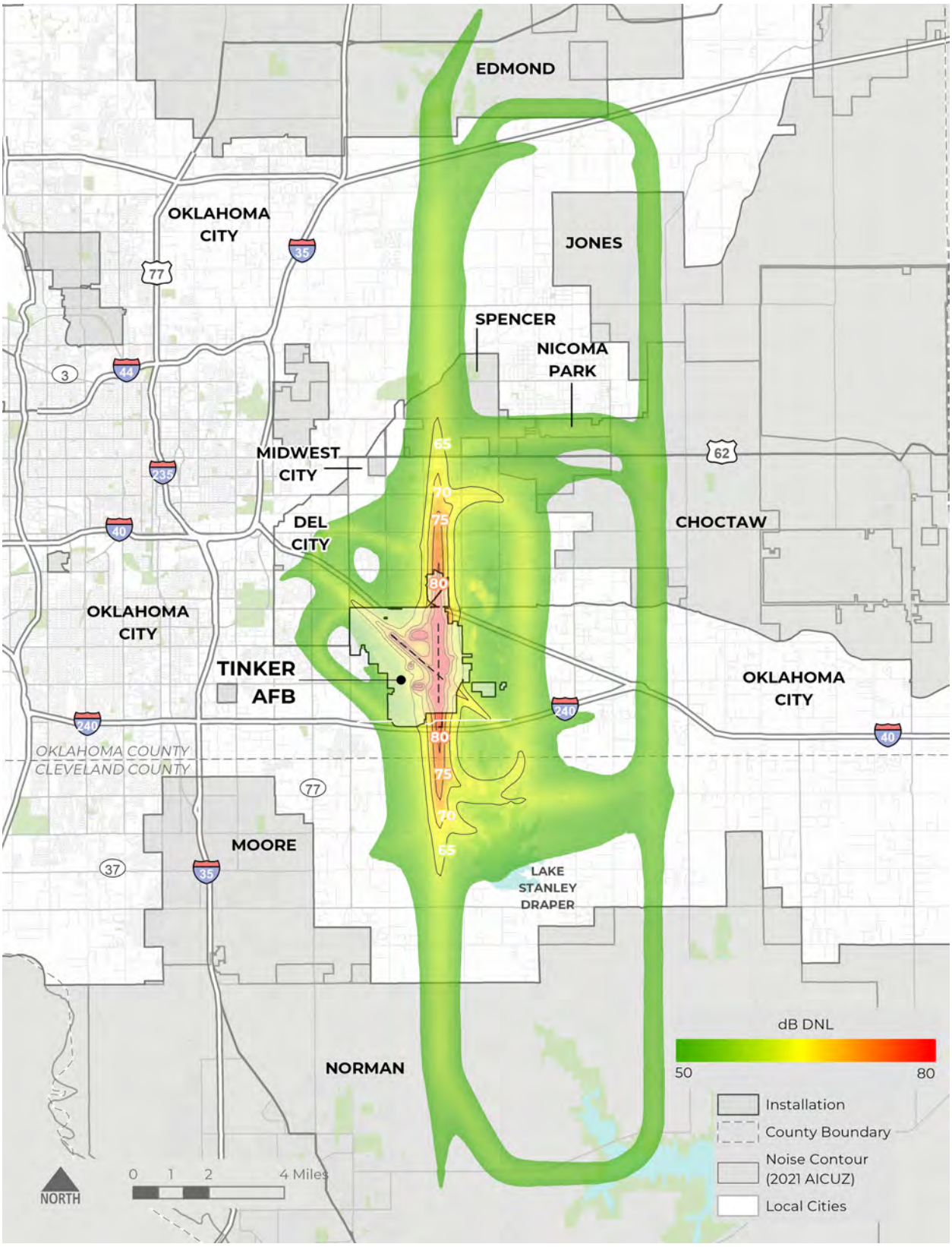


FIGURE 4-3
2021 TINKER AFB AICUZ STUDY NOISE CONTOURS
WITH GRADIENT SHADING

4.3 NOISE ABATEMENT

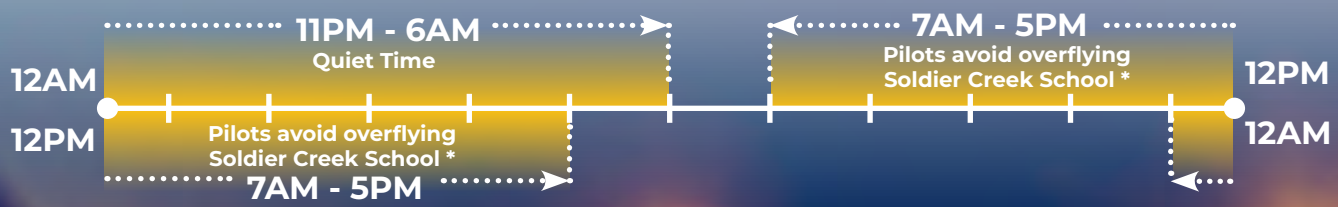
The Air Force recognizes that noise from military operations may cause concern for people living near military installations.

For this reason, the Air Force has established a noise program aimed at reducing and controlling the emission of noise and vibrations associated with the use of military aircraft, weapon systems, and munitions while maintaining operational requirements. The result is the implementation of various strategies, techniques, and procedures, documented under the Tinker AFB Instruction 13-204, Airfield Operations, aimed at protecting the installation's neighbors and structures from the harmful effects of noise and vibrations.

To minimize noise exposure for the residents and workforce at Tinker AFB and the surrounding communities , a number of key noise-abatement procedures are in place and listed below:

- Quiet hours are in effect from 11:00 p.m. to 6:00 a.m but all locally assigned aircraft are authorized practice approaches/pattern work till 02:00 a.m. Only scheduled full-stop landings, departures, and necessary taxi operations are authorized during these nighttime quiet hours.
- Circling approaches to Runway 18 are prohibited.
- Pilots will avoid overflying Soldier Creek School when school is in session (7:00 a.m. to 5:00 p.m., Monday through Friday, beginning in August until the end of May). This area is located 1.5 miles north of the airfield, at the corner of Southeast 15th Street and Douglas Boulevard.
- Pilots executing Visual Flight Rules straight-in approaches to Runway 13 or 18 may not descend below 2,000 feet MSL until within two miles of the runway.
- Use of afterburners in the Tinker AFB Surface Area is prohibited except in emergencies, initial takeoffs, or as required by aircraft technical orders.
- Unless directed otherwise by ATC, when remaining within the Runway 36 closed traffic or Runway 36 radar traffic pattern, pilots must climb runway heading to 2,500 feet MSL and past the airfield boundary prior to executing turns.
- Maintenance engine runs and pattern transition work are restricted between 11:00 p.m. and 6:00 a.m. daily.

Tinker AFB leadership periodically reviews flight operations and their potential impact on surrounding communities. This requirement facilitates the planning, designation, and establishment of flight tracks over sparsely populated areas and/or waterways as often as practicable to balance operational safety and reduce noise exposure levels in surrounding communities.



* Monday through Friday, beginning in August until the end of May

4.4 NOISE COMPLAINTS

At times, military operations may generate noise complaints. The Air Force evaluates all noise complaints to ensure future operations, when possible, do not generate unacceptable noise. Concerned citizens are encouraged to contact the Tinker AFB Public Affairs personnel with any noise complaints. Tinker AFB Public Affairs can be reached by phone at 405-739-2026.

Noise complaints are routed directly to a dedicated line monitored by a representative from the Public Affairs department. The person who receives the call fills out a noise complaint form that includes the caller's information, a description of the event, and the aircraft involved. Public Affairs then contacts the 72d Operations Support Squadron to determine whether there was anything unusual about aircraft operations at the time the complaint occurred.

Tinker AFB's Public Affairs department maintains the complaint information and periodically analyzes the information for similarities or patterns in the received complaints. After a complaint is logged, Public Affairs representatives will follow up with the individual who filed the complaint and provide feedback to the 72d Operations Support Squadron on what they found. To date, so few noise complaints have been received by Tinker AFB that there are no discernable patterns. Since 2016, noise complaints received at Tinker AFB have been few and vary in subject from aircraft noise during both the daytime and nighttime, aircraft altitude concerns, vibrations, and a loud siren.

Tinker AFB also posts information regarding aircraft operations on the installation website and social media accounts. Postings typically include alerts about upcoming events affecting aircraft operations (e.g., air shows, special operations, etc.) that can be shared publicly. These sites include:

- Website: http://www.tinker.af.mil/;
- Facebook: https://www.facebook.com/TinkerAirForceBase/; and
- Twitter: https://twitter.com/Team_Tinker

5 COMMUNITY & AIRCRAFT SAFETY

Community and aircraft safety is paramount to the Air Force and is a shared responsibility between it and the surrounding communities, with each playing a vital role in its success. Cooperation between the Air Force and the community results in strategic and effective land use planning and development. As such, the Air Force has established a flight safety program and has designated areas of accident potential around its air installations to assist in preserving the health, safety, and welfare of residents living near its airfield. This AICUZ Study provides the information needed, in part, to reach this shared safety goal.

Identifying safety issues assists the community in developing land uses compatible with airfield operations. As part of the AICUZ Program, the Air Force defines areas of accident potential, imaginary surfaces, and hazards to aircraft flight.

5.1 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

In the 1970s and 1980s, the military conducted studies of historical accident and operations data throughout the military. The studies showed that most aircraft mishaps occur on or near the runway, diminishing in likelihood with distance from the runway. Based on these studies, the DoD identified Clear Zones (CZs) and Accident Potential Zones (APZs) as areas where an aircraft accident is most likely to occur if an accident were to take place; however, it should be noted that CZs and APZs are not predictors of accidents. The studies identified three areas that, because of accident potential, planners should consider for density and land use restrictions: the CZ, APZ I, and APZ II.

The dimensions for CZs and APZs are based on the runway classification. Runway classifications are based on the type of aircraft that use them and are categorized as Class A or Class B. Class A runways are designated to be used by smaller and lighter aircraft, such as propeller-driven aircraft, some of the of the smaller training jet aircraft, gliders, and some remotely piloted vehicles. Class B runways are used by large aircraft, such as refueling and airlift aircraft as well as high-speed tactical aircraft. Runways at Tinker AFB are classified as Class B.

While the APZs extend outward from the ends of the runway along the extended runway centerline, an installation may add a curved APZ when over 80 percent of the operations follow a curved arrival or departure path.

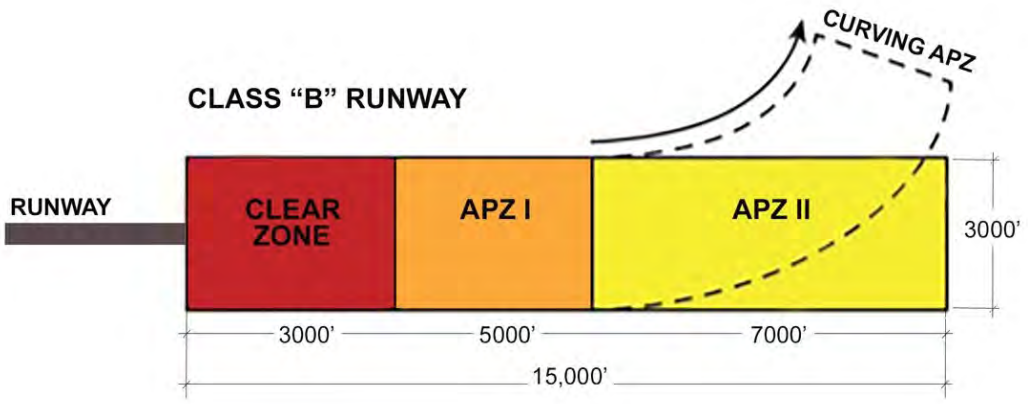
The CZs and APZs for Class B runways are described in the list below and are depicted on **Figure 5-1:**

- **Clear Zone:** At the end of all active DoD runways is an area known as the "Clear Zone." The CZ for Class B runways has an area of 3,000 feet square centered on the end of the runway. All active runways have CZs and should remain undeveloped.

- **APZ I:** Beyond the CZ is APZ I. APZ I is 3,000 feet in width and 5,000 feet in length along the extended runway centerline.

- **APZ II:** APZ II is the rectangular area beyond APZ I. APZ II is 3,000 feet in width by 7,000 feet in length along the extended runway centerline.

FIGURE 5-1
RUNWAY CLEAR ZONES AND ACCIDENT POTENTIAL ZONES FOR CLASS B RUNWAYS



Within the CZ, the only land uses compatible with military aircraft operations and defense missions are undeveloped lands and certain right-of-way and agricultural uses. For this reason, it is the Air Force's policy, where possible, to acquire real property interests in land within the CZ to ensure incompatible development does not occur. Within APZ I and APZ II, a variety of land uses are compatible; however, higher density uses (e.g., schools, apartments, churches) and more intense uses (e.g., office buildings, strip malls) should be restricted because of the greater safety risk in these areas. Chapter 6 discusses land use and recommendations for addressing incompatibility issues within APZs for each of Tinker AFB's runways.

Figure 5-2 depicts the CZs and APZs for Runways 18/36 and 13/31 for Tinker AFB. The CZs and APZs for both runways are straight, reflecting the installation's most prevalent operations, and are unchanged from the 2006 Tinker AFB AICUZ Study. To the north at the end of Runway 18, Tinker AFB's CZ, APZ I, and APZ II extend beyond the base boundary into Midwest City; to the south off of Runway 36, Tinker AFB's CZ, APZ I, and APZ II extend through Oklahoma City, in Oklahoma County into Cleveland County. The CZ, APZ I, and APZ II extend northwest off of the end of Runway 13 into Del City, and to the southeast off of the end of Runway 31, the CZ, APZ I, and APZ II extend into Oklahoma City.

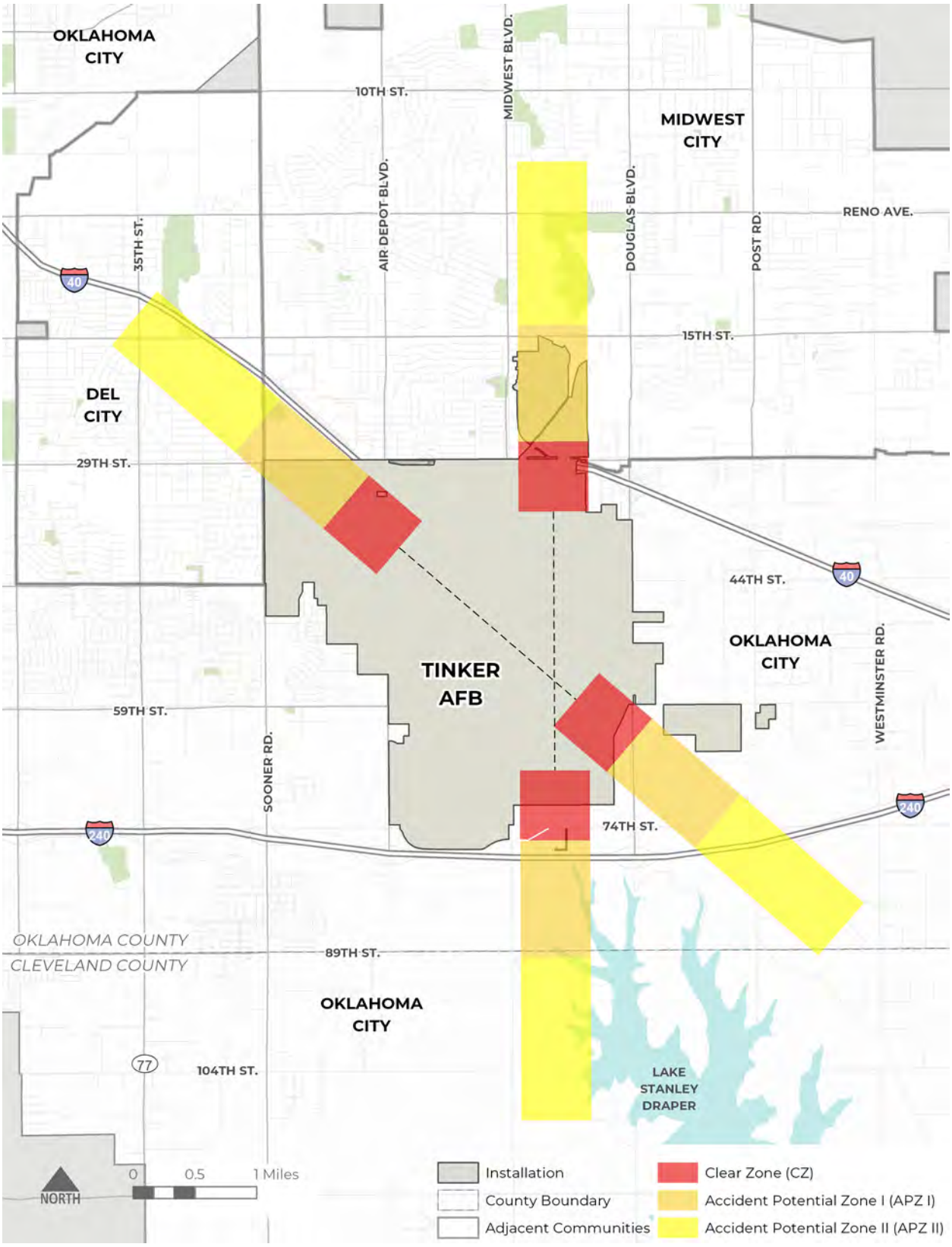


FIGURE 5-2
2021 TINKER AFB AICUZ STUDY CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

Table 5-1 tabulates the off-base land acreage and estimated population within the CZs and APZs. Off-base areas within APZ I affect approximately 1,932 acres and an estimated 4,480 residents. Off-base areas within APZ II affect approximately 940 acres and an estimated 571 residents. The CZ for Tinker AFB is 171 acres and no residents within it. Chapter 6 discusses land use and recommendations for addressing incompatibility issues within CZs and APZs for an airfield.

TABLE 5-1. OFF-INSTALLATION LAND AREA AND ESTIMATED POPULATION WITHIN THE CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

ZONE	ACRES	POPULATION
CZ	171	0
APZ I	1,932	4,480
APZ II	940	571
Total	3,043	5,051

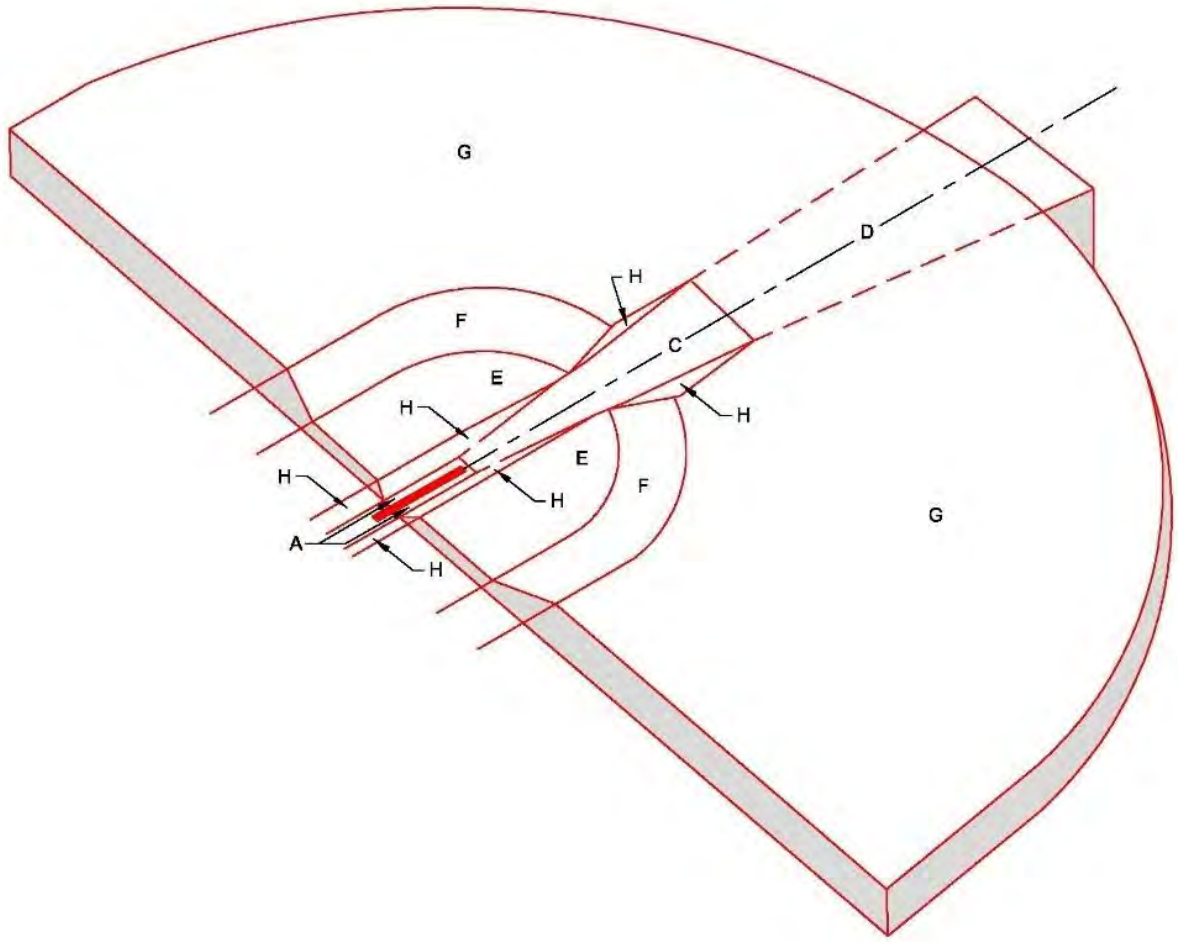
Source: U.S. Census Bureau, 2014-2018 American Community Survey 5-Year Estimates

5.2 IMAGINARY SURFACES

The DoD and FAA identify a complex series of imaginary planes and transition surfaces that together define the airspace needed to remain free of obstructions around an airfield. Obstruction-free imaginary surfaces form a complex bowl around the airfield to ensure safe flight approaches, departures, and pattern operations. Obstructions include natural terrain and man-made features such as buildings, towers, poles, wind turbines, cell towers, and other vertical obstructions to airspace navigation.

