



DEPARTMENT OF THE AIR FORCE
12TH FLYING TRAINING WING
JOINT BASE SAN ANTONIO – RANDOLPH TEXAS



October 25, 2017

Colonel Joel L. Carey, USAF
Commander
12th Flying Training Wing
1 Washington Circle, Suite 1
JBSA-Randolph, TX 78150

Community Leaders,

The 2017 Air Installations Compatible Use Zones (AICUZ) Study is an update of the 2008 Randolph AFB AICUZ Study. This update includes changes to the previous study attributed to anticipated operational changes and the noise modeling software's technical improvements.

The basic objective of the AICUZ program is to achieve compatible uses of public and private lands in the vicinity of military airfields. This can be accomplished by controlling incompatible development through local regulatory actions. The AICUZ Study provides information necessary to maximize beneficial use of the land surrounding JBSA-Randolph while minimizing the potential for degradation of public health and safety.

The AICUZ Study contains a description of various zones near the base. Specifically, it outlines the location of runway clear and accident potential zones, as well as noise contours. Additionally, the report recommends compatible land use for these areas. It is our hope that this information will be incorporated into your community comprehensive plans, zoning ordinances, subdivision regulations, building codes, and other related documents.

We deeply value the positive relationship that the 12th Flying Training Wing and all of JBSA-Randolph enjoy with our neighbors in the Greater San Antonio area. As your partner in this process, we continuously attempt to minimize disturbances generated by our execution of the Air Force mission. We look forward to our continued work together on these important issues.

Sincerely

JOEL L. CAREY, Colonel, USAF
Commander

JOINT BASE SAN ANTONIO-RANDOLPH AND SEGUIN AUXILIARY AIRFIELD, TEXAS

AIR INSTALLATIONS COMPATIBLE USE ZONES STUDY

FINAL



U.S. AIR FORCE

2017



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FINAL

2017

Prepared for:

Air Force Civil Engineer Center
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ACRONYMS

12 FTW	12 th Flying Training Wing
12 OG	12 th Operations Group
12 OSS	12 th Operations Support Squadron
340 FTG	340 th Flying Training Group
359 MDG	359 th Medical Group
AACOG	Alamo Area Council of Governments
Air Force	United States Air Force
AAF	Auxiliary Airfield
AETC	Air Education and Training Command
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFPC	Air Force Personnel Center
AGL	above ground level
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
CNEL	Community Noise Equivalent Level
CZ	Clear Zone
dB	decibel
dBA	A-weighted decibel
DNL	day-night average sound level
DoD	Department of Defense
DoDI	Department of Defense Instruction
EMI	Electromagnetic Interference
ETJ	extra-territorial jurisdiction
FAA	Federal Aviation Administration
FAR	floor area ratio
FM	Farm-to-Market Road
FLTS	Flight Test Squadron
FTS	Flying Training Squadron or Fighter Training Squadron
HAFZ	Hazards to Flight Zone
Hz	hertz
I-	Interstate
IFF	Introduction to Fighter Fundamentals
IFR	instrument flight rules
JBSA	Joint Base San Antonio

JLUS	Joint Land Use Study
LED	Light Emitting Diode
MSL	mean sea level
NLR	noise level reduction
NVG	night vision goggles
PM	Program Manager
PUD	planned unit development
RCS	radar cross section
REPI	Readiness and Environmental Protection Integration
SEL	sound exposure level
SH	State Highway
SLUCM	Standard Land Use Coding Manual
TCC	Texas Commanders Council
TMPC	Texas Military Preparedness Commission
UFC	Unified Facilities Criteria
US 90	U.S. Route 90
VFR	visual flight rules

1 INTRODUCTION

This study is an update of the 2008 Joint Base San Antonio (JBSA)-Randolph Air Installations Compatible Use Zones (AICUZ) Study and the 2000 AICUZ Study for Seguin Auxiliary Airfield (AAF), collectively referred to as the 2017 JBSA-Randolph AICUZ Study. This AICUZ Study reaffirms the United States Air Force (Air Force) policy of assisting local, regional, state, and federal officials in the areas surrounding JBSA-Randolph and Seguin AAF by promoting compatible development within the AICUZ area of influence, and protecting Air Force operational capability from the effects of land use that are incompatible with aircraft operations. The information provided in this AICUZ Study is intended to assist local communities with future planning.

The study presents the updated noise contours, which are based on 2016 flight operations at JBSA-Randolph and Seguin AAF, and documents changes to flight operations, noise exposure areas, accident potential, and land use compatibility conditions since the previous AICUZ studies.

1.1 AICUZ PROGRAM

Military airfields attract development—people who work on base want to live close to the base, while others want to provide services to base employees and residents. When incompatible development occurs near an installation or training area, affected parties within the community may seek relief through political channels that could restrict, degrade, or eliminate 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 in the vicinity of a military installation 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 noise levels, Clear Zones (CZs), Accident Potential Zones (APZs), and flight clearance requirements associated with military airfield operations be incorporated into local community planning programs in order to maintain the airfield's operational requirements while minimizing the impact to residents in the surrounding community. Mutual cooperation in the public planning process between military airfield planners and 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. As the communities that surround airfields grow and develop, the Air Force has the responsibility to communicate and collaborate with local government on land use planning, zoning, and similar matters that could affect the installations' operations or missions. Likewise, the Air Force has the responsibility to communicate and understand the potential impacts that new and changing missions may have on the local community.

1.2 SCOPE AND AUTHORITY

1.2.1 SCOPE

This Study is based on optimal flight operations to present updated noise contours. CZs and APZs associated with JBSA-Randolph and Seguin AAF's runways are provided with recommendations for compatible land uses in the vicinity of the base for state and local governments to incorporate into comprehensive plans, zoning ordinances, subdivision regulations, building codes, and other related documents.