There are different imaginary surfaces for fixed-wing runways (depending on type of aircraft supported by the runway) and rotary-wing runways/helipads. An illustration of the imaginary surfaces for typical Class B fixed-wing runways like those at Tinker AFB is depicted on **Figure 5-3. Table 5-2** provides brief descriptions for each of these surfaces. **Figure 5-4** depicts the actual runway airspace imaginary surfaces specific to Tinker AFB's Class B runways. In general, the Air Force does not permit above-ground structures on the primary surface (located on base), and height restrictions apply to transitional surfaces and approach and departure surfaces. Height restrictions are more stringent for areas closer to the runway and flight paths.

FIGURE 5-3
IMAGINARY SURFACES AND TRANSITION PLANES
FOR CLASS B FIXED-WING RUNWAYS



LEGEND

A	PRIMARY SURFACE
C	APPROACH - DEPARTURE CLEARANCE SURFACE (SLOPE) (50H:1V RATIO)
D	APPROACH - DEPARTURE CLEARANCE SURFACE (HORIZONTAL)
E	INNER HORIZONTAL SURFACE (45.72m [150'] ELEVATION)
F	CONICAL SURFACE (20H:1V)
G	OUTER HORIZONTAL SURFACE (152.40m [500'] ELEVATION)
H	TRANSITIONAL SURFACE (7H:1V)

TABLE 5-2. DESCRIPTIONS OF IMAGINARY SURFACES FOR MILITARY AIRFIELDS WITH CLASS B RUNWAYS

PRIMARY SURFACE	An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end, that defines the limits of the obstruction clearance requirements near the landing area. The width of the primary surface is 2,000 feet, or 1,000 feet on each side of the runway centerline.
APPROACH-DEPARTURE CLEARANCE SURFACE	An imaginary surface symmetrically centered on the extended runway centerline, beginning as an inclined plane (glide angle) at the end of the primary surface (200 feet beyond each end of the runway), and extending for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the starting point. The width of this surface at the runway end is 2,000 feet, flaring uniformly to a width of 16,000 feet at the end.
INNER HORIZONTAL SURFACE	This imaginary surface is an oval plane at a height of 150 feet above the established airfield elevation. The inner boundary intersects with the approach-departure clearance surface and the transitional surface. The outer boundary is formed by scribing arcs with a radius of 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
CONICAL SURFACE	An inclined imaginary surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1. The conical surface connects the inner and outer horizontal surfaces.
OUTER HORIZONTAL SURFACE	An imaginary surface that is located 500 feet above the established airfield elevation and extends outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.
TRANSITIONAL SURFACE	An imaginary surface that extends outward and upward at an angle to the runway centerline and extended runway centerline at a slope of 7:1. The transitional surface connects the primary and the approach-departure clearance surfaces to the inner horizontal, the conical, and the outer horizontal surfaces.

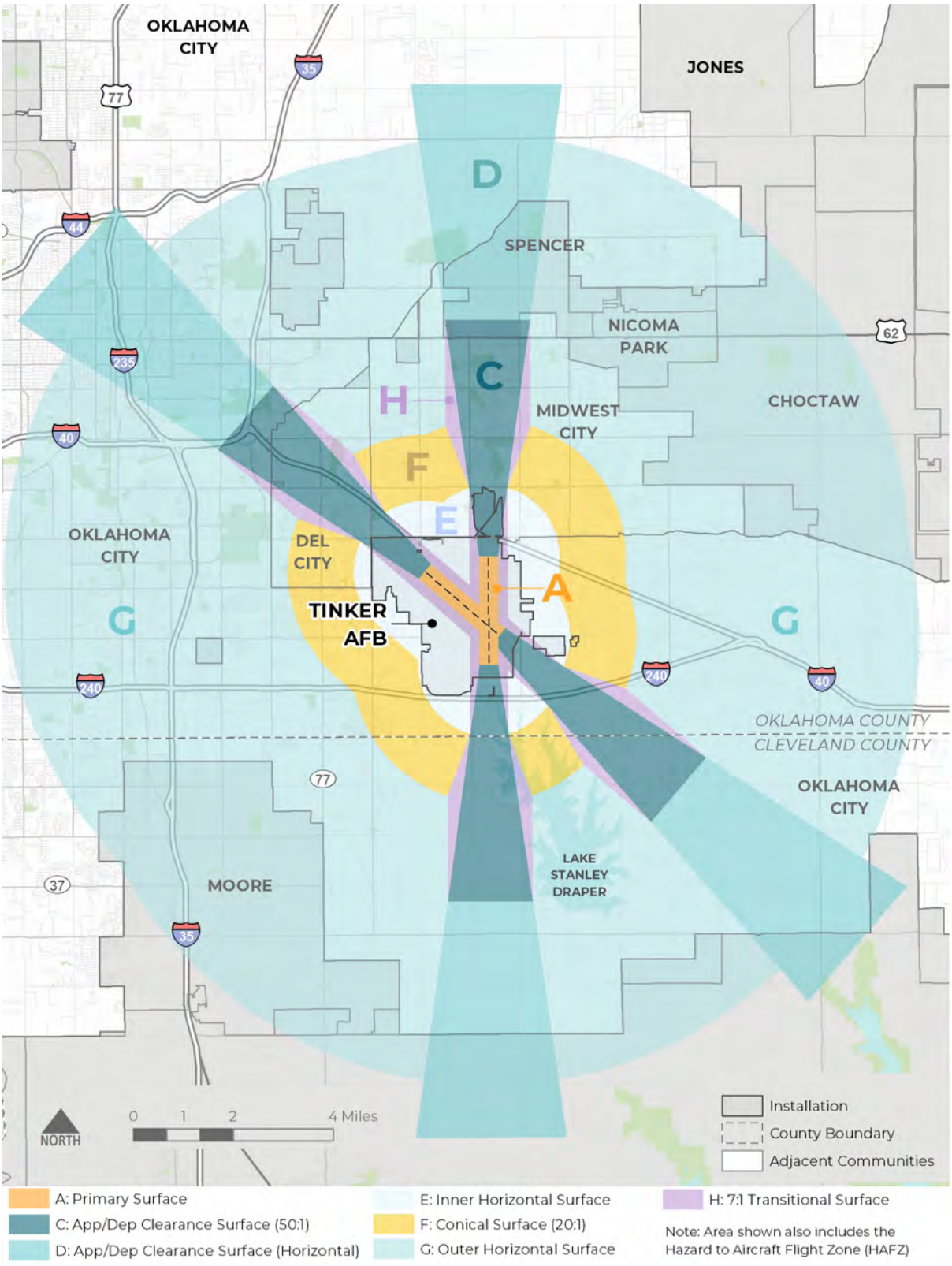


FIGURE 5-4
RUNWAY AIRSPACE IMAGINARY SURFACES AND TRANSITION PLANES FOR TINKER AFB

5.3 HAZARDS TO AIRCRAFT FLIGHT ZONE

Certain land uses and activities pose potential hazards to flight. To ensure land uses and activities are examined for compatibility, the Air Force has identified a HAFZ. The HAFZ is defined as the area within the imaginary surfaces that are shown on **Figure 5-4** above. Please note that the area and shape of the HAFZ may change with the encroachment issue at hand. For instance, issues related to bird/wildlife aircraft strike hazards (BASH) may follow natural boundaries, encompass local bodies of water, and extend along flight paths. Unlike noise zones and safety zones, the HAFZ does not have recommended land use compatibility tables. Instead, it is a "consultation zone," recommending that project applicants and local planning bodies consult with the Air Force to ensure the project is compatible with Air Force operations. These land use and activity compatibility considerations include:

- **HEIGHT**: Tall objects can pose significant hazards to flight operations or interfere with navigational equipment (including radar). Currently, challenges exist within and surrounding Tinker AFB airspace, and in areas where aircraft from the base operate, from height obstruction conflicts with wind turbines and communication towers in and near Visual Route (VR) 1116. In an effort to prevent vertical obstructions that affect Military Training Routes used by Tinker AFB aircraft, the installation regularly flies the VRs to ensure mission operations will not be impeded by conflicting airspace uses or obstructions.

  In addition, city and county agencies involved with approvals of permits for construction should require developers to submit calculations showing that projects they propose meet the height restriction criteria of 14 Code of Federal Regulations (CFR) 77.17 for Tinker AFB. City and county agencies may also consider requiring a "Determination of No Hazard" issued by the FAA for any tall objects within this zone.

- **VISUAL INTERFERENCE:** Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity can obstruct a pilot's vision during takeoff, landing, or other periods of low-altitude flight. Close coordination between the installation and landowners can often mitigate these concerns. For example, irrigating before plowing can greatly reduce dust concerns.

- **LIGHT EMISSIONS:** Bright lights, either direct or reflected, in the airfield vicinity can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot, or "halo," to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous for pilots at night, when the flash can diminish the eye's adaptation to darkness. The eyes partially recover from this adaptation in a matter of minutes, but full adaptation typically requires 40 to 45 minutes. Specific examples of light emissions that can interfere with the safety of nearby aviation operations include:

    - Lasers that emit in the visible spectrum, which can be potentially harmful to a pilot's vision during both day and night.

    - The increasing use of energy-efficient light-emitting diode (LED) lighting, which poses potential conflicts in areas where pilots use night vision goggles (NVG). NVG can exaggerate the brightness of these lights, interfering with pilot vision.

    - The use of red LED lights to mark obstructions, which can produce an unintended safety consequence because red LED lights are not visible on most NVG models, rendering them invisible to NVG users in the area.

- **BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD:** Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to different habitat types found in the airfield environment, including hedges, grass, brush, forest, water, and even the warm pavement of the runways. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force. Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft as well as loss of flight time.

  Most BASH aircraft collisions occur below 2,000 feet. To reduce the potential of a BASH incident, the Air Force recommends that land uses that attract birds not be located near installations with an active air operations mission. These land uses include:

  - Waste disposal operations;
  - Wastewater treatment facilities;
  - Transfer stations and landfills;
  - Golf courses;
  - Wetlands;
  - Storm water ponds;
  - Dredge disposal sites; and
  - Composting facilities

  Birds and raptors in search of food or rodents will flock to landfills, increasing the probability of BASH occurrences near these facilities. One can also use design modifications to reduce the attractiveness of these types of land uses to birds and other wildlife.

  A BASH risk exists at Tinker AFB due to resident and migratory bird species and other wildlife present near the base. The base has a BASH Plan in place to address these hazards. This plan establishes procedures to minimize BASH conditions at Tinker AFB. The base uses a variety of techniques and organizations in its BASH control program. This plan is designed to:

  - Establish a Bird/Wildlife Hazard Working Group and designate responsibilities to its members;

  - Establish procedures to identify high hazard situations and to aid commanders and aircrews in altering or discontinuing flying operations when required;

  - Provide for disseminating information to all assigned and transient aircrews on bird/wildlife hazards and procedures for bird/wildlife avoidance;

  - Establish guidelines to decrease airfield attractiveness to birds and other wildlife;

  - Provide guidelines for dispersing birds and other wildlife through lethal and non-lethal means, if necessary, when they present a hazard on the airfield.

  An identified BASH concern in the area of Tinker AFB is the East Oak Recycling and Disposal Facility on Mosley Road, between NE 23rd and NE 36th Streets, approximately five miles north of the installation. This landfill is approximately 150 acres in a relatively undeveloped area near the boundary of Oklahoma City and Midwest City. The landfill was recently approved for an expansion. It should be noted that there are several proactive methods being used by the company operating the landfill to deter and control birds and limit BASH concerns for Tinker AFB and other regional airports. These include limiting the landfill cell working face size and use of pyrotechnical launchers and a propane cannon to disperse birds randomly throughout the day. These methods are accepted and proven BASH mitigation activities.

- **RADIO FREQUENCY/ELECTROMAGNETIC INTERFERENCE:** The American National Standards Institute defines electromagnetic interference (EMI) as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronic or electrical equipment.

  EMI can be induced intentionally, as in forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, such as high-tension line leakage and emission from industrial machinery. In addition, EMI may be caused by atmospheric phenomena, such as lightning or precipitation static.

  New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, communities should use care when siting any activities that create EMI. Many of these sources are low-level emitters of EMI. However, when combined, they have an additive quality.

  EMI also affects consumer devices, such as cell phones, FM radios, televisions, and garage door openers. In some cases, the interference occurs when consumer electronics use frequencies set aside for military use.

- **DRONES/UNMANNED AIRCRAFT SYSTEMS (UAS)/REMOTELY PILOTED AIRCRAFT (RPA):** The use of drones near military airfields poses a serious flight safety hazard due to the potential for a mid-air collision between military aircraft and small- to medium-sized drones. The FAA maintains specific guidance about where drones (i.e., UAS) can be flown. Currently, non-DoD drone operations are not permitted within certain zones surrounding military bases. Additional restrictions are in place around airports, sports stadiums, and security-sensitive areas.

  It is important to note that in 2015, the FAA created a new statutory requirement that applies to all privately owned, unmanned aircraft that weigh more than 55 pounds. The FAAs goal is to allow the "opportunity to educate new aircraft users before they fly, so that they know the airspace rules and understand that they are ultimately accountable" and responsible for incidents that may occur as a result of their new toys.

  Presently, users are required to register aircraft meeting the aforementioned requirements in a national data base. The registration is web-based and patrons will be required to provide a nominal fee of $5 per application. This registration will be valid for a period not to exceed three years. The registration process requires you to provide your name, home address and a valid email address. When the application is complete, you will receive an aircraft registration/proof of insurance certificate and an identification number which is required to be marked on the aircraft. If you own

Tinker AFB hosted members of the community and Team Tinker to discuss issue of commercial, small unmanned aerial systems.

Tinker AFB's drone policy prohibits outdoor recreational use of all UAS, RPA, and model aircraft, to include helicopters, quadcopters, and similar aircraft, on Tinker AFB property.

To register your private unmanned aircraft, log on to www.faa.gov/usa/registration. Failure to register your unmanned aerial system can result in fines up to $250,000 and/or up to three years in prison. For more information on drone use in and around DoD airfields, visit the FAA's website at: www.faa.gov/uas.

multiple unmanned aircraft, this registration will be valid for all of them.

The FAA distinguishes between recreational flyers and commercial operators and has a process for each to be allowed to operate. Due to the novelty and ever-changing environment, drone operators should visit www.faa.gov/uas to ensure they have the most up to date guidance on how to legally operate.

In addition to FAA guidance, Tinker AFB Installation Commander issues a drone policy governing their use in and around Tinker AFB. The intent of this policy is to offer maximum protection to aircrews, aircraft, and base populace. Highlights of the installation's policy include the following:

- Tinker AFB's drone policy prohibits outdoor recreational use of all UAS and model aircraft, to include helicopters, quadcopters, and similar aircraft, on Tinker AFB property.

- The 72d Operational Support Squadron shall remain vigilant for UAS and model aircraft activity and report UAS and model aircraft activity upon identification.

- Report UAS and model aircraft activity to all aircraft under their control.

- Submit appropriate hazard report if a UAS or model aircraft causes a conflict with an aircraft. Brief UAS and model aircraft activity or incidents at the Airfield Operations Board.

6 LAND USE COMPATIBILITY ANALYSIS

CZs, APZs, and noise zones, as shown on Figure 6-1, and the HAFZ make up the AICUZ footprint for an air installation and are the basis for Tinker AFB's land use compatibility analysis. The AICUZ footprint defines the minimum recommended area within which land use controls are needed and requested to enhance the health, safety, and welfare of those living or working near a military airfield and to preserve the flying mission. The AICUZ footprint, combined with the guidance and recommendations set forth in the AICUZ Study, are the fundamental tools necessary for the planning process to achieve overall land use compatibility. The Air Force recommends that local and regional governments adopt the AICUZ noise zones, CZs, APZs, and HAFZ into planning studies, regulations, and processes to best guide compatible development around installations.

6.1 LAND USE COMPATIBILITY GUIDELINES & CLASSIFICATIONS

In an effort to establish long-term compatibility for lands within the vicinity of military air installations, the DoD has created land use compatibility recommendations based on the Federal Highway Administration's Standard Land Use Coding Manual (SLUCM). These guidelines are used by DoD personnel for on-installation planning and for engaging with the local community to foster compatible land use development off-installation. Table A-1 of Appendix A shows the suggested land use compatibility guidelines within the CZs and APZs. Table A-2 of Appendix A provides land use compatibility recommendations for aircraft noise within noise zones.

Section 6.4 presents the compatibility analysis and concerns within noise zones and APZs associated with Tinker AFB.

6.2 PLANNING AUTHORITIES, STAKEHOLDERS, & POLICIES

This section presents information for each governing body that has land use jurisdictions near Tinker AFB, including descriptions of existing and future land uses and zoning, any relevant stakeholder groups, and existing compatible planning policies and regulations.

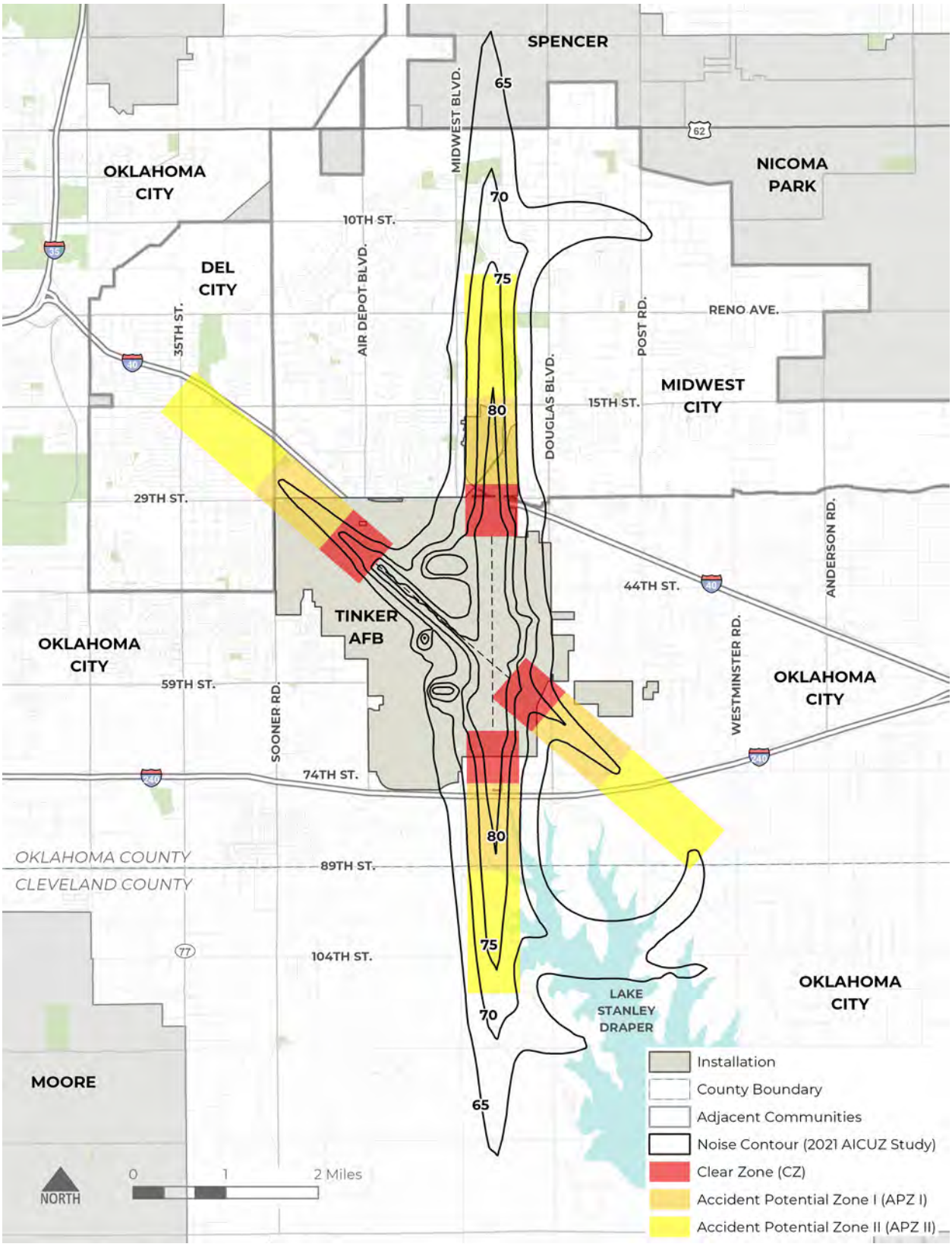


FIGURE 6-1
TINKER AFB 2021 COMPOSITE AICUZ FOOTPRINT

STATE OF OKLAHOMA LAND USE PLANNING AND ZONING

In the State of Oklahoma, land use planning and zoning is delegated to municipal and county governments, which are empowered to create comprehensive land use plans and may choose to join a joint planning commission to administer and coordinate local land use plans. Thus, there are neither statewide land use planning regulations nor state-enabling legislation for any type of state or regional land use planning. The Aircraft Pilot and Passenger Protection Act, discussed in Section 7.2, is a state law intended to increase safety near airports, including military airports, in Oklahoma.

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS (ACOG)

Regional councils are voluntary associations of local governments formed under Oklahoma law. These associations deal with the problems and planning needs that cross the boundaries of individual local governments or that require regional attention. Regional councils coordinate planning and provide a regional approach to problem solving through cooperative action. Although known by several different names, including councils of governments, regional planning commissions, associations of governments and area councils, they are most commonly referred to as "regional councils" or "councils of governments." No legal distinction exists among the different names.

In 1970, Oklahoma's governor established 11 substate planning districts to coordinate regional approaches and solutions applicable at the local level. The Association of Central Oklahoma Governments (ACOG) consists of 49 cities and 4 counties in Central Oklahoma region, including Oklahoma City. While not a governmental unit, the ACOG is intended to complement and supplement local government activities. Tinker AFB holds an associate membership with the ACOG.

ACOG's primary role is to conduct a comprehensive, coordinated, and continuing long-range transportation planning process. ACOG works with area local governments, transit providers, the Oklahoma Department of Transportation, the Federal Highway and Transit Administrations, other transportation agencies and stakeholders, and the public to prepare federally required long-range transportation plans and short-range implementation programs. Such plans and programs are a prerequisite for receiving federal transportation dollars.

OKLAHOMA COUNTY

Within unincorporated areas of Oklahoma County, land use planning and management is led by the Oklahoma County Planning Department. Portions of Tinker AFB's noise contours fall within Oklahoma County. The department is responsible for planning, subdivision, and zoning—including master planning. The current Oklahoma County Master Plan and Master Land Use Plan Map was published in 2007 and has a 2020 planning horizon. There is an ongoing effort to begin updating the master plan in the coming years

OKLAHOMA CITY

Planning, zoning, and development matters in Oklahoma City are addressed by the departments of Planning and Development Services. Together, these departments provide guidance for long-term growth and assistance for technical planning and zoning. Within the Planning Department, the Plan Development and Implementation Division manages long-range planning functions and provides technical assistance to support public, private, and nonprofit development in the urban core.

The Development Services Department houses the Development Center and Subdivisions and Zoning Division. The Development Center reviews building plans for code and ordinance compliance. The Subdivisions and Zoning Division manages rezoning requests, special zoning districts, and zoning applications. The City also maintains an airport overlay zone to regulate appropriate development within the AICUZ for Tinker AFB. Other relevant city services playing a role in land use and zoning include the Information Technology Department, which manages Geographic Information System (GIS) data.

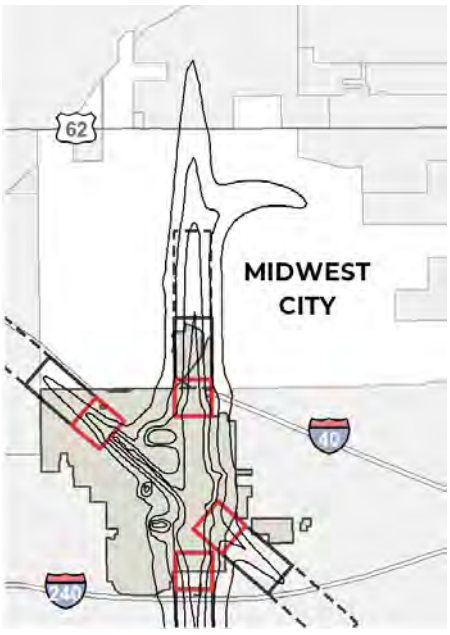
The City's comprehensive plan is a policy document used by city leaders, developers, business owners, and citizens to make decisions about future growth, development, policy, and capital improvements. The current comprehensive plan is entitled planokc and Oklahoma City's first new comprehensive plan since 1977. The planokc document was adopted by the Planning Commission on July 9, 2015, and by the City Council on July 21, 2015.The plan identifies Tinker AFB-specific strategies in support of the plan's economic development priorities:

- Increase economic diversity by supporting development of industry clusters such as aerospace, aviation, defense, bioscience (and other high-technology industries), renewable energy, new-to-market company headquarters, and advanced manufacturing. Strategies can include:
    - Protecting Airports and Tinker Air Force Base from encroachment by incompatible uses by analyzing the effectiveness of current Airport Environs overlay zoning districts and implementing necessary changes.
    - Facilitating expansion of Tinker-related operations to the east and south by prioritizing improvements to transportation, water, and sewer infrastructure.

The comprehensive plan is adopted by the Oklahoma City Planning Commission and City Council, which makes recommendations to the City Council on all zoning changes. Oklahoma City's Planning Commission consists of nine Oklahoma City residents appointed by the Mayor with City Council approval. Each of the City's eight wards is represented, with one member appointed at-large.

Following adoption of planokc, the Planning Commission requested several detailed plans for specific geographic areas. The Southeast Sector plan is an addendum to the planokc and includes Tinker AFB. A plan for the sector was adopted in 2007 (and incorporated as part of planokc) and identifies the need to protect the areas surrounding Tinker AFB from encroachment, per the incorporation of recommendations of the 2008 Tinker AFB Joint Land Use Study (JLUS). The Sector Plan used information that was gathered as part of the JLUS development process, which is described in Section 7. Actions identified in the plan include developing Lake Draper as a regional park, which is conditionally compatible with Tinker AFB's aircraft operations, and considering partnering with Tinker AFB to establish a conservation easement or similar arrangement to safeguard West Elm Creek Reservoir from development.

The City's Zoning Ordinance also addresses Tinker AFB areas. The Airport Environs Zone One (AE-1) and the Airport Environs Zone Two (AE-2) regulate development within the base's noise zones and APZs. Both zones regulate land use development, noise attenuation, and avigation easements.



The relationship between Tinker AFB and the City is excellent. The City provides relevant development packages to the Tinker Civil Engineering Directorate for review and input on a monthly basis.

MIDWEST CITY

Within Midwest City's Department of Community Development Current Planning Division, Comprehensive Planning, GIS, Engineering, and Building Inspections divisions are housed.

The Current Planning Division in Midwest City is directly responsible for overseeing residential and commercial development within the city. The Current Planning Division is also the point of contact for zoning information and requests to change the zoning of property, as well as the subdivision or the platting of property.

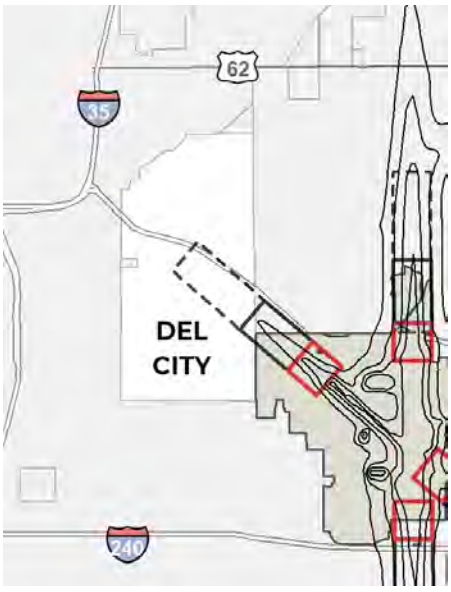
Midwest City has a Planning Commission whose members are appointed by the Mayor, approved by the City Council, and serve three-year terms. The Planning Commission has the power and duty to make and recommend to the City Council the adoption of a Comprehensive Plan and, when necessary, amendments to the plan for the development of the City. The Commission also recommends to the City Council approvals for subdivision of land within the City and acts as the Zoning Commission, making recommendations to the City Council on zoning requests.

The 2008 Midwest City Comprehensive Plan contains many references to Tinker AFB. The Land Use Plan map reflects the AICUZ APZs for both runways. Among other recommendations, the plan contains the following narrative:

- Midwest City supports land use planning efforts of the AICUZ Study and recommends that the City:
    - Continue to incorporate AICUZ policies and guidelines into the Comprehensive Plan;
    - Modify ordinances to support AICUZ Study, as deemed necessary;
    - Modify building codes to support AICUZ Study, as deemed necessary;
    - Implement height and obstruction ordinances;
    - Keep the DoD apprised of any development near Tinker AFB that may impact the program for JLUSs;
    - Inform Tinker AFB of planning and zoning decisions that have potential of affecting base operations;
    - Support the JLUS for the Tinker AFB area to protect the area from encroachment.

With respect to zoning, Midwest City has long supported Tinker AFB through the adoption of airport zoning regulations, regulation of CZ and APZ I areas, and delineation of APZs on land use plans contained in several of the City's Comprehensive Plans. As part of the City's 2008 comprehensive plan, Midwest City updated its zoning ordinances and subdivision regulations. The changes made to the airport zoning ordinance reflected JLUS recommendations that the City determined to be in the best interests of Midwest City and Tinker AFB.

As with Oklahoma City, Midwest City provides relevant development packages to the Tinker Civil Engineering Directorate for review and input on a monthly basis.



DEL CITY

The Planning and Zoning Division in Del City includes zoning, comprehensive planning, and GIS. Planning activities guide land use and facilitate new development. New development and redevelopment are managed in accordance with adopted regulations, particularly the planning and zoning ordinance and the comprehensive plan.

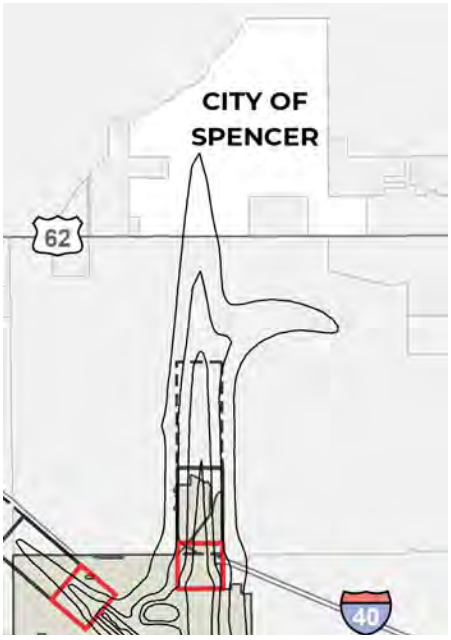
All community development activities are coordinated through the Planning and Zoning Division. This

allows integration of planning, inspections, permitting, code enforcement, and economic development. The division provides services such as:

- Processing zoning clearances for permits and business occupancy applications;
- Updating the planning and zoning ordinance;
- Processing Planning Commission applications (rezoning, lot split, plat, special use permit);
- Providing zoning information to customers;
- Updating the City's official zoning map; and
- Working to ensure compatible land use around Tinker AFB.

The Planning and Zoning Division also has responsibility for the City's stormwater management activities, including floodplain management, drainage, and stormwater quality (shared with Public Works).

The Del City Planning Commission advises the Mayor, City Council, and City Departments on issues related to development and betterment of the City as a place of residence and for business. The Commission consists of nine members, who are nominated by the Mayor and confirmed by the City Council.



Appendix A of the City's planning and zoning ordinance, adopted in 2001 and revised in 2015, designates zoning through an airport overlay district that supports development in the city compatible with Tinker AFB's aircraft operations. The City has also recently adopted an Energy Code to use in regulating noise attenuation.

CITY OF SPENCER

The City of Spencer is located approximately nine miles north of Tinker AFB in Oklahoma County. A small portion of the top of Tinker AFB's 60 DNL noise contour extends into the City of Spencer. The area within the contour is characterized primarily as low-density residential land uses with some commercial uses and public/quasi-public interspersed. Star Spencer High School is also located within the 65 DNL noise contour. All uses are considered compatible in this area.

6.3 LAND USE AND PROPOSED DEVELOPMENT

The land use compatibility analysis evaluates existing and future land uses and zoning near Tinker AFB to determine compatibility conditions. Existing land use is assessed to determine current land use activity, while future land use and zoning are used to project development and potential growth areas. Land use and zoning GIS data utilized were obtained from the information technology or GIS and planning-focused departments of Oklahoma City, Midwest City, and Del City.

In order to analyze the compatibility of nearby land uses surrounding Tinker AFB, the use of each parcel of land is characterized into the following land use categories. While the specific

categories used by each local government may vary, these generalized categories provide a starting point for each analysis. Appendix A of this study, Land Use Compatibility Tables, provides further description on the SLUCM land use categories along with notes on general compatible uses for Tinker AFB's surrounding jurisdictions. Appendix C provides a table illustrating how the local land use designations of these jurisdictions surrounding the base were consolidated into the following categories:

- Commercial: Includes offices, retail stores, hospitality/restaurants, and other types of commercial establishments.
- Industrial: Includes manufacturing, warehouses, and other similar uses.
- Public/Quasi-Public: Includes publicly owned lands and utilities and land to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
- Open/Agriculture/Low Density: Passive open space and agricultural areas.
- Recreation: Land areas designated for recreational activity, such as parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.
- Residential: Includes all types of residential activity, such as single- and multi-family residences, rural residential, and mobile homes.
- Undeveloped: Includes undeveloped parcels.
- Transportation/Utility: Includes major and minor transportation systems and areas designated to support utilities.
- Undesignated: Includes some parcels that had no indicated value or were listed as "undesignated" in the original datasets.

Existing land use and parcel data provided by local communities were evaluated to ensure an actual account of land use activity regardless of conformity to zoning classification or designated planning or permitted use. Additionally, local management plans, policies, ordinances, and zoning regulations were evaluated to determine the type and extent of land use allowed in specific areas. (For details on how the generalized existing land use layer was created, see Appendix C).

6.3.1 EXISTING LAND USES

Tinker AFB is located in a developed area within Oklahoma City, Oklahoma County. The base's associated noise zones, CZs, and APZs also span across developed areas of Midwest City and Del City to the north and northwest. A small portion of the northern tip of the noise contours crosses into the rural suburb of Spencer, Oklahoma. Most of the undeveloped lands around Tinker AFB are within Oklahoma City and lie to the south. The noise zones for Tinker AFB expand south into these undeveloped areas of unincorporated Oklahoma and Cleveland counties. Overall, the area surrounding Tinker AFB can be characterized by moderate density development with more undeveloped areas south of the base. Existing land use within the 2021 Tinker AFB AICUZ Study CZs, APZs, and noise contours for Tinker AFB are illustrated on **Figure 6-2.**

Several transportation corridors surround Tinker AFB, including major highways (I-40 and I-240) and smaller state and county highways. Areas of dense commercial land uses follow along I-40 immediately to the north of the installation. This includes major big box stores, restaurants, and associated retail and commercial businesses.

Further north (Midwest City) and northwest (Del City) of the base (northwest of Sooner Road and SE 29th Street in Del City), and northeast of S. Douglas and SE 29th Street (in Midwest City),

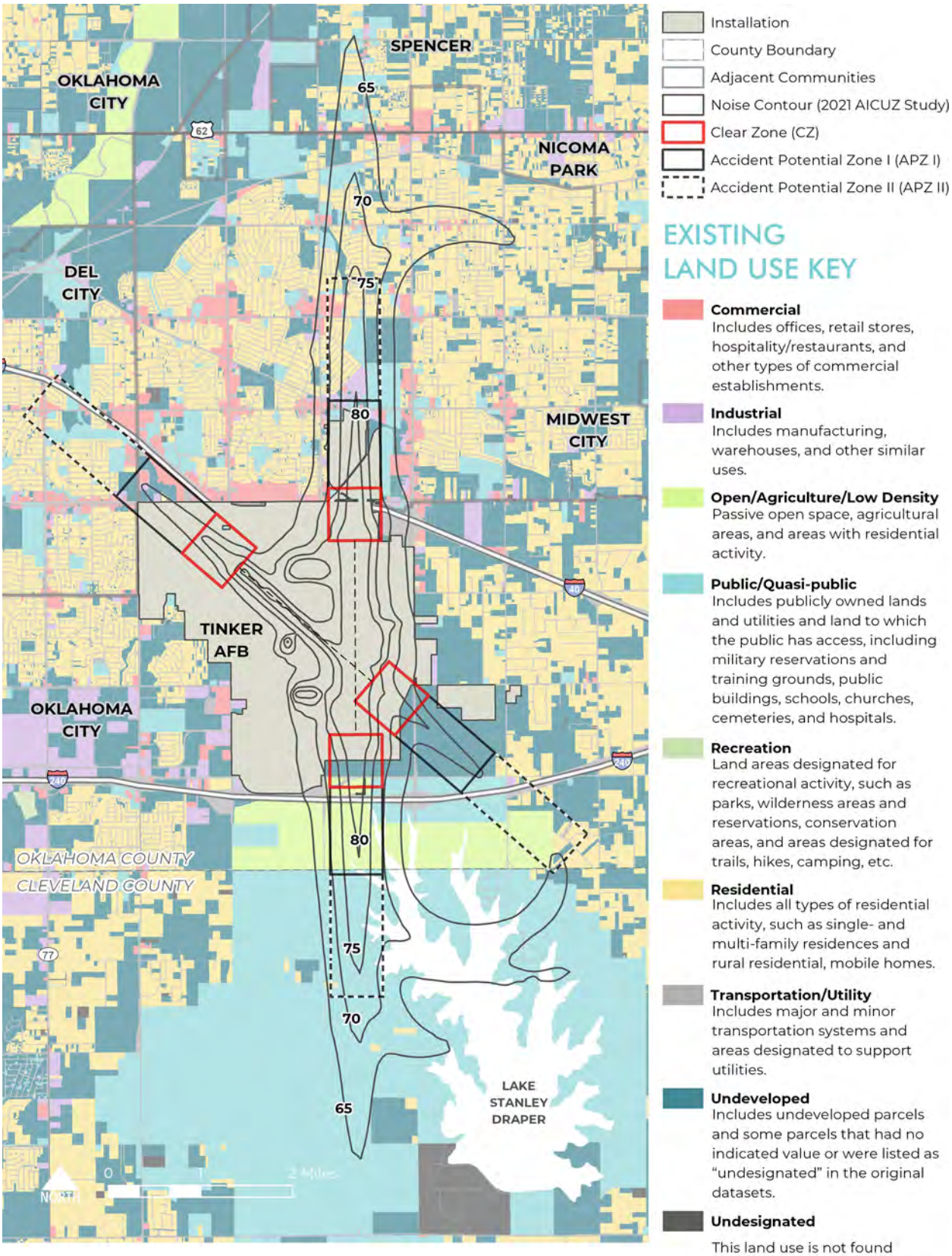


FIGURE 6-2
EXISTING LAND USE AND 2021 TINKER AFB AICUZ STUDY NOISE CONTOURS, CZS, AND APZS

Residential is the dominant land use type. Interspersed are areas of Commercial and Public/Quasi-Public (government/institutional) type land uses.

In 1973, Midwest City in conjunction with Oklahoma County, facilitated the purchase and demolition of 836 single-family homes to the immediate north of Tinker AFB. This major action resulted in relocation of approximately 2,500 people from this area and out of Tinker AFB's APZ I. That land is now under a long-term lease with Oklahoma County to ensure this important area adjacent to the installation is protected from incompatible development.

To the south in Oklahoma City and unincorporated Oklahoma County, land uses are less dense with areas of Open/Agriculture/Low density and Undeveloped land use, and areas of Single-family Residential. South of the east-west I-240 corridor, land uses include Undeveloped and Open space areas associated with land designated as Oklahoma City Water Utilities Trust lands and the 3,000-acre Stanley Draper Lake to the southeast, which is the drinking water source for Oklahoma City. This area is a designated Environmental Conservation District and buffers the installation to the south and east from any major development as there is limited infrastructure in place and development is therefore limited at this point.

To the west of Tinker AFB (west of S. Air Depot Road), several different land use types are present, including primarily Residential, Industrial, and pockets of Open/Agricultural/Low density that include Open space areas.

East of Tinker AFB (east of S. Douglas Boulevard and north of I-240), land uses are also less dense than to the north and west, and include Public/Quasi-Public (government uses associated with Tinker AFB), some Industrial land, large areas of Undeveloped land, and pockets of Residential and Low-density Rural Residential land uses.

6.3.2 CURRENT ZONING

All land surrounding Tinker AFB is zoned. **Figure 6-3** overlays the 2021 Tinker AFB AICUZ Study noise contours, CZs, and APZs with current generalized zoning in the vicinity of Tinker AFB (For details on how the generalized zoning layer was created, see Appendix C). Land surrounding Tinker AFB generally reflects and is supportive of existing land use patterns in Oklahoma City, Midwest City, and Del City.

The majority of lands surrounding the installation in Oklahoma City are primarily zoned for Residential (R-1 Residential and also include Planned Unit Developments which can be Residential and also Mixed Use), Industrial (Moderate Industrial Use) and Commercial use.

In Midwest City to the north of Tinker AFB, commercially zoned lands exist along the major corridors of I-40, 29th Street, 15th Street, Air Depot Boulevard, Douglas Boulevard, and Midwest Boulevard. Additionally, areas zoned Residential (R-1), Planned Unit Development, and Industrial are also present in proximity to the installation.

Northwest of the installation in Del City, zoning districts are primarily Commercial (Interstate Highway Commercial) and Residential (R-1 Single-family Residential). Southwest of the base, in Oklahoma City, large areas are zoned for Agricultural use and extend through Oklahoma County into Cleveland County.

Oklahoma City's zoning ordinance, under Article XIII, Zoning Overlay Districts, includes the "Airports Zoning Overlay Districts." This overlay district specifically addresses Tinker AFB, delineating development limitations in airport restriction zones. These limitations are enforced through the establishment of the AE-1 and AE-2 overlay zoning, which regulates development within the APZs and noise zones for Tinker AFB. Both overlay zones regulate land use development, noise attenuation, and avigation easements.