1.2.2 AUTHORITY

Department of Defense Instruction (DoDI) 4165.57, *"Air Installations Compatible Use Zones,"* (DoD 2015), establishes policy and assigns responsibility for educating air installation personnel and engaging local communities on issues related to noise, safety, and compatible land use in and around air installations as well as prescribes procedures for plotting noise contours for land use compatibility analysis.

Air Force Instruction (AFI) 32-7063, *"Air Installations Compatible Use Zones Program,"* (Air Force 2015) implements DoDI 4165.57 and applies to all Air Force installations with active runways located in the United States and its territories. This instruction provides guidance to installation AICUZ Program Managers (PMs).

Air Force Handbook 32-7084 *AICUZ Program Manager's Guide* (Air Force 2017) provides installation AICUZ PMs specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ Program. It is written in a "how to" format and aligns with AFI 32-7063.

1.3 PREVIOUS AICUZ EFFORTS AND RELATED STUDIES

Previous AICUZ studies and other relevant studies include:

- 1993 AICUZ Study for Seguin AAF
- December 2000 AICUZ Study for Seguin AAF
- 2000 AICUZ Study for Randolph Air Force Base (AFB)
- April 2008 AICUZ Study for JBSA-Randolph; 2015 amendment to AICUZ Study
- July 2015 Joint Land Use Study (JLUS)

1.4 CHANGES THAT REQUIRE AN AICUZ STUDY UPDATE

AICUZ studies should be updated when an installation has a significant change in aircraft operations (i.e., the number of takeoffs and landings), a change in the type of aircraft stationed and operating at the installation, or changes in flight paths or procedures. This AICUZ Study has been prepared to reflect current flight tracks, noise contours, APZs, and flight operations.

As the DoD aircraft fleet mix and training requirements change over time, the resulting flight operations, which drive the noise contours, change as well. Additionally, non-operational changes may result in the need for an AICUZ Study update. The primary changes since the previous AICUZ Study include:

- Increase of operations at JBSA-Randolph
- Changes in flight tracks and total flying days at JBSA-Randolph
- Increased flying operations at Seguin AAF

In 2015, the JBSA-Randolph CZs were amended to comply with a November 2014 Headquarters Air Force/A4 directive to correct nonstandard CZs. Although the CZs at JBSA-Randolph were previously delineated to show only those portions within the installation boundary, all of the CZs are now the standard 3,000 feet by 3,000 feet, extending outward from the runway ends.

1.4.1 UPDATE OF AIR FORCE INSTRUCTIONS

The 2017 JBSA-Randolph AICUZ Study uses the most recent AFI, which uses “annual average day” (Air Force 2015). The primary reason for the change to average annual day is to be consistent with the land use recommendations guidelines.

1.4.2 UPDATE OF LAND USE ENVIRONMENT

The land use compatibility analysis of the AICUZ Study should be updated to reflect the current land use environment. New development has occurred around both JBSA-Randolph and Seguin AAF since the previous AICUZ Studies, and this AICUZ Study includes newly identified areas of compatibility concern.

2 INSTALLATION PROFILE

2.1 LOCATION

JBSA-Randolph is in the northeastern portion of Bexar County, Texas, approximately 13 miles from downtown San Antonio (Figure 2-1). The base is situated between Interstate (I-) 10 and I-35. The installation is directly surrounded by the cities of Universal City to the north, Converse to the west, and Schertz to the east and south. The installation also conducts approaches and touch-and-go training at Seguin AAF in Guadalupe County, Texas, approximately 30 miles east of JBSA-Randolph. Seguin AAF is a few miles east of the City of Seguin.