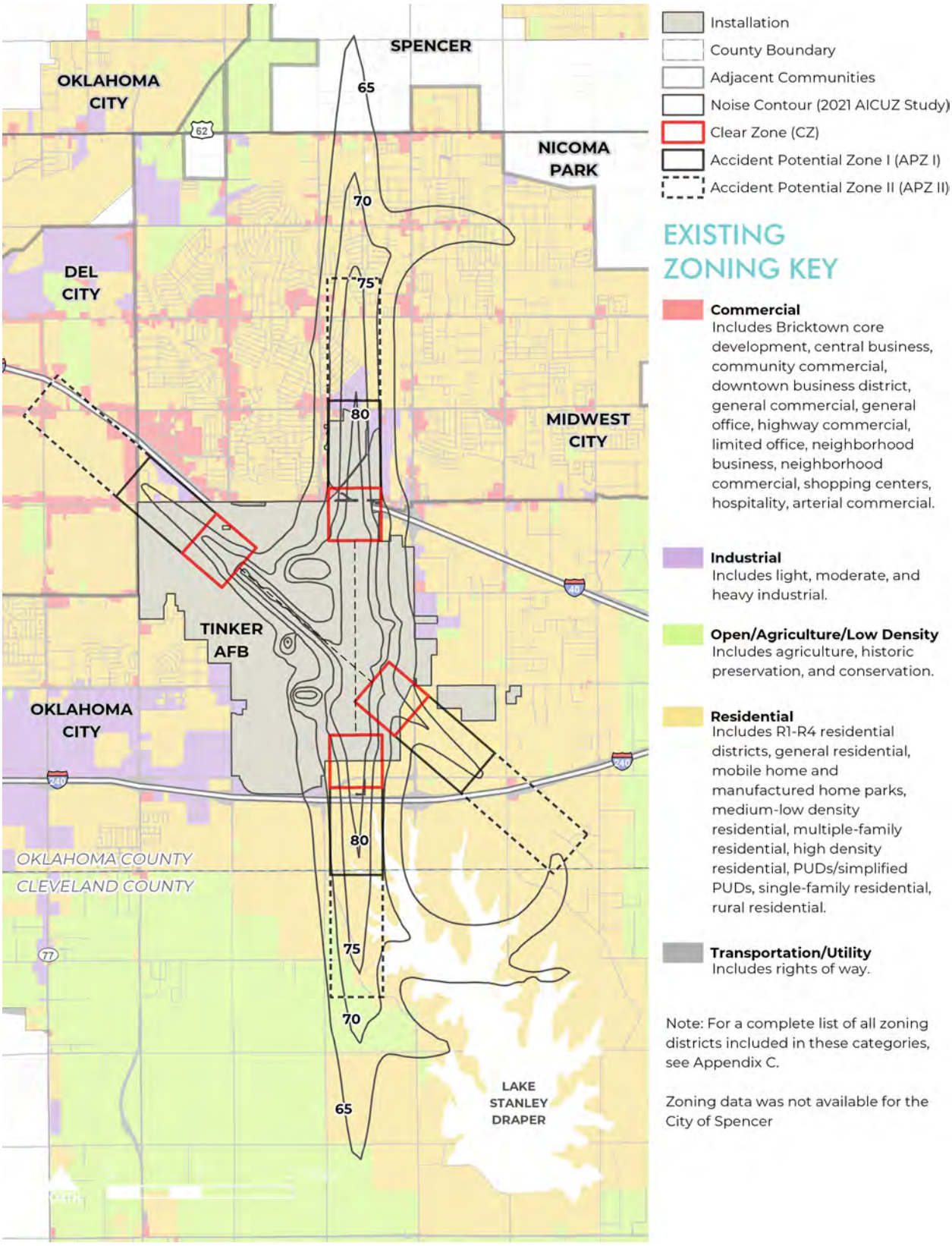


FIGURE 6-3
EXISTING ZONING AND 2021 TINKER AFB AICUZ STUDY NOISE CONTOURS, CZS, AND APZS

Midwest City has long supported Tinker AFB through the enforcement of airport zoning, land use plans, and comprehensive plans. Further, Midwest City implements a conventional zoning ordinance that contains a supplement, "Airport Zoning Ordinance, Appendix B," which is intended to both support the mission of Tinker AFB and protect the basic private property rights of its surrounding landowners. The Airport Zoning Ordinance, Appendix B, supplement contains land use compatibility guidelines (as contained in the 2006 Tinker AFB AICUZ Study). The broad guidelines in many instances require interpretation by the city to provide for functional regulations. Airport Zoning Ordinance, Appendix B, also prescribes standards that are designed to influence land use decisions. It should be noted that approximately 95 percent of the total CZ and APZ areas in Midwest City are pre-existing land use conditions. However, Midwest City's regulations ensure that pre-existing land use conditions do not expand in a manner inconsistent with specified guidelines because all new developments are subject to the Airport Zoning Ordinance, Appendix B.

Del City also implements a conventional zoning ordinance that incorporates "Appendix A" of its zoning ordinance, which designates zoning through an airport overlay district and regulates development in APZs. The ordinance supports compatible development within Tinker AFB's APZs and development compatible with overall aircraft operations. This ordinance is known as the "Tinker Air Force Base Zoning Ordinance." Flight approach zones, height limitations, airport environs, and compatible use districts and associated allowable uses with designated density and height standards that are consistent with the Air Force compatibility guidance are all defined and addressed in the ordinance. All new development in Del City is subject to the provisions of this ordinance. However, because the majority of historical flying activity at Tinker AFB had not occurred on Runway 13, land to the northwest of the airfield, in Del City, developed in large part without consideration of AICUZ compatibility guidelines. There was not a designated APZ II for Runway 13 until the 2006 AICUZ was published. While some of the land uses in this area are both incompatible and compatible with restrictions, based on current AICUZ land use recommendations, Tinker AFB does not expect (and has not requested) any structures be removed. For all intents and purposes, the land uses are considered pre-existing conditions. The recommended criteria for APZ II are intended to apply only to new development and future redevelopment. It should be further noted that the Tinker JLUS (see Appendix D) guidelines for density and Del City's interim guidelines for development within the APZ II have been used to guide development within the APZ II area since it was added.

6.3.3 FUTURE LAND USE

Figure 6-4 shows generalized future land use surrounding Tinker AFB area that was compiled from local zoning maps and comprehensive plan data. Oklahoma City and Midwest City have designated future land use areas. (For details on how the generalized future land use layer was created, see Appendix C).

In Oklahoma City, the city's comprehensive plan is used to guide future land use decisions in the city and supports and designates areas around Tinker AFB for future compatible development. The areas south and southwest of Tinker AFB are designated primarily as Industrial land use (i.e. Heavy Industrial and Employment Reserve Areas) as are areas to the west. In addition, these areas of the city are not fully served by water and sewer utilities at the present time. The industrial land use in this area avoids any future land use patterns from developing that are incompatible with aircraft operations. Land south and southeast of Tinker AFB surrounding Lake Stanley Draper is currently vacant and designated as Open/Agriculture/Low density and reserved for environmental conservation. Areas to the east fall within an industrial overlay land use type.

As a fully built out municipality, Del City does not designate future land use and is essentially consistent with existing use. Redevelopment in Del City is addressed through rezoning and enforcement of the city's zoning code and specifically as it applies to their airport overlay zoning.

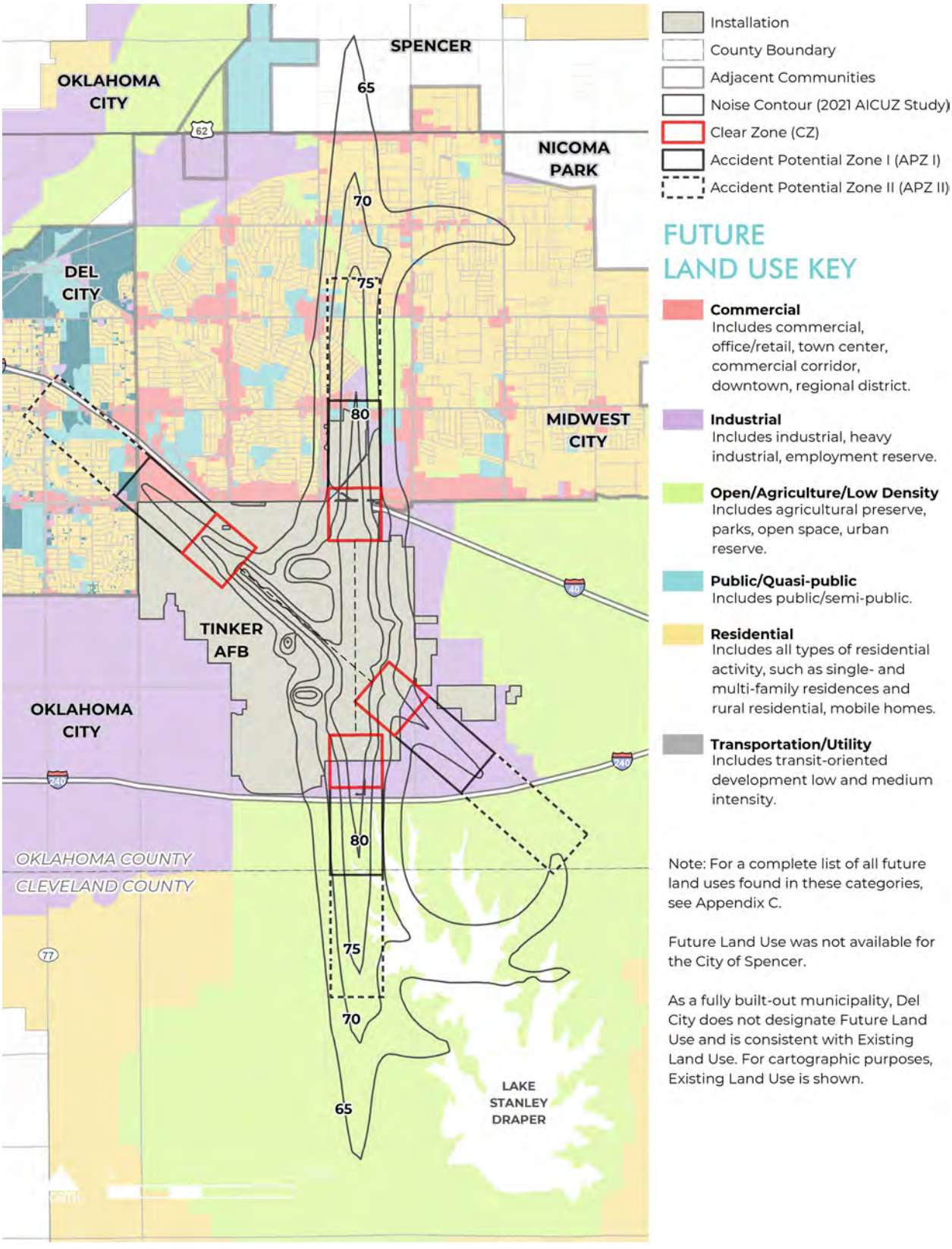


FIGURE 6-4
FUTURE LAND USE AND 2021 TINKER AFB AICUZ STUDY NOISE CONTOURS, CZS, AND APZS

It is anticipated developed areas within Midwest City and Del City will generally maintain their mixture of residential and commercial uses. Any development in these areas is expected to consist of infill and redevelopment. As a result, future land use north and northwest of Tinker AFB will continue to be consistent with and reflect existing land use patterns.

6.4 COMPATIBILITY CONCERNS

6.4.1 LAND USE ANALYSIS

Land use describes how land is developed and managed, and is characterized by the dominant function occurring within an area. To compare land use consistently across jurisdictions, this analysis uses generalized land use classifications illustrating land use compatibility across common land use types. These generalized land use categories are not exact representations of the local community's land use designations but combine similar land uses like those introduced in Section 6.3, Land Use and Proposed Development (see Appendix C).

For the purpose of this analysis, the DoD AICUZ compatibility guidelines (Tables A-1 and A-2 of Appendix A) utilize the SLUCM standards to provide generalized land use classifications. **Table 6-1** provides generalized compatibility guidelines for the SLUCM categories. Land use compatibility falls into one of four categories: (1) compatible, (2) compatible with restrictions, (3) incompatible, and (4) incompatible with exceptions. The conditionally compatible land uses (i.e., categories 2 and 4) may require incorporation of noise attenuation measures into the design and construction of structures and further evaluation to be considered "compatible" and may require density limitations for land in APZs or other modifications in order to be deemed compatible.

TABLE 6-1. GENERALIZED LAND USE CATEGORIES AND NOISE/SAFETY COMPATIBILITY

Generalized Land Use Category[3]	Noise Zone (dB DNL)								
	<65	65-69	70-74	75-79	80-84	85+	CZ	APZ I	APZ II
Residential	Yes	No[1]	No[1]	No	No	No	No	No	No[1]
Commercial	Yes	Yes	Yes[2]	Yes[2]	No	No	No	Yes[2]	Yes[2]
Industrial	Yes	Yes	Yes	Yes	Yes[2]	No	No	Yes[2]	Yes[2]
Public/Quasi-Public	Yes	Yes[2]	Yes[2]	Yes[2]	No	No	No	No	Yes[2]
Recreation	Yes	Yes[2]	Yes[2]	No	No	No	No	Yes[2]	Yes[2]
Open/ Agriculture/ Low Density	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Undesignated	Yes	No	No	No	No	No	No	No	No

Notes:
1 Incompatible with exceptions.
2 Compatible with restrictions.
3 This generalized table demonstrates the land compatibility guidelines. Refer to Appendix A for use in determining land use compatibility.

6.4.2 EXISTING LAND USE COMPATIBILITY CONCERNS

Figures 6-5 and 6-6 illustrate the compatibility of existing land use within noise contours, CZs, APZs for Tinker AFB.

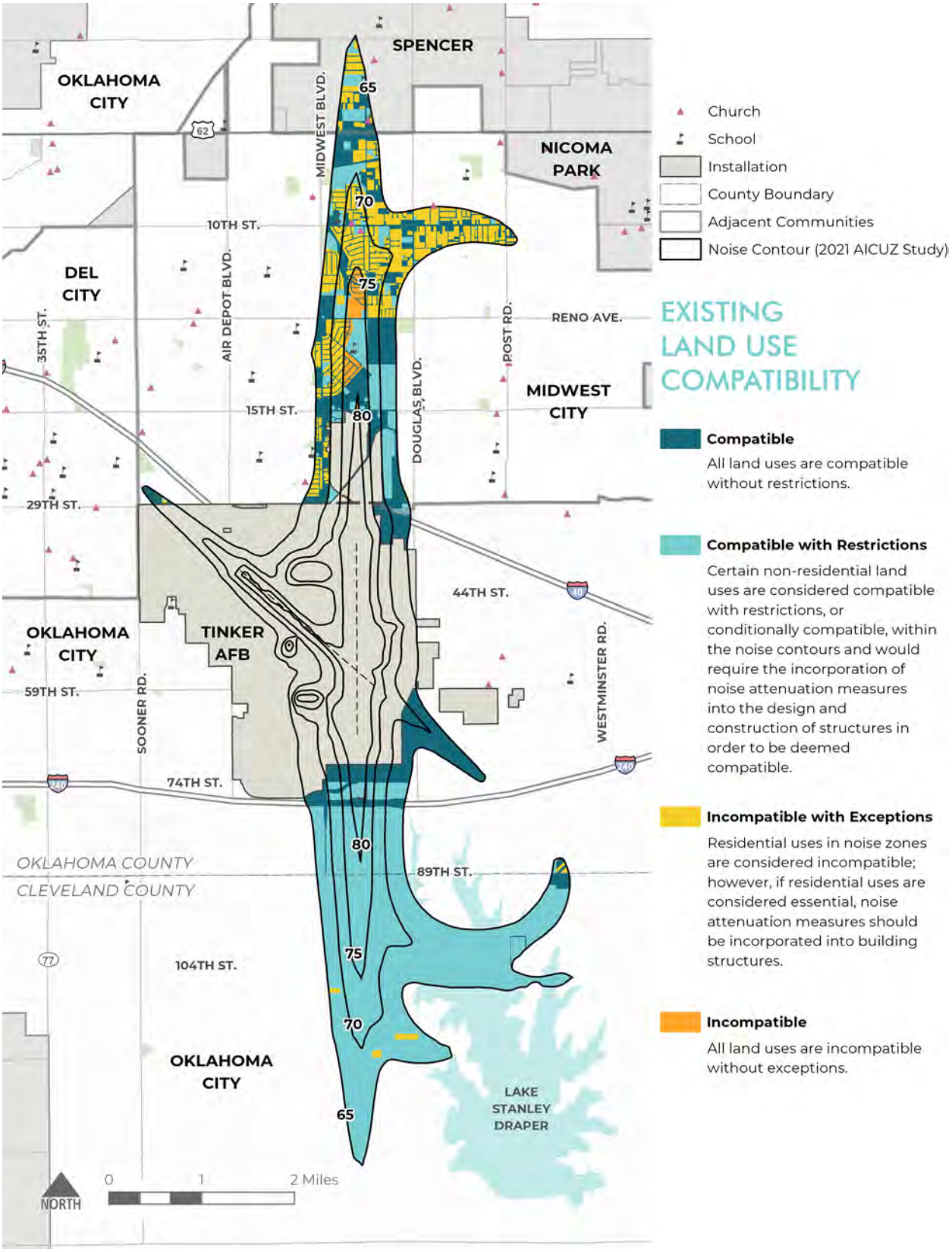


FIGURE 6-5
INCOMPATIBLE EXISTING LAND USE WITHIN NOISE CONTOURS

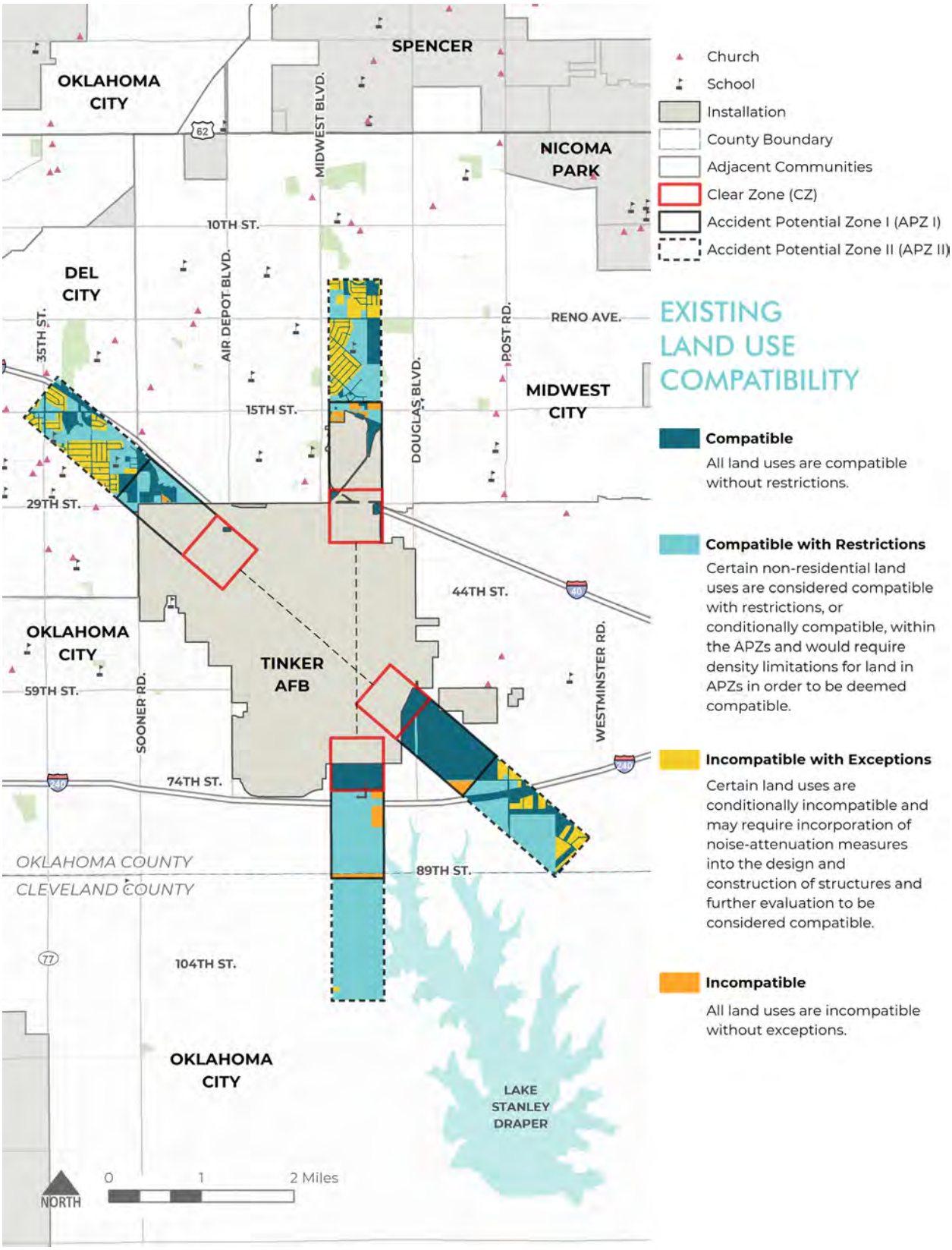


FIGURE 6-6
INCOMPATIBLE EXISTING LAND USE WITHIN CZS AND APZS

The following presents an overview of the prominent land use types and their compatibility within Tinker AFB's noise zones, CZs and APZs.

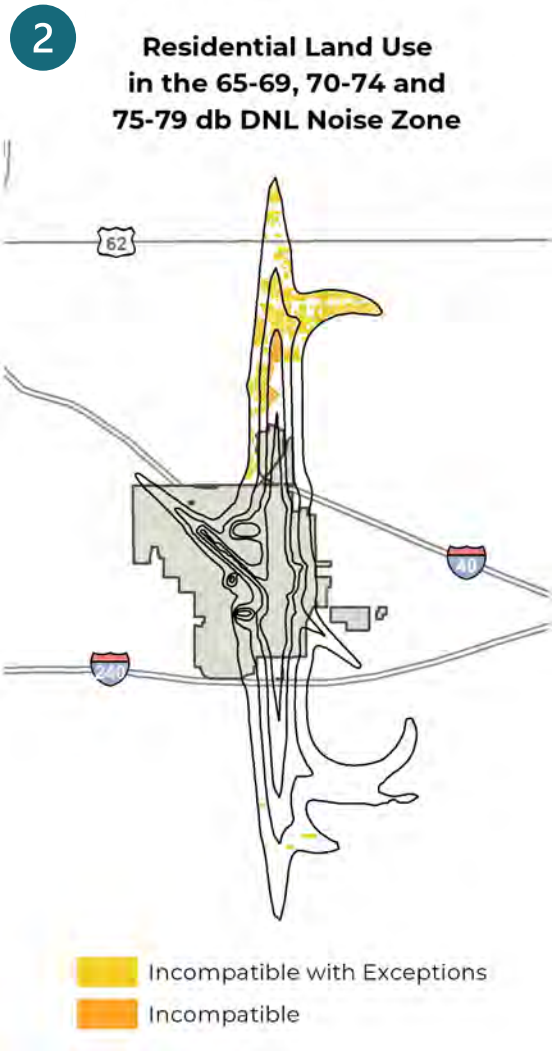
Approximately 4,500 acres (or about 80 percent) of the total acreage within the noise zones for Tinker AFB are considered compatible, including conditionally compatible (compatible with restrictions), with aircraft operations. A discussion of general land uses within the Tinker AFB noise zones, CZs and APZs, and corresponding numbered inset maps for each is provided below. Detailed analysis of the land use compatibility at each of Tinker AFB's runways is also provided below. A list of off-installation land use acreages within the noise zones by land use category are found in **Table 6-2** at the end of this section.

1

Public/Quasi-public and Open/Agriculture/Low-density in the in the 65-69, 70-74 and 75-79 dB DNL noise zones

Of the 4,500-acres that are compatible (including compatible with restrictions), 1,875 acres of land use is categorized as Public-Quasi Public in the 65-69 dB DNL noise zone, and a total of 531 and 210 acres in the 70-74 and 75-79 dB DNL noise zones, respectively, are present and considered compatible with restrictions. The vast majority of these land uses are public/institutional-type facilities owned by the various public entities in the region (e.g., Oklahoma City Water Utilities Trust) and are undeveloped and controlled through various land use instruments (i.e. long term easements). There are also , city-owned facilities (e.g., Midwest City Schools) and several religious institutions (e.g., Hillcrest Baptist Church). These uses are considered compatible with restrictions. In addition, there are approximately 440 acres of conditionally compatible (compatible with restrictions) land designated as Open/Agriculture/Low density land that is undeveloped and less than 3 acres of incompatible Public – Quasi Public land use in the 80+ dB DNL noise zone (See **inset map #1**).

2



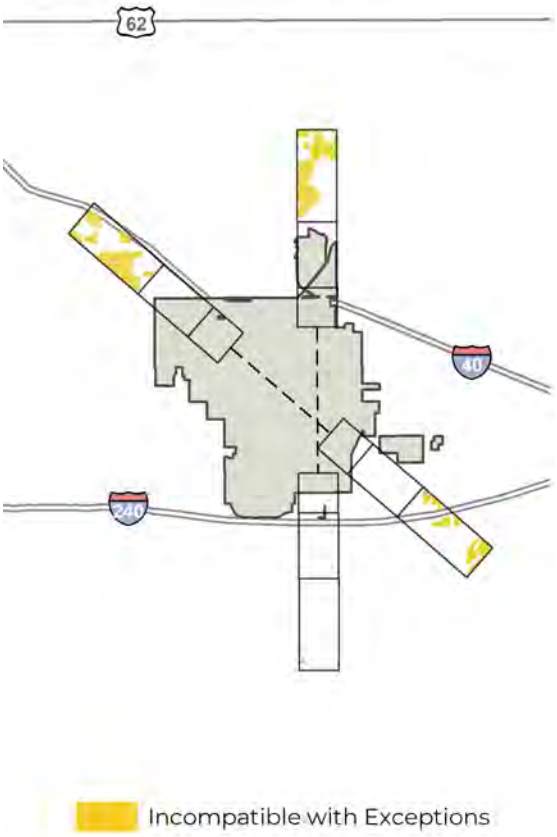
With respect to the remaining 900 acres (or 20 percent) of land use that is considered incompatible, it is noteworthy that 603 acres of Residential land use is present in the 65-69 dB DNL noise zone. Residential is the only land use type that is incompatible at noise levels between 65 and 69 dB DNL. In this zone, residential uses are incompatible. If communities cannot avoid residential noise level reduction materials must be incorporated construction or remodeling. Regardless, the DoD considers all residential uses with the 65 dB or greater noise zone incompatible with aircraft operations. An additional 221 acres of Residential land use is present in the 70-74 dB DNL noise zone (see **inset map #2**). In the 70-74 dB DNL noise zone, Residential land use is considered incompatible with exceptions and is discouraged. Lastly there are also 77 acres of incompatible Residential land use in the 75-79 dB DNL noise zone located to both the north and south of Reno Avenue in Midwest City between Midwest Boulevard and Douglas Boulevard. The vast majority of Residential land use in both of these noise zones is R-1 Single-family Residential with some smaller pockets of High-density Residential in Midwest City. Per the DoD's land use compatibility guidelines (Appendix A), allowable exceptions for Residential land use in these high-noise zones include implementing measures to achieve noise-level reduction. This land use type (Residential) accounts for approximately 16 percent of the total area encompassed by Tinker AFB's noise zones.

3

Of note within Tinker AFB's APZs are approximately 437 acres of incompatible Residential land use in APZ II for Runways 13, 31, and 18 (see **inset map #3**). This land use type is considered incompatible with exceptions--the exception being related to density of development. As mentioned previously, the overwhelming majority of Residential land use surrounding the base is R-1 Single-family Residential. Residential land uses generally are considered incompatible within APZ II if densities are greater than two dwelling units per acre. Municipal residential density requirements in R-1 zones vary and would need to be specifically assessed for compatibility in each jurisdiction against these guidelines. A list of off-installation land use acreages within the station's CZs and APZs by land use category are found in **Table 6-3** at the end of this section.

3

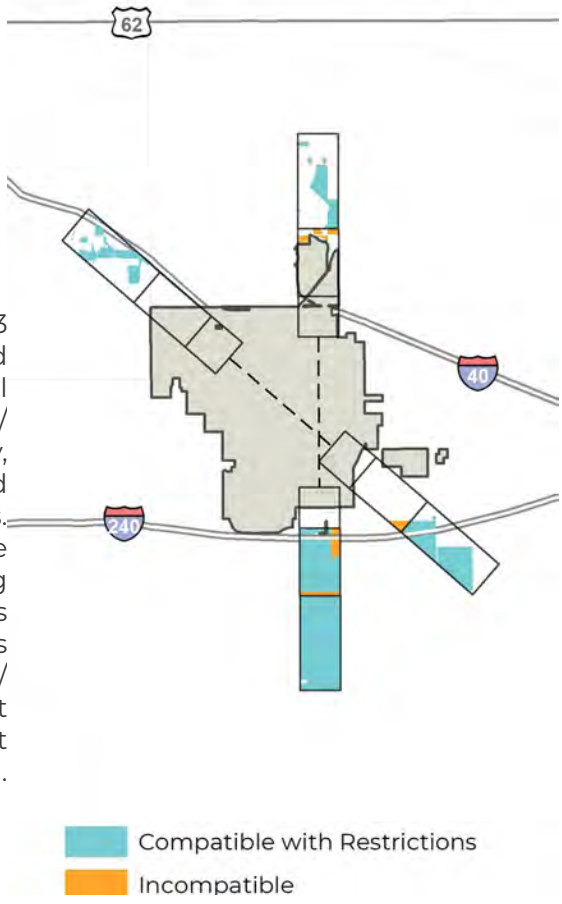
Residential Land Use Present in APZ II



As described in Section 6.3.2, development in Del City historically occurred without consideration of the DoD's land use compatibility guidelines due to limited use of Runway 13 and limited aircraft activity occurring over the city. In fact, there was no APZ II for the crosswind runway (Runway 13) until the 2006 AICUZ was published. Development in this area includes a mix of residential (R-1 single-family residential), commercial land (interstate highway commercial and arterial commercial) and right of way (Interstate 40). Commercial uses are present in the area (at Interstate 40 and S. Sooner Road), including a hotel, restaurants, and several other commercial establishments. All new infill development in the city is compliant with AICUZ land use compatibility criteria, specifically related to allowable development in APZ II for Runway 13.

4

Public/Quasi-Public and Open/Agriculture/Low-Density Land Use Present in APZ I and APZ II



In APZ I, most notably for Runway 36, a total of 113 acres of Public/Quasi-Public land use is considered incompatible (see **inset map #4**). In addition, a total of 815 and 416 acres of land use classified as Public/Quasi-public and Open/Agriculture/Low density, respectively, are within Tinker AFB's APZs. These land uses are considered compatible with restrictions. Open/Agriculture/Low density land use is compatible with restrictions, specifically as it applies to limiting activities that attract concentrations of birds creating a hazard to aircraft operations. These types of uses should be excluded. With respect to Public/Quasi-Public land use, compatibility is dependent on density and intensity of uses, where uses that promote people-intensive uses should be prohibited.

TABLE 6-2. OFF-INSTALLATION EXISTING LAND USE ACREAGE WITHIN NOISE ZONES

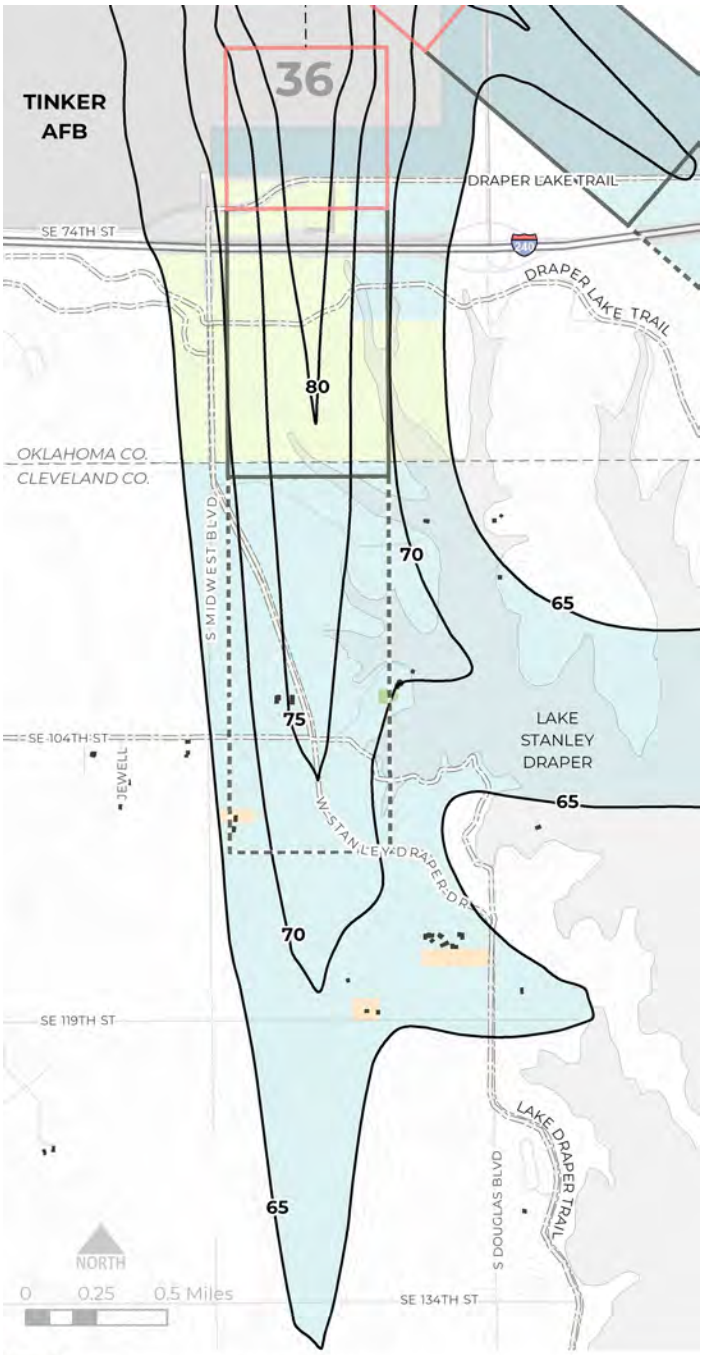
DESIGNATION	GENERALIZED LAND USE CATEGORY[1]	65-69	70-74	75-79	80+	Total
Incompatible OR Incompatible with Exceptions	Commercial					-
	Industrial					-
	Public/Quasi-Public				2.46	2.46
	Recreation					-
	Open/Agriculture/Low Density					-
	Residential	603.75	221.51	77.30		902.56
	Transportation/Utility					
Compatible OR Compatible with Restrictions	Commercial	116.12	24.40	4.70		145.22
	Industrial	38.25	18.38	41.75	0.46	98.84
	Public/Quasi-Public	1,874.87	531.75	210.85		2,617.47
	Recreation	3.77	1.86			5.63
	Open/Agriculture/Low Density	146.15	122.33	133.09	39.34	440.91
	Residential					-
	Transportation/Utility	294.85	121.00	49.24	14.05	479.14
	Undeveloped	502.38	157.95	35.04	21.89	717.26
Subtotals	Incompatible	603.75	221.51	77.30	2.46	905.02
	Compatible	2,976.39	977.67	474.67	75.74	4,504.47
		3,580.14	**1,199.18**	**551.97**	**78.20**	**5,409.49**

Notes:
All noise zones on Tinker AFB are excluded from the acreage counts.
[1] Refer to Appendix A for details.

TABLE 6-3. OFF-INSTALLATION EXISTING LAND USE ACREAGE WITHIN CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

DESIGNATION	GENERALIZED LAND USE CATEGORY[1]	CZ	APZ I	APZ II	Total
Incompatible OR Incompatible with Exceptions	Commercial				-
	Industrial				-
	Public/Quasi-Public		113.32		113.32
	Recreation				-
	Open/Agriculture/Low Density	20.47[2]			20.47
	Residential		3.76	437.89	441.65
	Transportation/Utility				-
	Undeveloped				-
Compatible OR Compatible with Restrictions	Commercial		54.79	72.86	127.65
	Industrial		26.63	53.18	79.81
	Public/Quasi-Public			815.19	815.19
	Recreation				-
	Open/Agriculture/Low Density		265.86	150.79	416.65
	Residential				-
	Transportation/Utility	32.47	82.47	206.44	321.38
	Undeveloped	117.67	392.85	196.36	706.88
Subtotals	Incompatible	20.47	117.08	437.89	575.44
	Compatible	150.14	822.60	1,494.82	2,467.56
	TOTAL	**170.61**	**939.68**	**1,932.71**	**3,043.00**

Notes:
All Clear Zones and Accident Potential Zones on Tinker AFB are excluded from the acreage counts.
[1] Refer to Appendix A for details.
[2] Although Open/Agriculture/Low Density land use is present within the CZ, this area of the CZ is vacant and under land use controls and considered compatible with aircraft operations.



Noise Contour (2021 AICUZ Study)
Clear Zone (CZ)
Accident Potential Zone I (APZ I)
Accident Potential Zone II (APZ II)

EXISTING LAND USE KEY

- Industrial
- Residential
- Open/Agriculture/Low Density
- Transportation/Utility
- Public/Quasi-public
- Undeveloped

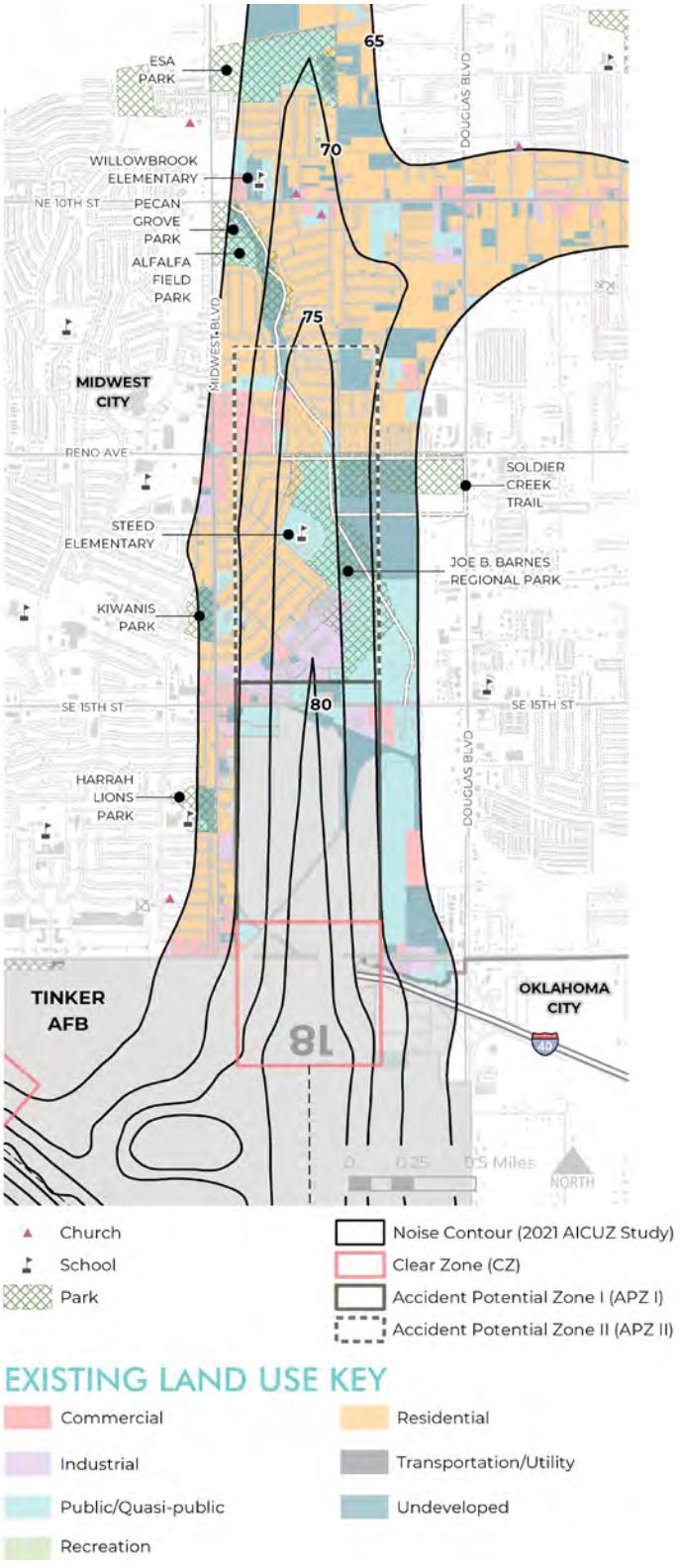
The following presents additional detailed analysis of land uses and compatibility proximate to each of Tinker's runways ends within and around the installations noise zones, CZs and APZs. When discussing land use compatibility, it is important that the analysis focuses on areas impacted but also goes beyond the noise contours and CZ and APZs and touches the adjacent areas of influence.

RUNWAY 36

In further assessing off-installation land use compatibility, it can be seen from the inset that the majority of the off-base lands within the noise contours, CZs and APZs for Runway 36 are designated as Undeveloped, Open/Agriculture/Low density and/or Public/Quasi-Public. A small piece of the Runway 36 CZ extends off base but uses beneath this area as well as the vast majority and all of APZ I are undeveloped and are compatible with Tinker's aircraft operations. Land in APZ I is vacant land owned by OKC Water Utilities Trust and provides a buffer from any development to the base. In addition, all of the land in the area is owned by either the federal government and/or Oklahoma City (or one of its trusts) and is covered by recorded land instruments (i.e. easements) which control any incompatible development. Interstate 240 also bisects APZ I for Runway 36. This use is compatible with restrictions in APZ I, as long as no above ground passenger terminals and no above ground power transmission or distribution lines are present along the highway.

Most land uses in the CZs, especially people-intensive land uses, are considered incompatible with military aircraft operations, and the CZs should remain free of any structure or potential obstructions per Air Force AICUZ compatibility guidelines.

The Air Force traditionally acquires CZs in fee or controls them through restrictive easements so they are clear of both vegetation and development. The land area within the CZs for Runways 36, 31 at Tinker AFB are vacant and controlled by various land control instruments and easements and under the ownership of either the federal government and/or the City of Oklahoma City Water Utilities Trust. However, Tinker AFB should consider purchasing the land in these CZs in fee so that its fence line might be extended to encompass its CZs for these runways and any future development fully controlled in perpetuity.

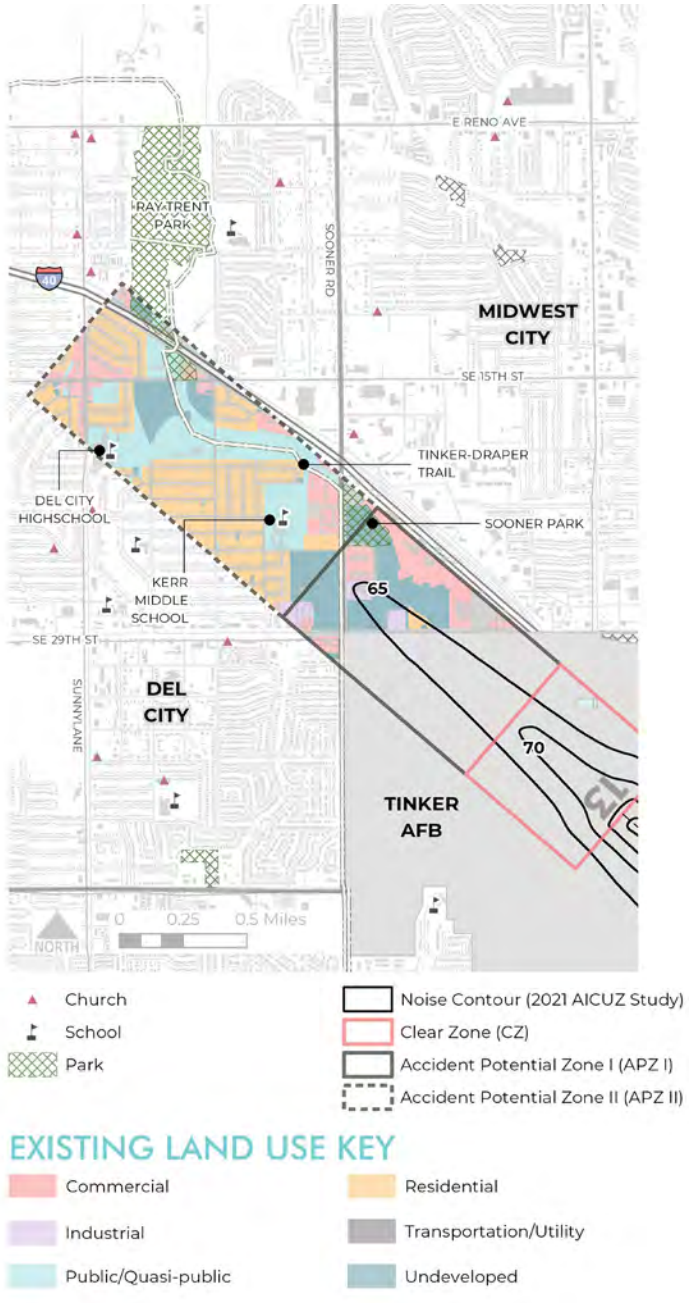


RUNWAY 18

The entire CZ, majority of APZ I and <80 dB DNL noise zone for Runway 18 fall within vacant Tinker AFB controlled property to the north of the base (as discussed in Section 6.3.1). These areas all considered compatible with Tinker's aircraft operations. The east-west Interstate 40 also traverses the Runway 18 CZ. Highways are discouraged but considered compatible with restrictions in the CZ and should not be wider than two lanes and violate obstacle clearance criteria.