2.2 HISTORY

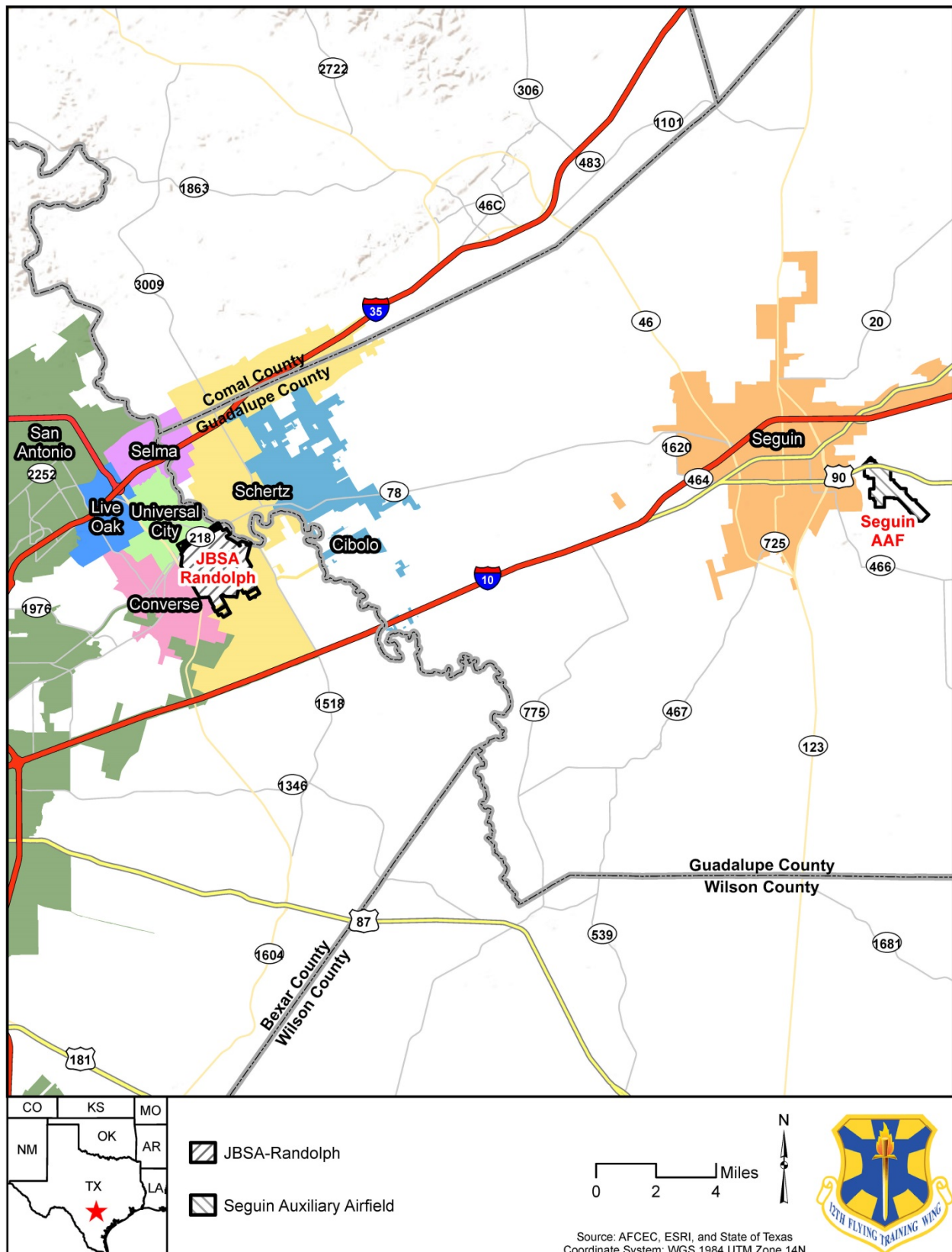
JBSA-Randolph, known as the “Showplace of the Air Force” due to the building’s Spanish Colonial Revival architectural style, was established as a flight training facility for the United States Army Air Corps in 1931. The installation was named after Captain William Millican Randolph, who was serving on the installation’s naming committee when he died in an airplane crash (JBSA 2016a).

The installation had its origin in the enactment of the Air Corps Act of 1926, when the Army Air Corps program was expanded and a new airfield was needed to accommodate training requirements. The City of San Antonio purchased a 2,300-acre tract of land and donated it to the Army Air Corps in 1927. In 1931, the Air Corps Training Center headquarters moved to Randolph Airfield, and primary and basic pilot training for cadets and student officers began on November 2, 1931. Primary training courses continued until 1939, when the mission of Randolph Airfield changed to basic pilot training. In March 1943, the Central Instructor School was established, and the cadet pilot training program was replaced by pilot instructor training. In 1947, the Air Force became a separate service from the Army Air Forces, and Randolph Airfield was named Randolph AFB.

Seguin AAF was built in 1941, originally with three runways, to serve as an auxiliary training field for Randolph Army Airfield. In 2012, the airfield temporarily closed for renovations that included the removal of two abandoned runways and widening of the remaining runway. The 560th Flying Training Squadron, which qualifies pilots as T-38C Instructor Pilots, is the primary user of Seguin AAF and uses the field for the majority of its touch-and-go training (JBSA 2015).

In 2005, the DoD implemented the Base Closure and Realignment Commission’s joint basing recommendations. Support functions at Randolph AFB, Lackland AFB, and Fort Sam Houston airfields were combined to form JBSA, with the Air Force as the lead agency. The 502nd Air Base Wing provides installation support across all JBSA locations.

Figure 2-1: Regional Location



2.3 MISSION

The primary mission of the 12th Flying Training Wing (12 FTW) is to provide fundamental flight training for student pilots and to train instructor pilots. The 12 FTW is the only unit in the Air Force that conducts both pilot instructor training and combat systems officer training. JBSA-Randolph serves as headquarters of the 12 FTW, the Air Education and Training Command (AETC), and the Air Force Personnel Center (AFPC), and supports several other Air Force and Reserve tenants.

2.4 HOST AND TENANT ORGANIZATIONS

2.4.1 12TH FLYING TRAINING WING

The 12 FTW consists of three flying groups and a maintenance group, including the 12th Operations Group (12 OG) and 12th Maintenance Group at JBSA-Randolph. The 12 FTW is responsible for four single-source aviation pipelines including combat systems officer training, pilot instructor training, remotely piloted aircraft pilot indoctrination, and basic sensor operator qualification. In collaboration with the JBSA-Randolph host 502nd Air Base Wing, the 12 FTW is jointly responsible for protection of the mission space required for flight operations. The 12 FTW also has two geographically separated subordinate units: the 306th Flying Training Group based at the Air Force Academy in Colorado Springs and the 479th Flying Training Group at Naval Air Station Pensacola. The 306th Flying Training Group conducts all aviator programs for the Academy and oversees screening for all potential pilots and combat systems officers, and the 479th Flying Training Group conducts Combat Systems Officer training. The 12 FTW hosts the Introduction to Fighter Fundamentals (IFF) program and conducts electronic warfare training for the Air Force and multi-national forces. More than 2,500 Air Force Academy cadets and 2,200 undergraduate flight training candidates are trained by the 12 FTW each year (JBSA 2014a).

2.4.1.1 12TH OPERATIONS GROUP

The 12 OG oversees pilot instructor training, IFF student and instructor training, weapons systems officer training, and remotely piloted aircraft pilot and basic sensor operator training. The 12 OG comprises the 12th Operations Support Squadron (12 OSS), the 99th Flying Training Squadron (FTS), 435th Fighter Training Squadron (FTS), 558 FTS, 559 FTS, and 560 FTS (JBSA 2014a, JBSA 2016b).