Within APZ I the land use shown as Public Quasi-Public land use is almost entirely vacant land. There is a golf course present and an electric substation located along the north and south sides of SE 15th Street, respectively. These uses are located among otherwise vacant land in this area. The dominant land use in APZ II for Runway 18 is Single-family Residential uses in Midwest City. Pockets of Industrial land use are also present along SE 15th Street. Most Industrial land uses are considered compatible in this area. Residential uses within APZ II are compatible with restrictions as long as they do not exceed two dwelling units per acre in density. However, it should be noted many of the Single-family Residential uses surrounding Tinker AFB are above the recommended density level. Additionally, Residential uses in the 75-79 dB DNL noise zone are considered incompatible. There are also schools in this area. Steed Elementary School for example is located within APZ II and the 75-79 dB DNL noise zone for

Runway 18 and Willowbrook Elementary is located in 65-69 dB DNL noise zone. There are also community parks and trails (Joe B. Barns Regional Park and Soldier Creek Trail) throughout the area. Religious activities (churches), educational services (schools), and other types of gathering places are considered people-intensive land uses and incompatible within APZs. Parks are considered compatible with restrictions. They must be low intensity and not include playgrounds..

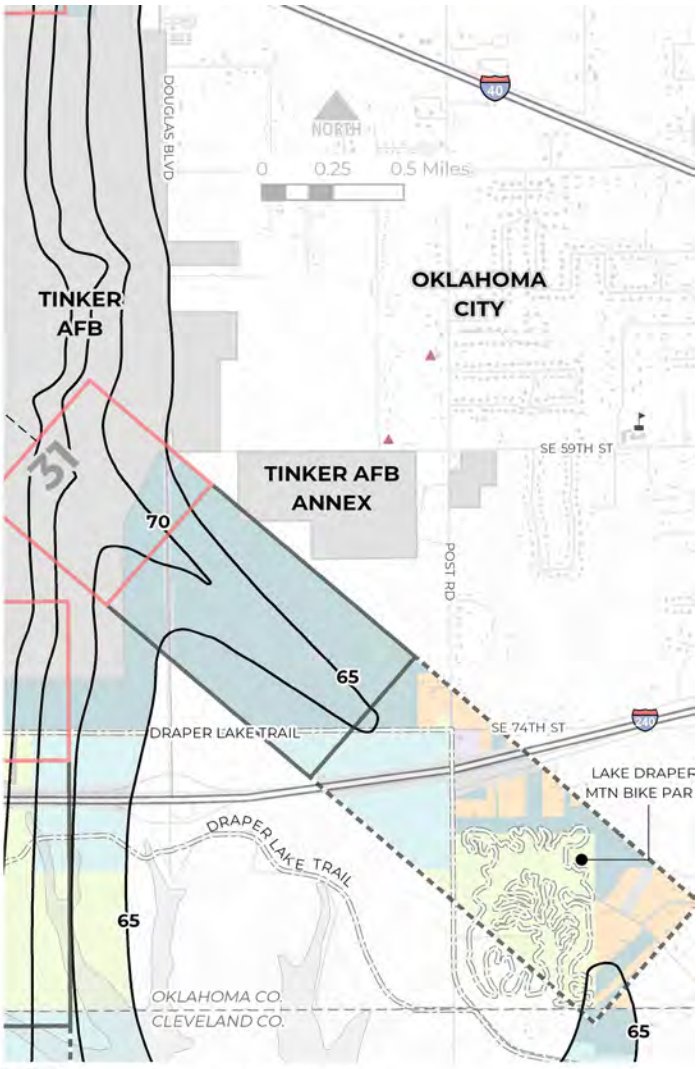


RUNWAY 13

The noise contours northwest of the base for Runway 13 extend very minimally outside the base boundary into Midwest City. The CZ and approximately half of APZ I are also contained within the base boundary. A large swath of Undeveloped land is present within APZ I and a portion of APZ II for Runway 13 southwest of a commercial area along Interstate 40. This Undeveloped land is considered compatible with aircraft operations. APZ II for Runway 13 is primarily located in Del City. Sooner Park, a portion of Ray Trent Park and the Tinker-Draper Trail traverse within both APZ I and II. As mentioned previously, Parks are considered compatible with restrictions.

Land uses within and surrounding APZ II for Runway 13 include Single-family Residential and Public/Quasi Public uses. Residential uses within APZ II are compatible with restrictions as long as they do not exceed two dwelling units per acre in density. The density of the housing in this area exceeds this minimum requirement. There are also several commercial uses located within APZ II near Sooner Road and Interstate 40, including hotels (Candlewood Suites and Springhill Suites), a shopping center with several retail stores and restaurants. Hotels, shopping centers and restaurants are incompatible within APZ II.

Of particular note within APZ II for Runway 13 is Kerr Middle School, Del City High School and their associated recreation fields. As mentioned previously, schools and other types of gathering places are incompatible within APZs.



Noise Contour (2021 AICUZ Study)
Clear Zone (CZ)
Accident Potential Zone I (APZ I)
Accident Potential Zone II (APZ II)

EXISTING LAND USE KEY

- Industrial
- Residential
- Open/Agriculture/Low Density
- Transportation/Utility
- Public/Quasi-public
- Undeveloped

RUNWAY 31

As the inset map shows, the majority of the CZ for Runway 31 is contained within the Tinker AFB boundry. Outside of the boundary, the Runway 31 CZ and all of APZ I falls within Undeveloped land, which is compatible with aircraft operations. The 65-69 dB DNL noise zones for Runway 31 extend offbase to the southeast about one mile also primarily over Undeveloped land use. Interstate 240 bisects APZ II and is consisered compatible.

The majority of land uses in APZ II are designated as low density and include a mix of Residential, Public/Quasi Public and Undeveloped lands. There are also a handful of Industrial and Commercial uses located in the vicinity of SE 74th Street and South Post Road. Despite this, almost all of APZ II is vacant and compatible with aircraft operations.

Lake Draper Mountain Bike Park is located in southeastern corner of APZ II along South Post Road and Highland Boulevard. The park includes multiple mountain bike trails. Parks are considered compatible with restrictions. They must be low intensity and not include playgrounds.

6.4.3 FUTURE LAND USE COMPATIBILITY CONCERNS

Future Land Use within Noise Contours, CZs and APZs are presented in compatibility overview **Figure 6-7 and 6-8** and the acreages by future land use type and their associated compatibility tabulated in **Tables 6-4 and 6-5**. The existing land uses discussed in Section 6.4.2 are generally similar to the future land use classifications for the land surrounding Tinker AFB; therefore, many of the compatibility classifications for specific uses are similar to the previous existing land use analysis. Oklahoma City and Midwest City have future land use data; Del City does not. Consequently, Del City data are not included in this analysis or on the compatibility figures.
Future land use designations in Oklahoma City are broadly characterized as urban low intensity and rural medium intensity, and do not differ substantially from current land use conditions in the City. Because the vast majority of the designated future residential land use in Oklahoma City is designated as low-to-medium intensity, it is unlikely that land use and subsequent development will vary greatly in the future around Tinker AFB and increase incompatibility.

In Midwest City, future uses are generally consistent with current land use. Most land use is compatible or compatible with restrictions, with the exception being the incompatible residential areas north of Runway 18 that are located in the higher noise zones (i.e. 75-79 dB DNL noise zone).

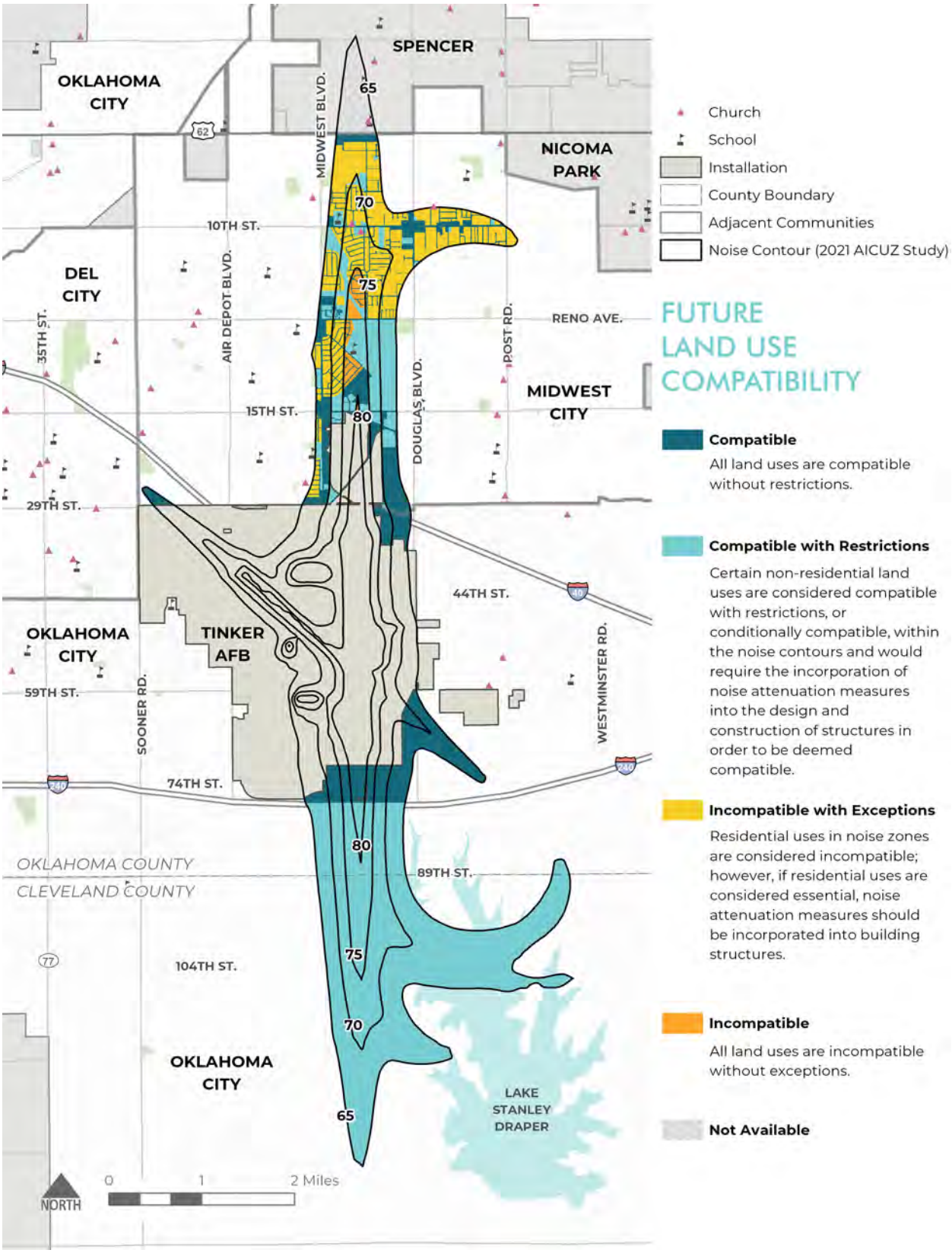


FIGURE 6-7
INCOMPATIBLE FUTURE LAND USE WITHIN NOISE CONTOURS

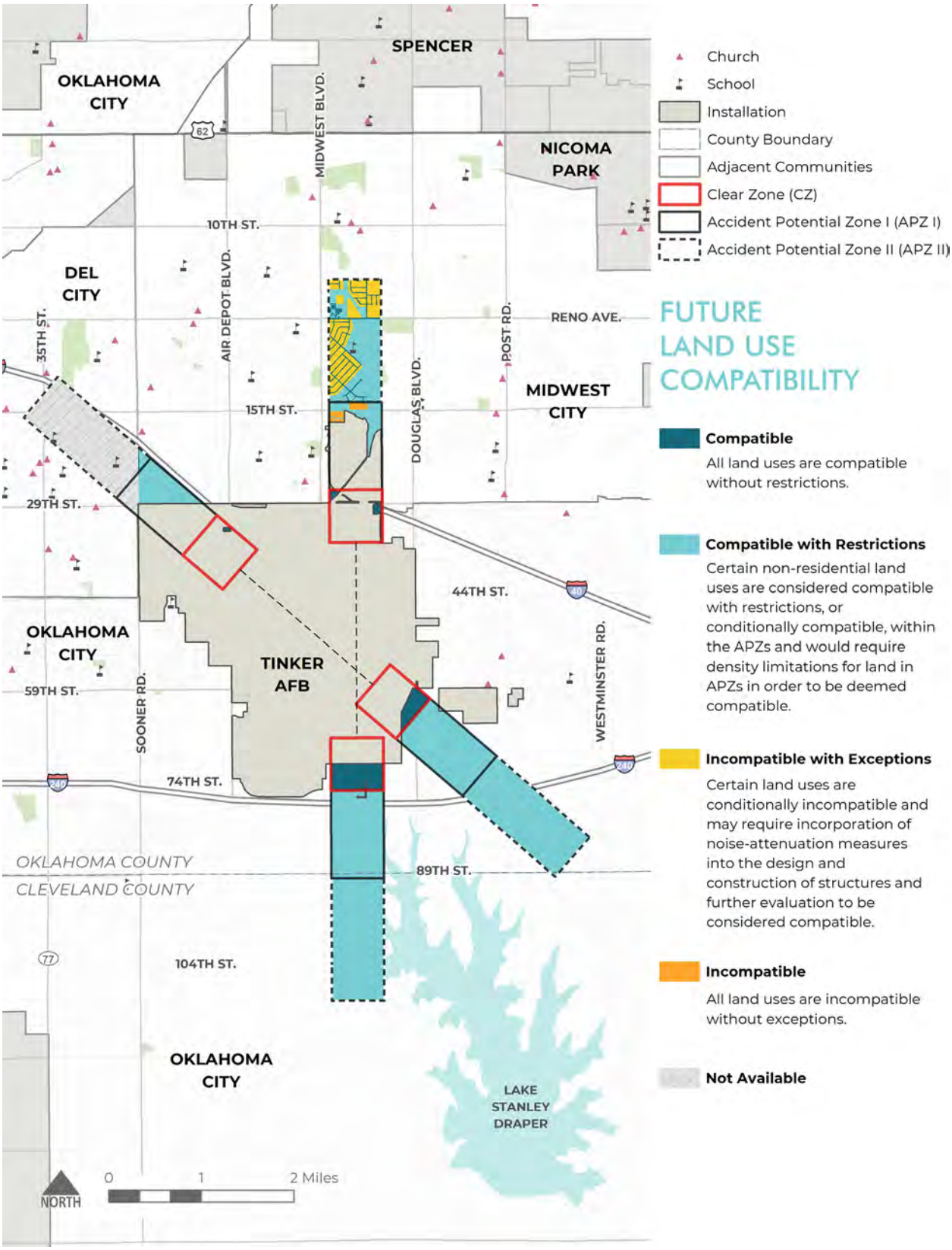


FIGURE 6-8
INCOMPATIBLE FUTURE LAND USE WITHIN CZS AND APZS

TABLE 6-4. OFF-INSTALLATION FUTURE LAND USE ACREAGE WITHIN NOISE ZONES

DESIGNATION	GENERALIZED LAND USE CATEGORY[1]	65-69	70-74	75-79	80+	Total
Incompatible OR Incompatible with Exceptions	Commercial				0.39	0.39
	Industrial					-
	Public/Quasi-Public				1.77	1.77
	Recreation					-
	Open/Agriculture/Low Density					-
	Residential	674.41	250.74	73.72		998.87
	Undesignated					-
	Transportation/Utility					-
Compatible OR Compatible with Restrictions	Commercial	208.39	30.69	12.43		251.51
	Industrial	348.12	143.37	93.79	44.75	630.03
	Public/Quasi-Public	78.60	34.67	12.52		125.79
	Recreation					-
	Open/Agriculture/Low Density	1,932.54	665.43	327.70	28.08	2,953.75
	Residential					-
	Transportation/Utility	168.44	74.27	31.82	3.22	277.75
No Data – Del City / Spencer						169.62
Subtotals	Incompatible	674.41	250.74	73.72	2.16	1,542.49
	Compatible	2,736.09	948.43	478.26	76.05	3,697.51
		3,410.50	**1,199.17**	**551.98**	**78.21**	**5,409.48**

Notes:
All noise zones on Tinker AFB are excluded from the acreage counts.
[1] Refer to Appendix A for details.

TABLE 6-5. OFF-INSTALLATION FUTURE LAND USE ACREAGE WITHIN CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

DESIGNATION	GENERALIZED LAND USE CATEGORY[1]	CZ[2]	APZ I	APZ II	Total
Incompatible	Commercial	0.40			0.40
	Industrial	159.66			159.66
	Public/Quasi-Public	4.07	22.66		26.73
	Recreation				-
	Open/Agriculture/Low Density				-
	Residential			188.58	188.58
	Transportation/Utility				-
Compatible	Commercial		138.46	28.61	166.07
	Industrial		407.28	145.58	552.86
	Public/Quasi-Public			21.54	21.54
	Recreation				-
	Open/Agriculture/Low Density		310.11	1018.05	1,167.75
	Residential				-
	Transportation/Utility	6.47	26.96	56.33	89.76
No Data – Del City / Spencer					509.06
Subtotals	Incompatible	164.15	22.66	188.58	1,025.64
	Compatible	6.47	882.81	1,270.11	2,159.39
	TOTAL	**170.60**	**905.47**	**1,458.69**	**3,043.82**

Notes:
All noise zones on Tinker AFB are excluded from the acreage counts.
[1] Refer to Appendix A for details.
[2] Although Commercial, Industrial and Public/Quasi Public land uses are present in the CZ, this area of the CZ is vacant and under land use controls and considered compatible with aircraft operations.

6.4.4 FUTURE GROWTH AREAS AND POTENTIAL DEVELOPMENT PROJECTS AROUND TINKER AFB

Areas that are proximate to an air installation but fall outside the formally designated AICUZ and where AICUZ-focused land use planning recommendations and guidelines are not formally applied are sometimes referred to as "white spaces." These large areas exist in all regions around bases where land development rules vary, regulatory authority is broad, and long-term development strategies do not necessarily consider AICUZ concepts--but their potential impact on mission is real.

Future projects--both in the white spaces and within the designated AICUZ--in the region of influence surrounding Tinker AFB that are, or were at one time, planned and that warrant attention from a land use compatibility standpoint include the following (these projects are also shown on **Figure 6-9**):

OKLAHOMA COUNTY:

Kickapoo Turnpike, between Interstate 40 and Interstate 44 in Eastern Oklahoma. Oklahoma County is closely watching how a 21-mile north-south turnpike (approximately 8 miles to the east of Tinker AFB) develops and how much associated infrastructure and follow-on development it attracts. Little to no infrastructure is currently in place in these unincorporated areas of Oklahoma County. The $300 million, 21-mile tollway loop, called Kickapoo Turnpike, will link Interstate 40 and Interstate 44 in eastern Oklahoma County, providing an alternative route to Tulsa that will ease congestion on busy Interstate 35. Construction on the interchange began in 2018, and the entire turnpike is expected to be complete by 2021. Although this area is outside of Tinker AFB's APZs and noise zones, it bears watching as a potential future growth corridor proximate to the installation.

MIDWEST CITY/OKLAHOMA CITY:

1 3 **Commuter Rail line, Station, and Mixed-Use Development**. One of several proposed rail corridors to improve connections among the region's growth centers is the Midwest City/Tinker AFB Corridor, a 10-mile east-west corridor that would connect downtown Oklahoma City to Midwest City and Tinker AFB (see **Figure 6-9**).

The eastern portion of the corridor is near Runway 18 and would potentially overlap with the 65-70 dB DNL noise zone and be just outside of APZ I. The proposed project also would likely include a rail station and mixed-use development in the area that would be compatible in the 65-70 dB DNL noise zone.

2 **Palmer Loop Trail.** Palmer Loop Trail is a proposed 2.7-mile shared-use trail that would follow the outside perimeter of APZ I at the end of Runway 18, within the 65-69 dB DNL noise zone. The trail is intended to provide a connection point for both north-south and east-west trails, as well as nine other trails within the Midwest City trail system. Identified as a high priority among over 35 miles of proposed trails in the 2009 Midwest City Trails Master Plan and Implementation Study, the Palmer Loop Trail would consist of two segments. To the north, the trail would be connected by the existing Rail-with-Trail (i.e., trail adjacent to a railroad corridor). To the south, the trail would include a segment subject to airport zoning.