The 99 FTS, 559 FTS, and 560 FTS conduct Pilot Instructor Training in the T-1, T-6, and T-38 aircraft, respectively. The 435 FTS completes IFF training in the T-38. The 558 FTS has the Air Force's only undergraduate remotely piloted aircraft training program and provides three distinct courses for officer and enlisted aircrew.

12th Operations Support Squadron

The 12 OSS's responsibilities include airfield management, air traffic control (ATC), airspace management, simulator training, scheduling, flight records, registrar, weather, international training, and aircrew flight equipment for all 12 OG training (JBSA 2016b).

2.4.1.2 12TH MAINTENANCE GROUP

The 12th Maintenance Group is responsible for the overall fleet health of 187 aircraft assigned at JBSA-Randolph and Naval Air Station Pensacola, and provides on-equipment and off-equipment maintenance support for aircraft (JBSA 2016b).

2.4.2 359TH MEDICAL GROUP

The 359th Medical Group (359 MDG) provides comprehensive medical and health services for military personnel and their dependents at JBSA-Randolph, and military retirees in the San Antonio area. The 359 MDG supports the 12 FTW, Headquarters AETC, AFPC, Air Force Recruiting Service, and 35 associate units (59th Medical Wing 2016).

2.4.3 AIR EDUCATION AND TRAINING COMMAND

AETC is the second-oldest major command in the Air Force with a mission to “recruit, train and educate Airmen to deliver airpower for America.” AETC is headquartered at JBSA-Randolph and includes Air Force Recruiting Service and the Air University. AETC has 16 active-duty and seven Reserve wings. They operate at 12 major installations in Alabama, Arizona, Mississippi, Oklahoma, and Texas, and support tenant units on numerous bases around the world (AETC 2013).

2.4.4 AIR FORCE PERSONNEL CENTER

AFPC provides personnel support services and programs for active-duty and retired military personnel and their dependents, and civilian Air Force members. AFPC is headquartered at JBSA-Randolph and is responsible for worldwide personnel operations of 1.77 million force Airmen, retirees, and family members (AFPC 2016).

2.4.5 RESERVE UNITS

Reserve units at JBSA-Randolph include the 39 FTS and their parent unit the 340th Flying Training Group (340 FTG). The 340 FTG oversees the 39 FTS at JBSA-Randolph, as well as other squadrons at the other pilot training locations throughout AETC. The mission of the 340 FTG and 39 FTS is to train and provide a reserve of experienced instructor pilots to augment the AETC instructor cadre in the event of wartime mobilization. During wartime, or in the event of hostilities, the unit is mobilized to offset the anticipated loss of experienced active-duty pilot inputs into AETC's Pilot Instructor Training pipeline.

The 415th Flight Test Squadron (FLTS), another reserve unit at JBSA-Randolph, is responsible for ensuring the airworthiness of T-38 Talon aircraft after major maintenance performed at Randolph Field.

2.5 OPERATIONAL AREAS

2.5.1 JBSA-RANDOLPH AIRFIELD

JBSA-Randolph has a unique design, with the building area centered on the field, streets laid out concentrically, and the aircraft ramps and parallel runways situated on the eastern and western sides of the base perimeter. The installation occupies approximately 2,900 acres of land. Airfield components at JBSA-Randolph are shown in Figure 2-2.

The airfield is equipped with two Class B parallel runways¹ running northwest/southeast on opposing sides of the base perimeter. Class B runways are primarily used by large, heavy, and high-performance aircraft. Runway 15L/33R measures 8,351 feet long and 200 feet wide and runs along the northeastern border of JBSA-Randolph. Runway 15R/33L measures 8,352 feet long and 200 feet wide and runs along the southwestern border of JBSA-Randolph. The overruns at the ends of each runway are 1,000 feet long. The airfield elevation is 762 feet above mean sea level (MSL). Runway 15L/33R has a high-intensity approach lighting system with centerline sequenced flashers, and Runway 15R/33L has precision approach path indicators. Instrument Landing System approaches are conducted on all runways.

The airfield operates Monday through Friday from 7:00 a.m. to 7:00 p.m. and on Sunday from 1:00 p.m. to 4:00 p.m., and is closed on Saturday and federal holidays. Current hours of operation and the schedule for weekend hours or holidays are published by the DoD or Federal Aviation Administration (FAA) in Notices to Airmen. Extenuating circumstances can result in extended operating hours or temporarily suspended operations. The airfield may be temporarily closed in consideration of landing area conditions, crash crew equipment availability, status of navigational aids, and severe weather conditions.

2.5.2 SEGUIN AUXILIARY AIRFIELD

Seguin AAF is a 956-acre training field used for T-38 and T-6 approaches and touch-and-go operations. The airfield consists of one Class B runway, designated as Runway 13/31, measuring 8,350 feet long and 150 feet wide. The airfield elevation is 525 feet MSL. The airfield operates from sunrise to sunset Monday through Friday, and is closed on weekends and federal holidays. The airfield does not have a control tower; however, a manned Runway Supervisor Unit is used for observation and safety control during flight operations. Additionally, the airfield is equipped with fire and rescue assets. Airfield components at Seguin AAF are shown in Figure 2-3.

¹ A runway is typically used in both directions and counted as two separate runways, depending on the direction of the departure. Each direction is labeled as a separate runway and numbered based on its magnetic heading. Parallel runways have the same heading but include the suffixes “L” and “R” for left and right, respectively.