The west side would connect to the Rail-with-Trail, cross 15th Street, and continue parallel to APZ I to Palmer Drive. The trail would then continue parallel to Palmer drive and connect with

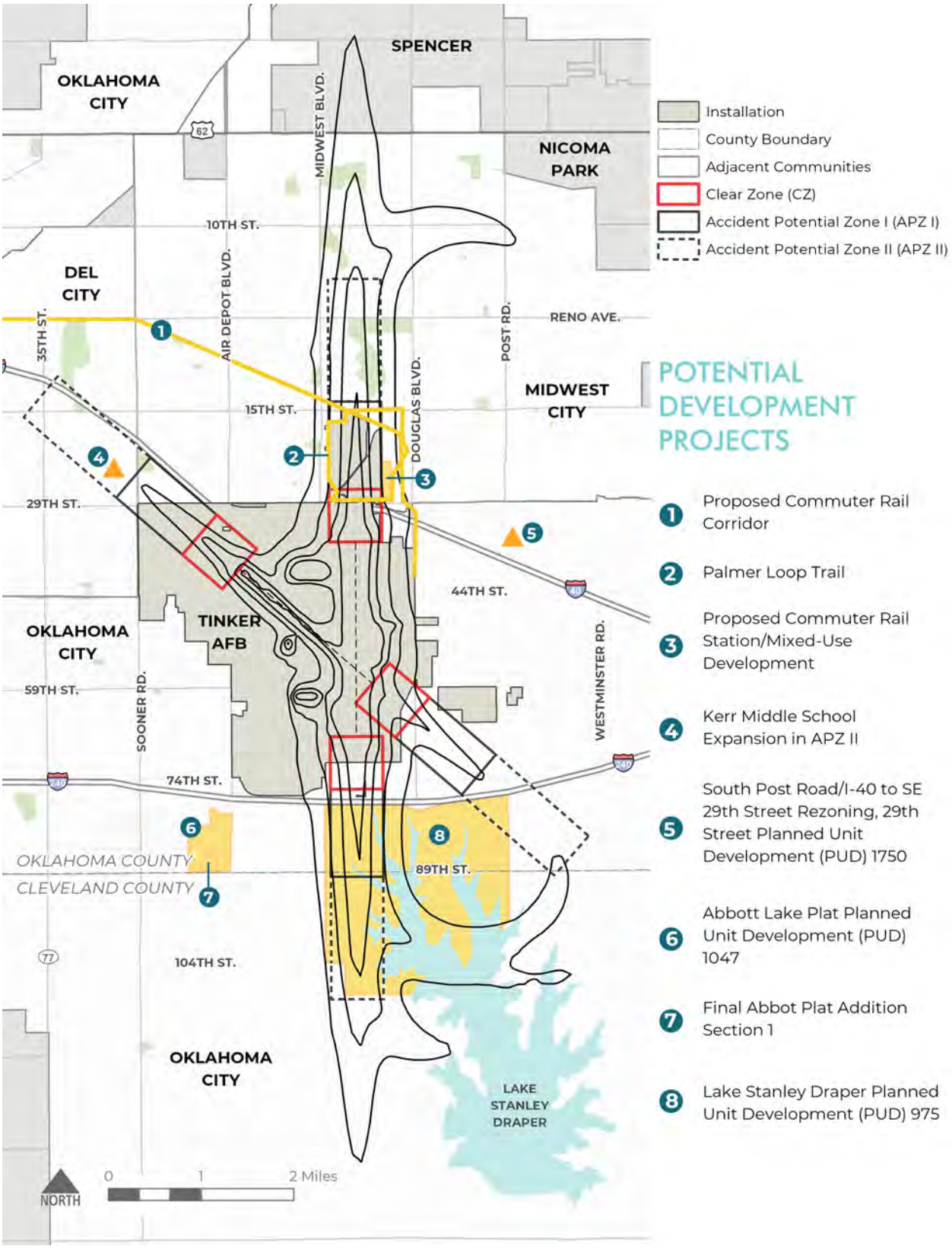


FIGURE 6-9
FUTURE DEVELOPMENT PROJECTS AROUND TINKER AFB

another proposed trail at 29th Street. In 2014, Midwest City received just over $1.7 million in federal grants to extend the city's existing seven miles of trail to 11 miles of trail.

Palmer Loop--the portion following the outside perimeter of APZ I near Palmer Drive--is one of the areas proposed to receive a new 10-foot-wide trail. This new segment would start at the existing Soldier Creek trail network.

DEL CITY:

4 **School Expansion/Consolidation - Kerr Middle School in APZ II (closing Del Crest Middle School).** The Midwest City-Del City School District is moving forward with a $26.5 million consolidation plan that calls for closing two middle schools and expanding, renovating, and renaming two others. Most impactfully for Tinker AFB, Del Crest Middle School in Del City is set to close in Summer 2020. Del Crest students will move to Kerr Middle School, which is located in APZ I, by the 2020-2021 school year. As part of this plan, the school district will bring in four temporary portable classroom buildings, with two classrooms in each, for a total of eight additional classrooms. It should also be noted that in the fall of 2020, Jarman Middle School will be joined with Monroney Middle School to become Midwest City Middle School. The new consolidated school in Midwest City is Moroney Middle on E. Reno Avenue. The new consolidated school is outside of Tinker's APZ I for Runway 18 but a portion of the school would be within the 65-70 dB DNL noise zone. It is recommended that Tinker AFB and local school districts coordinate on future school consolidation plans to ensue schools are not impacted in a negative way.

Rendering of the new Del City Middle School.

OKLAHOMA CITY:

5 **South Post Road/I-40 to SE 29th Street Rezoning, 29th Street Planned Unit Development (PUD). (PUD 1750).** This project is a proposed map amendment to the comprehensive plan, changing the designation of the property from rural medium district to urban low intensity in an area located south of SE 29th Street and east and west of S. Post Road. This change would permit commercial and residential development in this area. Oklahoma City planning staff notified Tinker AFB of the proposed rezoning, and it was determined that there were no issues with the proposed uses related to height and density and no overall conflict with aircraft operations. The Oklahoma City Planning Commission approved the application for amendment in 2020.

6 **Abbott Lake Plat, PUD 1047 (2004).** This is an older proposed residential PUD located southwest of Tinker AFB. The PUD consists of approximately 177 acres and is located south of Interstate 240 and west of S. Air Depot Road on the Oklahoma/ Cleveland County border. The property is currently vacant. The site plan calls for industrial, commercial, and residential development areas and commercial with internal street connections. The location of the proposed PUD is located is outside of designated high-noise zones and APZs, however, it is proximate to the installation and if developed, should be monitored for compatible development.

7 **Final Abbot Plat Addition Section 1 (2020).** This is a smaller area within the original PUD 1047 (discussed above) that is proposed for single- family residential use west of Abbot Lake. The site is proximate to Tinker AFB but outside of high-noise zones and Oklahoma City's AE-2 zoning district.

Lake Stanley Draper, PUD 975 (2008). This older proposal focuses on development on 2,200 acres of property at the north end of Lake Draper. Redevelopment plans call for future

8 recreational and retail development. The project would seek to attract private investors to develop these proposed recreational facilities for development such as a golf course, campground, and marina. Existing zoning of the 2,200 acres is R1 single-family residential and PUD. The PUD is south of the end of Runway 36 and as such is bisected by APZs I and II and is within the 65-70 and 70-75 dB DNL noise zones. Depending on uses that ultimately evolve and are considered for development, compatibility would need to be assessed. Golf courses, campgrounds, and marinas are considered conditionally compatible in APZs and high noise zones.

7 IMPLEMENTATION

Implementation of this 2021 Tinker AFB AICUZ Study must be a joint effort between Tinker AFB and the surrounding communities. This AICUZ Study provides the best source of information to ensure land use planning decisions made by local municipalities are compatible with a future installation presence. This chapter discusses the roles of all partners in the collaborative planning process.

7.1 MILITARY ROLE

The goal of the AICUZ Program is to assist local, regional, state, and federal officials in protecting the public health, safety, and welfare by promoting long-term land use compatible with military operations, and to protect Air Force operational capability from the effects of incompatible land use. This program helps mitigate noise and safety concerns for the surrounding communities and advises these communities about potential impacts from flight operations on the safety, welfare, and quality of life of their citizens. The Air Force promotes compatible partnerships between its installations and surrounding communities by being a good neighbor.

U.S. AIR FORCE

Tinker AFB is responsible for flight safety, noise abatement, and participation in existing local jurisdictional land use planning processes as part of its AICUZ Program responsibilities. Air Force policies and guidance require that installation leadership periodically review existing practices for flight operations and evaluate these factors in relationship to populated areas and other local situations.

Tinker AFB will:

- Ensure that, wherever possible, air operations planners route flights over sparsely populated areas to reduce the exposure of lives and property to a potential accident.
- Periodically review existing traffic patterns, instrument approaches, weather conditions, and operating practices and evaluate these factors in relationship to populated areas and other local conditions. The purpose of this review is to limit, reduce, and control the impact of noise from flying operations on surrounding communities.
- Consider the establishment of a community forum between the installation and surrounding stakeholders to discuss land use and other issues of concern; the installation anticipates holding these meetings on an annual basis.
- Schedule land use planning meetings to provide a forum for agencies to meet and discuss future development and to address issues that may surface because of new proposals.

- Provide copies of the AICUZ Study to local, county, tribal, and regional planning departments and zoning administrators to aid in the planning process, and provide copies of the AICUZ Study to appropriate state and federal agencies.

Preparation and presentation of this 2021 Tinker AFB AICUZ Study is one phase in continuing Air Force participation in the local planning process. The Air Force recognizes that, as the local community updates its land use plans, Tinker AFB must be ready to provide additional input, as needed.

7.2 STATE AND REGIONAL ROLES

As noted in Section 6.2, in the State of Oklahoma, land use planning and zoning are delegated to municipal and county governments, which are empowered to create comprehensive land use plans and coordinate local land use plans. Recommendations for working with local governments to encourage compatible land use are discussed below, in Section 7.3.

AIRCRAFT PILOT AND PASSENGER PROTECTION ACT

The APPPA was passed into law by the state in 2010 to increase safety near airports—including military airports—in Oklahoma. The APPPA is administered by the Oklahoma Aeronautics Commission (discussed below) and regulates:

- The height of structures built or erected near public-use airports and military installations in Oklahoma, and

- Construction projects that may be deemed incompatible with normal airport operations due to safety concerns for individuals both in the air and on the ground.

Building a structure for an incompatible use (i.e., homes, schools, child care facilities, hospitals, nursing homes, churches, and other buildings or areas where people would gather) within 500 feet of an airport runway centerline or in the runway protection zone requires obtaining a permit from the Oklahoma Aeronautics Commission. Structures in excess of 150 feet above an airport's elevation and within three miles of the airport also require a permit. The APPPA is credited with providing critical protection to the integrity and safety of military aircraft operations and airspace used by the military for training.

acog

ASSOCIATION OF CENTRAL OKLAHOMA GOVERNMENTS

In 2008, the ACOG served as the project sponsor for the Tinker AFB JLUS. As discussed in Section 6.2, the JLUS provided recommendations to protect the communities and address land use compatibility concerns in response to the 2006 Tinker AFB AICUZ Study. The JLUS was a cooperative planning effort between Tinker AFB and impacted communities and entities near the base, including Choctaw, Del City, Midwest City, Nicoma Park, Oklahoma City, Oklahoma County, Spencer, and Cleveland County. The JLUS partners continue to meet quarterly in order to maintain communication on JLUS implementation activities and development issues near Tinker AFB.

GREATER OKLAHOMA CITY CHAMBER

GREATER OKLAHOMA CITY CHAMBER

For more than a century, the Greater Oklahoma City Chamber has supported members and the business community through economic and community development, government relations,

education and workforce development initiatives, and tourism growth. The chamber is one of Tinker AFB's strongest partners. In addition to participating as a JLUS Communication Group Partner, the chamber champions aviation and aerospace as key industries and acknowledges Tinker AFB as the heart of aerospace in the region.

In 2016, the chamber commissioned the Greater Oklahoma City Region Aerospace Industry Survey and Economic Impact Assessment. The assessment identifies Tinker AFB as the greatest concentration of aerospace maintenance, repair, and overhaul activity in the region and acknowledges that this activity has attracted many of the aerospace-related companies to the region. On a local level, when encroachment issues have threatened base security and given rise to noise concerns, the chamber has assumed a role of helping package programs, such as Capital Improvement Plan bond elections held by Oklahoma County.

OKLAHOMA AERONAUTICS COMMISSION

Created by the Legislature in 1963, the Oklahoma Aeronautics Commission encourages, fosters, and assists in the development of aeronautics across the state. The commission has drafted and recommended legislation as part of its charge to advance the interests of the state in aeronautics—including in support of Tinker AFB. To provide Oklahoma with a competitive edge in maintaining the state's status as having the largest military aircraft repair facilities in the world (via Tinker AFB), the commission recommended legislation in 2005 that eliminated sales tax on all aircraft repairs. In 2008, the commission drafted legislation for tax credits for engineers hired by aerospace employers and the employers themselves. This legislation directly benefited Tinker AFB and related aerospace companies (e.g., Boeing). The Oklahoma Aeronautics Commission also served as a JLUS Communication Group Partner and administers the APPPA.

OKLAHOMA STRATEGIC MILITARY PLANNING COMMISSION

The Oklahoma Strategic Military Planning Commission includes seven members, five of which represent the interests of the state's military installations (i.e., Altus AFB, Fort Sill, McAlester Army Ammunition Depot, Tinker AFB, and Vance AFB). The remaining two members are legislative appointees who serve as ex officio, non-voting members of the commission. Initially established as a coordination mechanism among Oklahoma's military installations in response to Base Realignment and Closure, the Commission administers funds, appropriated by the Oklahoma Legislature and Governor, to local governments in communities near military installations. The grant program is intended to facilitate public projects that protect the interests of the community with respect to issues related to the realignment, expansion, reduction, or closure of a military installation. Several development projects at Tinker AFB have been supported by these grant funds, including the Hruskocy Gate relocation, discussed below.

The Commission is also engaged in legislation at the State level to protect Oklahoma's military installations from wind energy projects. Per Oklahoma House Bill 3561, the Commission is formally involved in the wind energy development approval process and is notified when an intent to build is submitted to the Oklahoma Corporation Commission, the state's public utilities commission. Upon notification, the Commission notifies local base commanders and documents potential areas of impact in a letter to the Military Aviation and Installation Assurance Siting Clearinghouse. Oklahoma prohibits the construction or operation of a proposed wind energy facility that would have a significant adverse impact on the mission, training, or operations of any military installation, as determined by the Military Aviation and Installation Assurance Siting Clearinghouse and the FAA.

OKLAHOMA INDUSTRIES AUTHORITY
The Oklahoma Industries Authority serves to benefit the public of Oklahoma County. The authority is part of the public-private partnership network of the Alliance for Economic Development of Oklahoma City, which coordinates land, incentives, and economic tools to make Oklahoma City attractive to companies and developers. The Authority has supported installation operations by partnering with Tinker AFB to establish mission- critical facilities. In partnership with the DoD, the authority manages Tinker AFB's Maintenance Repair and Overhaul Technology Center, which accommodates military aircraft, extending the industrial mission of Tinker AFB. A lease agreement was renewed and executed between these entities and Tinker's Maintenance Repair and Overhaul Technology Center is under a new lease for up to 5-years. Additionally, the authority was also recently awarded a grant from the Oklahoma Strategic Military Planning Commission to support the relocation of Hruskocy Gate. The grant funds were used to cover site clearing and improvements related to the relocation.

READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION
Tinker AFB could continue to pursue funding sources through existing federal government programs, such as DoD's Readiness and Environmental Protection Integration (REPI) Program, for protection of mission-sensitive areas. Tinker AFB's REPI strategy is ongoing and is a collaboration with regional stakeholders.

The REPI Program is a key tool used by DoD and its partners to protect the military's ability to train, test, and operate. DoD created the REPI Program in response to the development of lands and loss of habitat in the vicinity of or affecting its installations, ranges, and airspace that can lead to restrictions or costly and inadequate training and testing alternatives. Through REPI, DoD works with state and local governments, conservation organizations, and willing private landowners to address these challenges to the military mission and the viability of DoD installations and ranges. The REPI Program has enjoyed broad bipartisan support both in the U.S. Congress and among groups representing state and local officials. Through FY 2019, DoD and its partners have spent over $14 million on REPI projects at three installations in the State of Oklahoma.

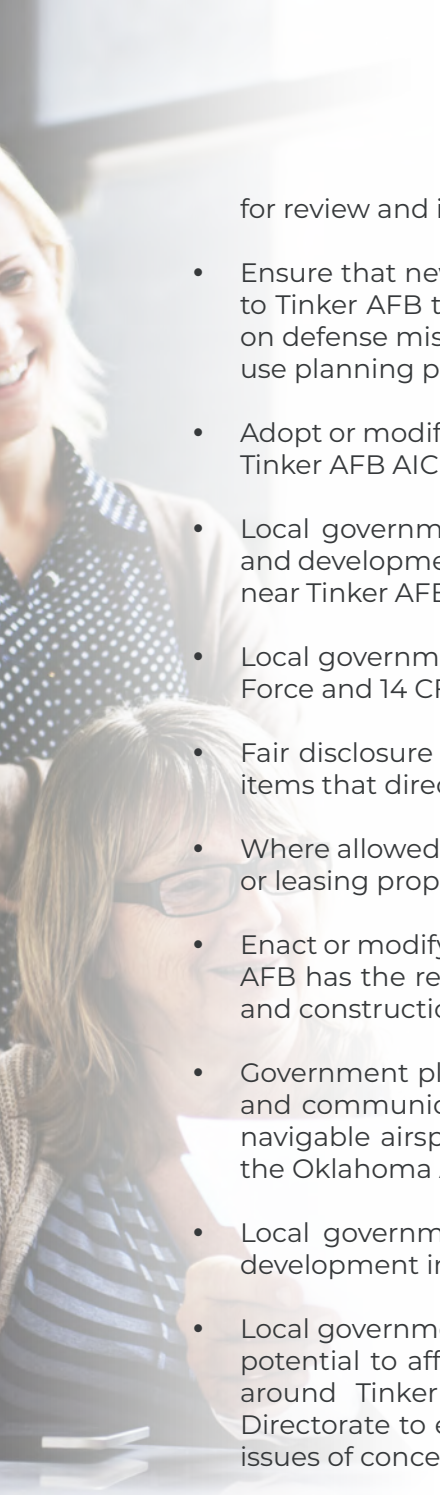
Tinker AFB's REPI projects implement recommendations from the Installation's JLUS to protect high-priority safety and noise zones, with Tinker AFB's partner, Land Legacy, acquiring conservation easements to preserve wetlands, habitat, and water resources.

Tinker AFB's past REPI actions include fee-simple purchase by Land Legacy of one of four designated parcels. Land Legacy also acquired an easement (restriction on development rights) for the other three parcels in Oklahoma City.

7.3 LOCAL GOVERNMENT ROLE

The role of the local government is to enact planning, zoning, and development principles and practices that are compatible with the installation and protect the installation's mission. The residents of the surrounding community have a long history of working with personnel from Tinker AFB. Adoption of the following recommendations during the revision of relevant land use planning or zoning regulations will strengthen this relationship, increase the health and safety of the public, and protect the integrity of the installation's flying mission:

- Local government planners consider AICUZ policies and guidelines when developing or revising city comprehensive plans and use AICUZ overlay maps and Air Force Land Use Compatibility Guidelines (see Appendix A) to evaluate existing and future land use proposals. Tinker AFB and Oklahoma City enjoy an excellent, long-standing collaborative partnership. The city provides relevant development packages to the Tinker Civil Engineering Directorate



for review and input on a monthly basis.

- Ensure that new development or change of use applications for properties are submitted to Tinker AFB to afford the opportunity to assess those applications for potential impacts on defense missions. The Tinker AFB Civil Engineering Directorate is the installation's land use planning point of contact.

- Adopt or modify zoning ordinances to reflect the compatible land uses outlined in the 2021 Tinker AFB AICUZ Study, including the creation of military airport overlay zones.

- Local governments review their capital improvement plans, infrastructure investments, and development policies to ensure they do not encourage incompatible land use patterns near Tinker AFB, with particular emphasis on utility extension and transportation planning.

- Local governments implement height and obstruction ordinances that reflect current Air Force and 14 CFR 77 requirements, presented in this study as HAFZs.

- Fair disclosure ordinances be enacted to require disclosure to the public for those AICUZ items that directly relate to military operations at Tinker AFB.

- Where allowed, local governments require real estate disclosure for individuals purchasing or leasing property within noise zones, CZs, and APZs.

- Enact or modify building/residential codes to ensure that any new construction near Tinker AFB has the recommended noise level reduction measures incorporated into the design and construction of structures.

- Government planning bodies monitor proposals for tall structures, such as wind turbines and communication towers, to ensure that new construction does not pose a hazard to navigable airspace around Tinker AFB. Where appropriate, coordinate with the FAA and the Oklahoma Aeronautics Commission on the height of structures.

- Local government land use plans and ordinances reflect AICUZ recommendations for development in CZs, APZs, and noise zones.

- Local governments consult with Tinker AFB on planning and zoning actions that have the potential to affect installation operations. It should be noted that all three communities around Tinker AFB coordinate their development proposals with Civil Engineering Directorate to ensure transparency and that the Air Force is able to weigh in on land use issues of concern.

- Invite Air Force leadership to be ex officio members on boards, commissions, and regional councils addressing long-range development and other planning policies.

- Encourage the development of a working group of city, county, and Tinker AFB representatives to discuss land use concerns and major development proposals that could affect military operations.

TINKER PARTNERSHIP STEERING COMMITTEE

As development surrounding Tinker AFB continues, Tinker AFB leadership should continue coordination with local leadership and elected officials on that development. This coordination should to ensure the continued operational capability of the base by ensuring growth that is compatible with aircraft operations to both protect public health, safety, and welfare and to preserve the mission of Tinker AFB.

To that end, another very successful local action at Tinker AFB is the ongoing activity of the Tinker Partnership Steering Committee (TPSC). The TPSC was established to promote collaboration between Tinker AFB and the State of Oklahoma, Oklahoma County, Oklahoma City, Del City, Midwest City, the Oklahoma Strategic Military Planning Commission, and the Greater Oklahoma City Chamber of Commerce.

The TPSC provides the framework to identify needs and requirements of Tinker AFB and the partners with the ultimate goal of sustaining and increasing the military value of Tinker AFB and to support the economic vitality and quality of life in the region.

The TPSC Executive Council membership meets quarterly and includes the Commander, 72nd Air Base Wing, a member of the County Commission of Oklahoma County, and the mayors of Oklahoma City, Midwest City, and Del City.

TINKER AFB JLUS RECOMMENDATIONS
In addition, Appendix D highlights the recommendations from the 2008 Tinker AFB JLUS. These recommendations provide for additional actions by local governments to improve land use decisions that may affect the mission of Tinker AFB. The recommended actions are aimed at improving the compatibility of land uses around Tinker AFB with the base's mission now and in the future.