Figure 2-2: JBSA-Randolph Airfield

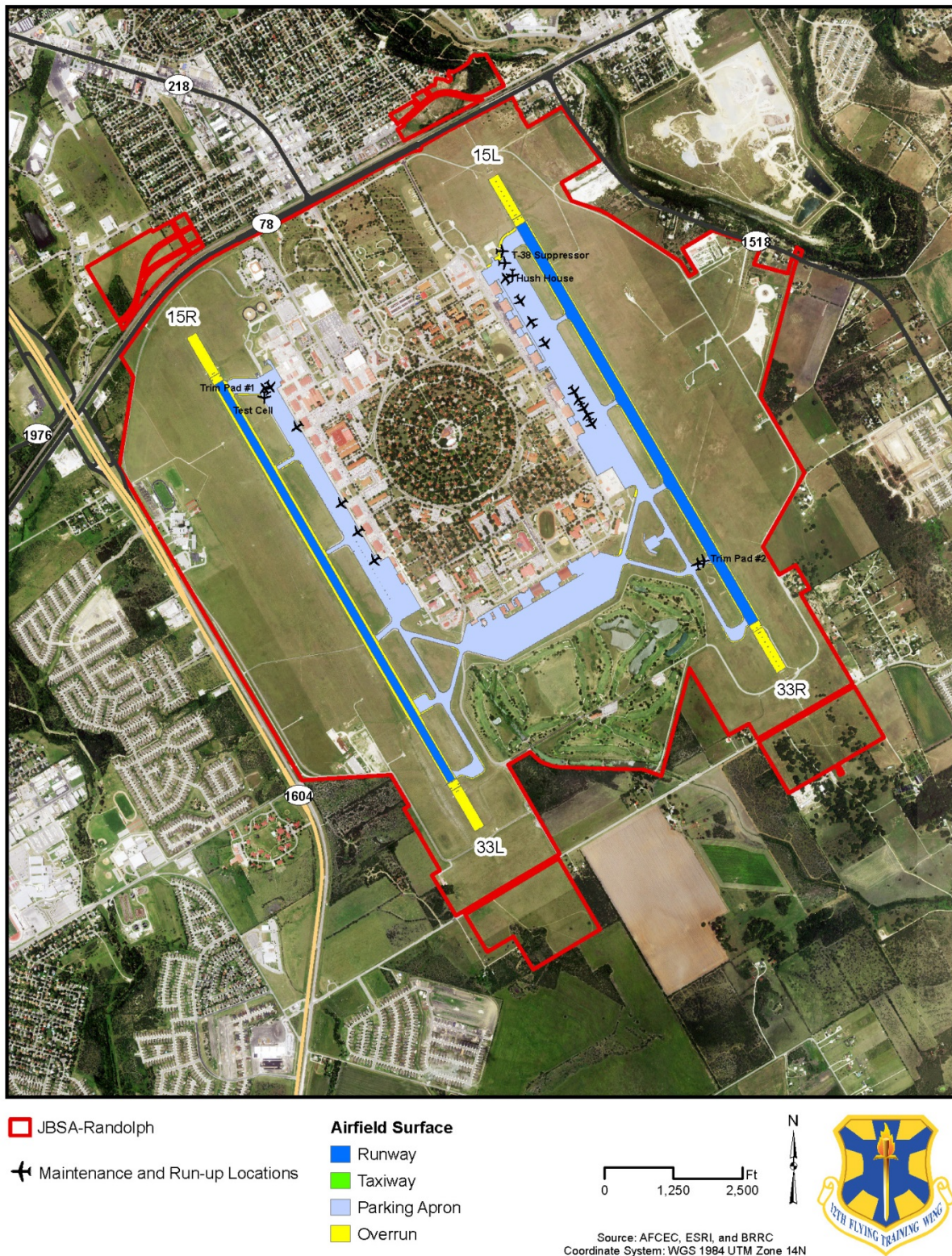
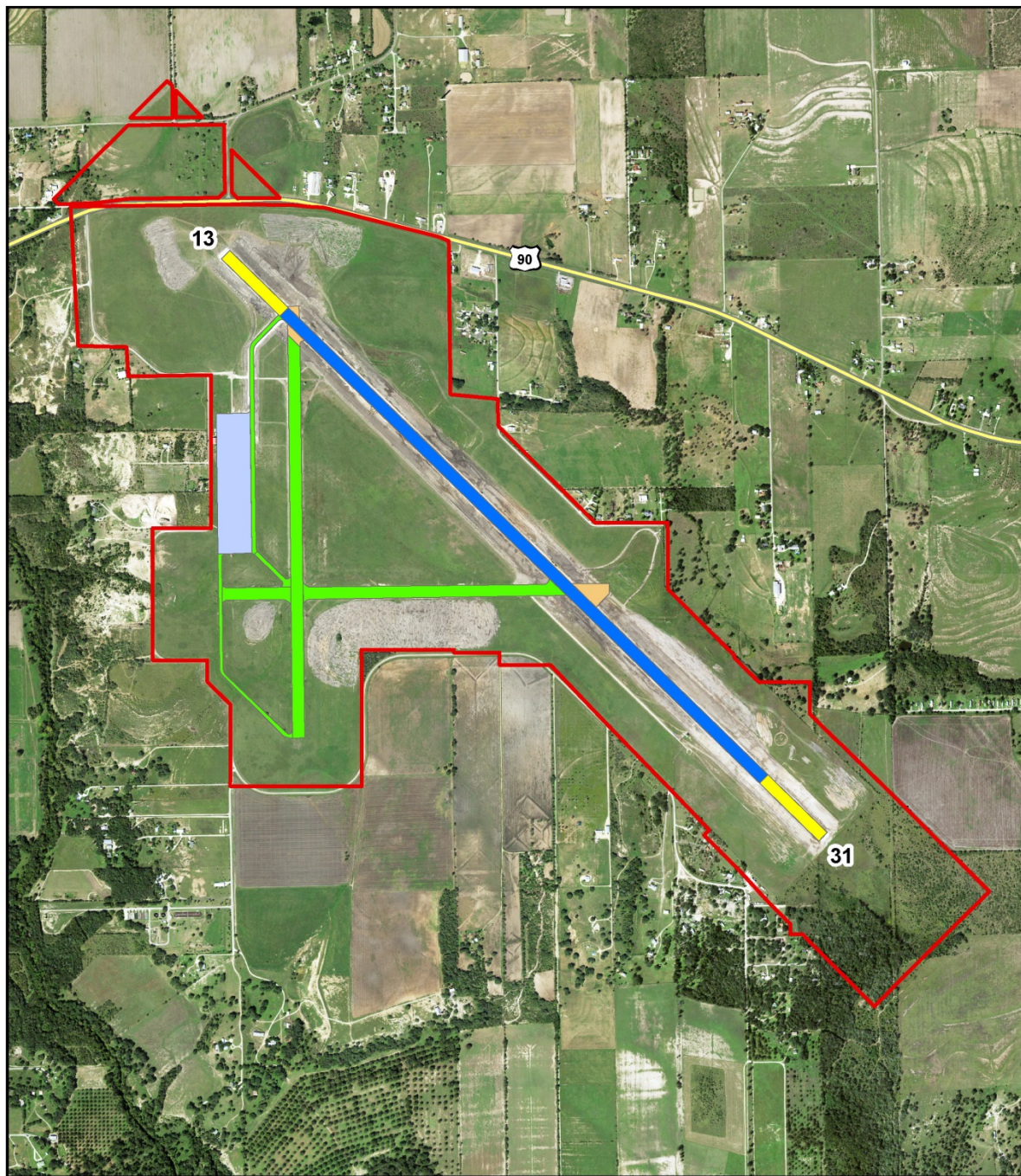


Figure 2-3: Seguin Auxiliary Airfield



Seguin Auxiliary Airfield

Airfield Surfaces

- Runway
- Taxiway
- Parking Apron
- Overrun
- Helipad

0 1,000 2,000 Ft



Source: AFCEC and ESRI
Coordinate System: WGS 1984 UTM Zone 14N

2.6 LOCAL ECONOMIC IMPACTS

The military provides direct, indirect, and induced economic benefit to local communities through jobs and wages. Benefits include employment opportunities and increases in local business revenue, property sales, and tax revenue. According to the Texas Comptroller's Office economic analysis, the DoD contributed \$136 billion to the Texas economy in 2015 (Office of the Governor 2016).

The economic impact of a military installation is based on annual payroll (jobs and salaries), annual expenditures, and the estimated annual dollar value of 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.

Based on the 2014 Economic Impact Report, JBSA-Randolph directly employs approximately 9,386 military and civilian personnel, with military dependents accounting for an additional 2,536 personnel (JBSA 2014b). JBSA-Randolph's spending generated \$122 million in local expenditures, including construction, services, and procurement methods, and created an additional 5,552 jobs in the local communities. In total, JBSA-Randolph has an estimated total economic impact of nearly \$1.15 billion on the local economy. The majority of this economic impact was due to the annual payroll and the estimated value of jobs created.

A summary of personnel for JBSA-Randolph is provided in Table 2-1, and a summary of the economic impact of the base is provided in Table 2-2.

Table 2-1: Personnel by Classification at JBSA-Randolph

Classification	Total
Active Duty Military	2,770
Reserve and Guard	314
Total Military	3,084
Appropriated Fund Civilian Employees	5,318
Other Civilian Employees	984
Military Dependents	2,536
Total Civilian	8,838
Grand Total	11,922

Source: JBSA 2014b

Table 2-2: Annual Economic Impact of JBSA-Randolph

Payroll	(\$)
Military	391,312,386
Federal Civilian	405,202,928
Other Civilian	11,376,003
Total	807,891,317
Expenditures	(\$)
Annual Expenditures	122,122,761
Estimated Annual Dollar Value of Jobs Created	225,076,720
Annual Payroll	807,891,317
Total Economic Impact	1,155,090,798

Source: JBSA 2014b

3 AIRCRAFT OPERATIONS

Flying activities, including where aircraft fly, how high they fly, how many times they fly over a given area, and the time of day they operate, must be fully evaluated to understand the relationship of flight operations and land use. This chapter discusses aircraft based at or transient to JBSA-Randolph, 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

3.1.1 BASED AIRCRAFT

Flight operations at JBSA-Randolph are conducted by jet and turboprop aircraft. Based aircraft at JBSA-Randolph include the T-1 Jayhawk, the T-6A Texan II, and the T-38C Talon. The T-6A accounts for the majority of flight operations at JBSA-Randolph and Seguin AAF. No aircraft are stationed at Seguin AAF. Table 3-1 presents based aircraft at JBSA-Randolph and the associated flying units.

Table 3-1: Based Aircraft at JBSA-Randolph

Squadron/Unit	Aircraft Type	Description
99 FTS	T-1	Twin-engine medium-range jet trainer
559 FTS	T-6A	Single-engine turboprop trainer
560 FTS	T-38C	Twin-engine supersonic jet trainer
435 FTS	T-38C IFF	Twin-engine supersonic jet trainer

Notes:

FTS Flying Training Squadron or Fighter Training Squadron
IFF Introduction to Fighter Fundamentals

3.1.1.1 T-1 “JAYHAWK”

The T-1A Jayhawk is a medium-range jet trainer aircraft used for advanced navigator training and specialized undergraduate training for student pilots identified to fly airlift or tanker aircraft.