7.4 COMMUNITY ROLE

Neighboring residents and installation personnel have a long-established history of working together for the mutual benefit of the Tinker AFB mission and the local community. Adoption of the following recommendations will strengthen this relationship, protect the health and ensure the safety of the public, and help protect the integrity of the installation's defense mission:

- **REAL ESTATE PROFESSIONALS AND BROKERS:**
    - Know where noise zones, CZs, or APZs encumber land near the air installation and invite installation representatives to brokers' meetings to discuss the AICUZ Program with real estate professionals.
    - Disclose noise impacts to all prospective buyers of properties within areas with noise levels greater than 65 dB DNL or within the CZs or APZs.
    - Require the real estate multiple listing service to disclose noise zones and CZs or APZs for all listings.
- **DEVELOPERS:**
    - Know where the noise zones and CZs or APZs encumber land near the air installation. Consult with Tinker AFB on proposed developments within the AICUZ footprint.
    - Participate in local discussions regarding existing zoning ordinances and subdivision regulations to support the compatible land uses outlined in this AICUZ Study through implementation of a zoning overlay district based on noise contours and CZs or APZs.
- **LOCAL CITIZENS:**
    - Participate in local forums with the installation to learn more about the

installation's missions.

- Become informed about the AICUZ Program and learn about the program's goals, objectives, and value in protecting the public's health, safety, and welfare.

- When considering property purchases, ask local real estate professionals, city planners, and installation representatives about noise and accident potential.

While the installation and community are separated by a fence, it is recognized that Tinker AFB activities and operations may affect the community. Likewise, community activities and development decisions can affect Tinker AFB's ability to complete its local hometown mission. The local military and community goals can be mutually achieved through a combination of collaborative planning and partnerships, open communication, and close relationships. The AICUZ Study can provide a foundation on which related communication can be based to ensure that the community and its hometown military installation can continue to coexist for many years.

Questions about the AICUZ Program may be directed to the installation Public Affairs Office at 405-734-2035 or 72abw.pa.workflow@us.af.mil.

8 REFERENCES

ACOG. 2008. Tinker AFB, Joint Land Use Study, 2008.

AFCEC. 2017. KC-46A Third Main Operating Base (MOB 3) Beddown Environmental Impact Statement (EIS), 2017.

DoD. 1978. "Planning in the Noise Environment," Air Force Manual AFM 19-10.

_____. 2019. Unified Facilities Criteria (UFC), Airfield and Heliport Planning and Design, UFC 3-260-01, 4 February.

_____. 2015. Instruction 4165.57, Air Installations Compatible Use Zones, March 12.

FAA. 2006. Advisory Circular 150/5200 34A. Construction or Establishment of Landfills Near Public Airports.

Greater Oklahoma City Chamber. 2016. Greater Oklahoma City Region Aerospace Industry - Industry Survey and Economic Impact Assessment. Available at: https://www.greateroklahomacity.com/clientuploads/pdf/greaterokc_aerospace_studyreport_2016.pdf, Accessed on April 20, 2020.

USAF.2017. Air Force Handbook 32-7084, AICUZ Program Manager's Guide, Nov 2.

_____. 2015a. Air Force Instruction AFI 32-7063, Air Installations Compatible Use Zones Program, December 18.

_____. 2006. Air Installations Compatible Use Zones (AICUZ) Study for Tinker AFB, 2006.

APPENDIX A

Land Use Compatibility Tables

Appendix A. Land Use Compatibility Tables

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
10	**Residential**				
11	Household Units				
11.11	Single units: detached	N	N	Y[2]	Maximum density of 2 Du/Ac
11.12	Single units: semi-detached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	**Manufacturing [3]**				
21	Food and kindred products; manufacturing	N	N	Y	Maximum FAR 0.56 IN APZ II
22	Textile mill products; manufacturing	N	N	Y	Maximum FAR 0.56 IN APZ II
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
26	Paper and allied products; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	**Manufacturing[3] (continued)**				
31	Rubber and miscellaneous plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
34	Fabricated metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	**Transportation, communication, and utilities[3, 4]**				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
42	Motor vehicle transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
43	Aircraft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
44	Marine craft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
45	Highway and street right-of-way	Y[5]	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
46	Automobile parking	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
47	Communication	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48	Utilities[7]	N	Y[6]	Y[6]	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48.5	Solid waste disposal (landfills, incinerators, etc.)	N	N	N	
49	Other transportation, communication, and utilities	N	Y[6]	Y	See Note 6 below
50	**Trade**				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I & .56 in APZ II
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	See Note 8 below
53	Retail trade – including, discount clubs, home improvement stores, electronics superstores, etc.	N	N	Y	Maximum FAR of 0.16 in APZ II
53	Shopping centers-Neighborhood, Community, Regional, Super-regional[9]	N	N	N	
54	Retail trade – food	N	N	Y	Maximum FAR of 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR of 0.28 in APZ II
57	Retail trade – furniture, home, furnishings and equipment	N	N	Y	Maximum FAR of 0.28 in APZ II
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR of 0.16 in APZ II

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
60	**Services[10]**				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR of 0.22 in APZ II
62	Personal services	N	N	Y	Office uses only. Maximum FAR of 0.22 in APZ II.
62.4	Cemeteries	N	Y[11]	Y[11]	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Maximum FAR of 0.22 in APZ II
63.7	Warehousing and storage services[12]	N	Y	Y	Maximum FAR of 1.0 in APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Maximum FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Maximum FAR of 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Maximum FAR of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Maximum FAR of 0.24 in APZ II
68	Educational services	N	N	N	
68.1	Child care services, child development centers, and nurseries	N	N	N	
69	Miscellaneous Services	N	N	Y	Maximum FAR of 0.22 in APZ II
69.1	Religious activities (including places of worship)	N	N	N	
70	**Cultural, entertainment and recreational**				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[13]	Y[13]	
72	Public assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements – fairgrounds, miniature golf, driving ranges; amusement parks, etc.	N	N	Y[20]	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[13]	Y[13]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[13]	Y[13]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
79	Other cultural, entertainment and recreation	N	Y[11]	Y[11]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
80	**Resource production and extraction**				
81	Agriculture (except live-stock)	Y[4]	Y[14]	Y[14]	
81.5,81.7	Agriculture-Livestock farming, including grazing and feedlots	N	Y[14]	Y[14]	
82	Agriculture related activities	N	Y[15]	Y[15]	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
83	Forestry activities[16]	N	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
84	Fishing activities[17]	N[17]	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
85	Mining activities[18]	N	Y[18]	Y[18]	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
89	Other resource production or extraction	N	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
90	**Other**				
91	Undeveloped land	Y	Y	Y	
93	Water areas[19]	N[19]	N[19]	N[19]	

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I, and maximum assemblies of 50 people an acre in APZ II. Recommended FARs are calculated using standard parking generation rates for various land uses, vehicle occupancy rates, and desired density in APZ I and II. For APZ I, the formula is FAR = 25 people an acre/ (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)). The formula for APZ II is FAR = 50/ (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)).

2. The suggested maximum density for detached single-family housing is two Du/Ac. In a planned unit development (PUD) of single family detached units, where clustered housing development results in large open areas, this density could possibly be increased slightly provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.

3. Other factors to be considered: Labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting and navigational aids necessary for the safe operation of the airfield when there are no other siting options), buildings, or above-ground utility and communications lines should normally be located in Clear Zone areas on or off the air installation. The Clear Zone is subject to the most severe restrictions.

5. Roads within the graded portion of the Clear Zone are prohibited. All roads within the Clear Zone are discouraged, but if required, they should not be wider than two lanes and the rights-of-way should be fenced (frangible) and not include sidewalks or bicycle trails. Nothing associated with these roads should violate obstacle clearance criteria.

6. No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.

7. Development of renewable energy resources, including solar and geothermal facilities and wind turbines, may impact military operations through hazards to flight or electromagnetic interference. Each new development should to be analyzed for compatibility issues on a case-by-case basis that considers both the proposal and potentially affected mission.

8. Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-11; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.

9. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super-regional facilities anchored by small businesses, a supermarket or drug store, discount retailer, department store, or several department stores, respectively.

10. Ancillary uses such as meeting places, auditoriums, etc. are not recommended.

11. Chapels, houses of worship, and other land uses of public gatherings are incompatible within APZ I or APZ II.

12. Big box home improvement stores are not included as part of this category.

13. Facilities must be low intensity, and provide no playgrounds, etc. Facilities such as club houses, meeting places, auditoriums, large classes, etc., are not recommended.

14. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

15. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.

16. Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zone lands owned in fee will be disposed of in accordance with applicable DoD guidance.

17. Controlled hunting and fishing may be permitted for the purpose of wildlife management.

18. Surface mining operations that could create retention ponds that may attract waterfowl and present bird/wildlife aircraft strike hazards (BASH), or operations that produce dust or light emissions that could affect pilot vision are not compatible.

19. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are pre-existing, nonconforming land uses. Naturally occurring water features that attract waterfowl present a potential BASH. Actions to expand naturally occurring water features or construction of new water features should not be encouraged. If construction of new features is necessary for storm water retention, such features should be designed so that they do not attract waterfowl.

20. Amusement centers, family entertainment centers or amusement parks designed or operated at a scale that could attract or result in concentrations of people, including employees and visitors, greater than 50 people per acre at any given time are incompatible in APZ II.

This page intentionally left blank.

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE			SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
10	**Residential**					
11	Household units	N[1]	N[1]	N	N	N
11.11	Single units: detached	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	N[1]	N[1]	N	N	N
11.13	Single units: attached row	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	N[1]	N[1]	N	N	N
11.32	Apartment: elevator	N[1]	N[1]	N	N	N
12	Group quarters	N[1]	N[1]	N	N	N
13	Residential hotels	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[1]	N[1]	N[1]	N	N
16	Other residential	N[1]	N[1]	N	N	N
20	**Manufacturing**					
21	Food and kindred products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y[2]	Y[3]	Y[4]	N
30	**Manufacturing (continued)**					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE		SUGGESTED LAND USE COMPATIBILITY				
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	**Transportation, communication and utilities**					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y [3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	25[5]	30[5]	N	N
50	**Trade**					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	**Services**					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE			SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
62.4	Cemeteries	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[2]	Y[3]	Y[4]	N
64	Repair services	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N
65.16	Nursing homes	N[1]	N[1]	N	N	N
66	Contract construction services	Y	25	30	N	N
67	Government services	Y[1]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N
69	Miscellaneous Services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	**Cultural, entertainment and recreational**					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[1]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	**Resource production and extraction**					
81	Agriculture (except live- stock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5, 81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

1. General

    a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, non-conforming land uses.

    b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 decibels (dB) in DNL 65-69 and 30 dB in DNL 70-74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.

    c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

    d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. Buildings are not permitted.

7. Land use is compatible provided special sound reinforcement systems are installed.

8. Residential buildings require an NLR of 25.

9. Residential buildings require an NLR of 30.

10. Residential buildings are not permitted.

11. Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

APPENDIX B

Key Terms

Appendix B. Key Terms

Day-Night Average Sound Level (DNL) – DNL is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, DNL includes a 10 dB penalty to events occurring during the acoustical nighttime period (10:00 p.m. through 7:00 a.m.). See Section 4.3 for additional information.

Decibel (dB) – Decibel is the unit used to measure the intensity of a sound.

Flight Profiles – Flight profiles consist of aircraft conditions (i.e., altitude, speed, power setting, etc.) defined at various locations along each assigned flight track.

Flight Track – The flight track locations represent the various types of arrivals, departures, and closed patterns accomplished at air installations. The location for each track is representative for the specific track and may vary due to air traffic control, weather, and other reasons (e.g., one pilot may fly the on one side of the depicted track, while another pilot may fly slightly to the other side of the track).

Operation – An aircraft operation is defined as one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because it has a takeoff component and a landing component. A sortie is a single military aircraft flight from the initial takeoff through the termination landing. The minimum number of aircraft operations for one sortie is two operations, one takeoff (departure) and one landing (approach).

This page intentionally left blank.

APPENDIX C

Existing Land Use, Future Land Use and Zoning Comparison

Appendix C. Existing Land Use, Future Land Use, and Zoning Comparison

Existing Land Use[1]	
Existing Land Use	**AICUZ Land Use Category**
Agricultural	Open/Agriculture/Low Density
Airport	Transportation/Utility
Church	Public/Quasi-public
Commercial	Commercial
Cultural	Public/Quasi-public
Education	Public/Quasi-public
Entertainment	Recreation
Exempt	Public/Quasi-public
Government	Public/Quasi-public
Hospital	Public/Quasi-public
Hospitality	Commercial
Industrial	Industrial
Mixed Use - Mixed Retail with Residential Units	Residential
Mixed Use - Mixed Retail with Office Units	Commercial
Office	Commercial
OUHSC - University of Oklahoma	Public/Quasi-public
Parking	Transportation/Utility
Passive Open Space	Open/Agriculture/Low Density
Recreation	Recreation
Residential	Residential
Retail	Commercial
ROW	Transportation/Utility
Rural Residential	Residential
Tinker AFB	Public/Quasi-public
Undeveloped	Undeveloped
Unspecified	Undesignated
Utility	Transportation/Utility
Future Land Use[2]	
Oklahoma City Future Land Use	**AICUZ Land Use Category**
Agricultural Preserve	Open/Agriculture/Low Density
Commercial Corridor	Commercial
Downtown	Commercial
Employment Reserve	Industrial
Heavy Industrial	Industrial

Open Space	Open/Agriculture/Low Density
Regional District	Commercial
Rural - Low Intensity	Open/Agriculture/Low Density
Rural - Medium Intensity	Open/Agriculture/Low Density
Transit-Oriented Urban Low Intensity	Transportation/Utility
Transit-Oriented Urban Medium Intensity	Transportation/Utility
Urban - High Intensity	Industrial
Urban - Low Intensity	Industrial
Urban - Medium Intensity	Industrial
Urban Reserve	Open/Agriculture/Low Density
Midwest City Future Land Use	**AICUZ Land Use Category**
Single-Family Detached Residential	Residential
Medium Density Residential	Residential
High Density Residential	Residential
Public/Semi-Public	Public/Quasi-public
Parks/Open Space	Open/Agriculture/Low Density
Office/Retail	Commercial
Commercial	Commercial
Industrial	Industrial
Town Center	Commercial
Zoning[3]	
Oklahoma City Zoning	**AICUZ Category**
Agricultural	Open/Agriculture/Low Density
Bricktown Core Development	Commercial
Central Business	Commercial
Community Commercial	Commercial
Downtown Business District	Commercial
Downtown Transitional – General	Commercial
Downtown Transitional – Limited	Commercial
General Commercial	Commercial
General Office	Commercial
General Residential	Residential
Heavy Industrial	Industrial
Highway Commercial	Commercial
Historic Preservation	Open/Agriculture/Low Density
Light Industrial	Industrial
Limited Office	Commercial
Manufactured (Mobile) Home Park	Residential
Manufactured (Mobile) Home Subdivision	Residential
Medium-Low Density Residential	Residential
Medium Density Multiple-Family Residential	Residential

Medium Density Residential	Residential
Moderate Industrial	Industrial
Neighborhood Business	Commercial
Neighborhood Commercial	Commercial
Neighborhood Conservation	Open/Agriculture/Low Density
Planned Unit Development	Residential
Shopping Center	Commercial
Simplified Planned Unit Development	Residential
Single-Family One-Acre Rural Residential	Residential
Single-Family Residential	Residential
Single-Family Residential Zero Lot Line	Residential
Single-Family Two-Acre Rural Residential	Residential
Stockyards City Development	Commercial
Midwest City Zoning	**AICUZ Category**
Agricultural	Open/Agriculture/Low Density
Agricultural Special Use Permit	Open/Agriculture/Low Density
Community Commercial District	Commercial
Community Commercial District Special Use Permit	Commercial
General Commercial District	Commercial
General Commercial District Special Use Permit	Commercial
General Office District	Commercial
General Office District Special Use Permit	Commercial
Heavy Industrial District	Industrial
High Density Residential District	Residential
High Density Residential District Special Use Permit	Residential
Hospitality District	Commercial
Hospitality District & Community Commercial District	Commercial
Hospitality District Special Use Permit	Commercial
Light Industrial District	Industrial
Manufactured Home Park District	Residential
Manufactured Home Subdivision District	Residential
Medium Density Residential District	Residential
Medium Density Residential District Special Use Permit	Residential
Moderate Industrial District	Industrial
Moderate Industrial District Special Use Permit	Industrial
Planned Unit Development	Residential
Restricted Commercial District	Commercial
Restricted Commercial District Special Use Permit	Commercial
Restricted Office District	Commercial
Restricted Office District Special Use Permit	Commercial
Simplified Planned Unit Development	Residential

Single-Family Detached Residential District	Residential
Single-Family Detached Residential District Special Use Permit	Residential
Two-Family Attached Residential District	Residential
Del City Zoning	**AICUZ Category**
A-1 Agricultural	Open/Agriculture/Low Density
A-C Arterial Commercial	Commercial
H-C Interstate Highway Commercial	Commercial
I-1 Light and Moderate Industrial	Industrial
I-2 Heavy Industrial	Industrial
N-C Neighborhood Commercial	Commercial
No Zoning District Assigned	N/A
O-C Office Commercial	Commercial
PUD Planned Unit Development	Residential
R-1-D Single Family Detached Residential	Residential
R-1-LH Single Family Large Home Residential	Residential
R-2 Two Family Residential	Residential
R-3 Medium Density Residential	Residential
R-4 High Density Residential	Residential
R-MH-1 Mobile Home Subdivision	Residential
Right of Way	Transportation/Utility
SPUD Simplified Planned Unit Development	Residential
U-R Urban Reserve	Open/Agriculture/Low Density
[1] Existing Land Use TriCountyParcels4Q2018 – provided by Oklahoma City via Tinker AFB [2]Future Land Use Oklahoma City Future Land Use (Planokc): http://planokc.org/ Midwest City Future Land Use - https://hub-mwcok.opendata.arcgis.com/datasets/future-land-use [3]Zoning Oklahoma City Zoning Map: https://www.okc.gov/departments/development-services/subdivision-zoning/zoning-map Del City Zoning – provided by steven.rhodes.15@us.af.mil Midwest City Zoning - https://hub-mwcok.opendata.arcgis.com/datasets/currentzoning	

D

APPENDIX D

Tinker JLUS Summary of Recommendations

Appendix D. Tinker AFB JLUS Summary of Recommendations

Recommendation	Action	Applicable Areas
Review Flight Path Corridors	Seek Tinker AFB input on public facilities locations, including schools, libraries, etc.	All local governments
Revise Current Comprehensive Plans and Zoning Requirements	Modify Comprehensive Plans and Zoning ordinances to minimize incompatible land uses in and around the Base, particularly within both of the AICUZ APZs.	Oklahoma City, Del City, Midwest City
Modify Land Use Policies Regarding Zoning Process	Establish land use policies against zoning land to any category permitting residential development within the 75 dB DNL or higher contour, or within the 65-74 dB DNL noise zone unless sound attenuation will be achieved.	Midwest City, Oklahoma City, Spencer
Consider Purchase of Land within the APZ I and 75+ dB Noise Contour	Consider as an alternative to regulatory methods for preserving land and minimizing the development of incompatible land uses.	Del City, Midwest City, Oklahoma City
Create Voluntary Acquisition Program	Consider providing a voluntary acquisition program for residential properties and vacant land located within APZ I areas.	Del City, Midwest City, Oklahoma City
Develop Voluntary Avigation Easement Program	Allow the acquisition of easements to ensure land use compatibility of properties within the 65 dB DNL or greater noise zones.	Spencer, Del City
Consider Fee Simple Purchase of a Portion of Land	Allow the purchase of a portion of property to protect open space or sensitive or critical areas within AICUZ noise contours and APZs.	Del City, Midwest City, Oklahoma City
Establish Transfer of Development Rights Program	Develop a transfer of development rights program to maintain public safety and mission sustainability where development rights currently exist.	All local governments

Recommendation	Action	Applicable Areas
Allow Land Banking in APZs and 75+ dB DNL Areas	Allow land to be placed in a temporary holding status to be turned over for compatible development at a future date.	Del City, Midwest City, Oklahoma City
Develop Real Estate Disclosure Process	Implement disclosure process for structures located within AICUZ noise contours and APZs at the initial advertisement of property.	Oklahoma County, Cleveland City
Help Manage Bird Population	Work with the state's agriculture department to help reduce the number of birds circling the landfill in the southeast sector of Oklahoma City.	Oklahoma County
Limit Landfills and Protect Wetlands	Prohibit new sanitary landfill or wetland mitigation projects within 10,000 feet of aircraft runways.	Del City, Midwest City, Oklahoma City, Oklahoma County
Update Building Codes	Continue to meet or exceed DoD recommendations for noise level reduction. Upgrade building codes to most recent version of the International Building Code.	Midwest City
Revise Ordinances	Ensure height and obstruction ordinances reflect current Air Force and FAA Part 77 requirements.	All local governments
Develop Construction Guide	Prepare for builders, developers, architects and building inspectors to clarify noise compatibility guidelines.	All local governments
Modify Architectural Design for Noise Level Reduction	Encourage existing structures and require new construction in the 65+ dB DNL and higher to participate in a sound attenuation program.	Midwest City, Oklahoma City, Spencer, Oklahoma County
Improve Acoustic Site Design	Encourage positioning of new structures within AICUZ noise contours on a development site for the purpose of reducing noise levels in the most noise-sensitive buildings.	Midwest City, Oklahoma City
Guard Against Urban Encroachment	Provide detailed information regarding proposed development plans and future mission changes.	All local governments

Recommendation	Action	Applicable Areas
Adopt Maximum Development Densities	Develop standardized distributed maximum densities for new development within AICUZ APZ I and II for various land uses.	Del City, Midwest City, Oklahoma City
Adopt Communication Strategy	Develop strategy and protocol for ongoing communication between Tinker AFB and surrounding communities to apprise each other of potential development within AICUZ accident potential and noise zones.	Del City, Midwest City, Oklahoma City, Spencer, Oklahoma County, Cleveland County
Revise Maps	Show APZs I and II and AICUZ noise contours on all adopted comprehensive plan maps and/or zoning maps.	Oklahoma County, Cleveland County, Del City, Midwest City, Oklahoma City