The aircraft is powered by twin turbofan engines, and has two side-by-side seats for primary pilots and a third seat behind the instructor seat for a trainee. The aircraft’s length is approximately 48 feet with a height of 14 feet and a wingspan of 43.5 feet. The



aircraft has a maximum speed of 538 miles per hour and a maximum range of 2,200 nautical miles. The T-1A has structural enhancements for increased bird strike protection and an additional fuselage fuel tank (Air Force 2005a).

3.1.1.2 T-6A “TEXAN II”

The T-6A Texan II turboprop trainer is the primary aircraft used for Joint Primary Pilot Training in basic flying skills common to Air Force and Navy pilots. Training in the T-6A at JBSA-Randolph began in 2000.

The T-6A Texan II is a single-engine aircraft with stepped-tandem seating in the single cockpit that allows for the student and instructor positions to be interchanged. The aircraft can also be flown by a single pilot in the front seat.



The aircraft is powered by one Pratt & Whitney 1,100-horsepower engine; due to its thrust-to-weight ratio, this aircraft can perform an initial climb of 3,100 feet per minute and can reach 18,000 feet in fewer than six minutes (Air Force 2003). The aircraft's length is approximately 33.3 feet, with a height of 10.8 feet and a wingspan of 33.4 feet. The aircraft has a maximum speed of 320 miles per hour and a maximum range of 900 nautical miles.

3.1.1.3 T-38C “TALON”

T-38C Talon is a twin-engine, high-altitude, supersonic jet trainer used in a variety of roles because of its design, economy of operations, ease of maintenance, high performance, and exceptional safety record. The aircraft is predominantly used by the AETC for undergraduate pilot and pilot instructor training.



The T-38C replaced the T-38A model at JBSA-Randolph in 2004. The modified T-38C model is equipped for training for air combat and weapons delivery, and is used to prepare pilots for the transition to fighter and bomber aircraft (Air Force 2004). The aircraft is powered by two General Electric J85-GE-5 turbojet engines with maximum thrust of 2,200 pounds without afterburner and maximum thrust of 3,300 pounds with afterburners. The aircraft is approximately 46 feet long, 12.8 feet tall, and has a 25-foot wingspan. This aircraft has airspeed of 812 miles per hour and a range of 1,093 miles (Air Force 2005b). This jet trainer is

also used for the IFF program, which is a specialized course for pilots who have earned their wings in undergraduate pilot training and prepares them for fighter aircraft operations.

3.1.2 TRANSIENT AIRCRAFT

Non-assigned aircraft at an airfield are considered transient. Aircraft typically land at other airfields to refuel or to conduct airfield training that cannot otherwise be accomplished at their home airfield. Table 3-2 lists the transient aircraft types at JBSA-Randolph in the past. In the future, other transient aircraft such as the F-22, F-35, C-17, and C-5 could potentially use JBSA-Randolph.

Table 3-2: Transient Aircraft

Aircraft Type	Description
A-10A	Twin-engine fighter jet
C-12	Twin-engine transport aircraft
C-130	Four-engine transport aircraft
C-21A	Twin-engine aircraft for airlift
F-15C	Twin-engine fighter jet
F-16C	Single-engine fighter jet
KC-135R	Four-engine refueling tanker
T-1	Twin-engine medium-range jet trainer
T-38C	Twin-engine supersonic jet trainer
UH-60A	Twin-engine medium-lift utility helicopter
T-6	Single-engine turboprop trainer

3.2 PRE-FLIGHT AND MAINTENANCE RUN-UP OPERATIONS

Pre-flight engine runs and maintenance runs are conducted prior to takeoff to test engines at various power settings and durations, and to check for malfunctions. Run-up locations are designated areas along the flight line where pilots or mechanics can conduct last-minute engine checks without obstructing ground traffic. To the maximum extent possible, engine run-up locations are established in areas that minimize noise impacts on base and in the surrounding communities. Additionally, engine testing occurs in “test cells” or “hush houses”, which are buildings specifically designed to muffle noise during engine testing. A hush house is a large enclosed, noise-suppressed facility that can accommodate an entire aircraft, and a test cell is used for out-of-frame engine testing. There are numerous parking areas where JBSA-Randolph conducts run-up operations in addition to the two trim pads, one hush house, and one test cell at JBSA-Randolph. No pre-flight or engine maintenance run-up operations are performed at Seguin AAF. Modeled engine run-up locations are depicted in Figure 2-2.

Engine runs are not typically conducted between 10:00 p.m. and 6:30 a.m.; however, depending on mission necessity, maintenance engine runs could occur during nighttime hours. A small percent (less than 1 percent) of idle engine runs for T-38 are occasionally conducted

before 7:00 a.m. The noise associated with pre-flight and engine maintenance engine runs was included in the noise analysis and modeling associated with the noise contours.

3.3 FLIGHT OPERATIONS

An aircraft operation is defined as one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because the aircraft crosses over a runway threshold twice, once on arrival and once on departure. Typical flight operations conducted at JBSA-Randolph include:

- **Departure.** An aircraft takes off to a training area or as part of a training maneuver.
- **Approaches and Arrivals.**
 - **Straight-In/Full-Stop Arrival.** An aircraft lines up on the runway extended centerline, descends gradually, lands, comes to a full stop, and then taxis off the runway.
 - **Overhead Arrival.** An expeditious arrival using visual flight rules (VFR). The aircraft arrives over the airfield at pattern altitude and then breaks (turns), performing a 180-degree turn to enter the landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and performs a 180-degree descending turn to land on the runway.
 - **Low Approach.** Runway approach where the pilot descends near the runway, typically lower than 500 feet, then increases altitude without making contact with the runway.
 - **Radar Approach.** An instrument approach where ATC actively provides assistance to aircraft. ATC personnel direct the aircraft to align with the runway centerline and glideslope to the runway, continuing until the pilot gains visual contact with the runway environment.
 - **Emergency Landing Procedures.** An approach procedure with engines at idle that is used when the engine reliability is questionable or when there are indications of impending engine failure. Emergency landing procedures are accomplished by all aircraft at JBSA-Randolph for both emergencies and training; however, T-6 aircraft emergency landing procedures differ most from typical procedures.
- **Patterns.** Patterns refer to operations where the pilot trains in a circuit at the airfield. Patterns are designed with either left- or right-hand turns, depending on variables that include airport design/layout and urban development/noise restrictions.

A pilot can operate an aircraft by VFR or instrument flight rules (IFR). VFR is a standard set of rules that govern the procedures for conducting flight under visual conditions (i.e., pilots remain clear of clouds, avoid other aircraft, and usually fly unassisted by ATC). IFR is a standard set of rules governing the procedures for conducting flights whereby ATC provides for separation between aircraft and is the standard flight rule

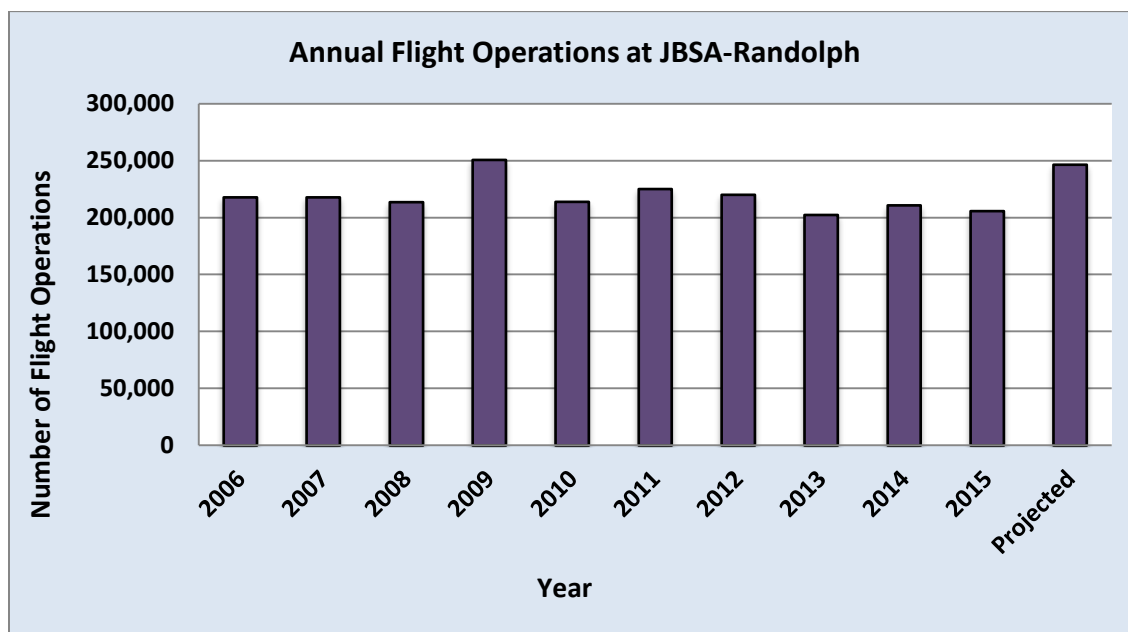
used outside of the local traffic pattern. Pilots flying IFR do so with the assistance of ATC and aircraft instruments.

- **Touch and Go.** A touch-and-go landing pattern is a maneuver that involves landing on a runway and taking off again without coming to a full stop. Usually the pilot then circles the airport in a defined pattern known as a circuit and repeats the maneuver.

3.4 ANNUAL OPERATIONS

Figure 3-1 summarizes flight operations that occurred at JBSA-Randolph over a 10-year period, including based and transient aircraft operations. Total annual operations account for each departure and arrival, including those conducted as part of a pattern operation.

Figure 3-1: Summary of Flight Operations



3.4.1 PROJECTED FLIGHT OPERATIONS

A total of 248,046 annual flight operations are projected at JBSA-Randolph for the 2017 AICUZ Study, which reflects an approximate 20 percent increase in flight operations since 2015; however, the projected operations are based on current optimal flying schedules and sortie² rates and are not indicative of changes to the mission or introduction of new training requirements at JBSA-Randolph. A total of 102,264 annual flight operations are projected at Seguin AAF, also based on optimal flying schedules and sortie rates. Projected operations at

² A sortie is “an aircraft flight consisting of one departure, one approach, and any number of closed patterns... One sortie is made up of more than one operation” (Air Force 2017).

Seguin AAF reflect increased T-6 operations. No operations are projected to occur from 10:00 p.m. to 7:00 a.m. at either airfield.

Table 3-3 summarizes the annual flight operations for JBSA-Randolph and Seguin AAF. Consistent with Air Force policy, aircraft operations are modeled on an annual average day basis that is based on 365 flying days per year. Average annual day is used to define the average number of daily airfield operations that would occur during a 24-hour period.

Table 3-3: Projected Annual Flight Operations at JBSA-Randolph and Seguin AAF

Aircraft	Departures	Arrivals	Closed Patterns	Total
JBSA-Randolph Assigned Aircraft				
T-1	3,220	3,220	966	7,406
T-6	16,740	16,740	107,135	140,615
T-38C	10,500	10,500	50,400	71,400
T-38 IFF	10,044	10,044	4,018	24,106
T-38 Depot	460	460	552	1,472
JBSA-Randolph Transient Aircraft				
A-10A	45	45	--	90
C-12	239	239	--	478
C-130	82	82	--	164
C-21A	75	75	--	150
F-15C	110	110	--	220
F-16C	97	97	--	194
KC-135R	51	51	--	102
T-1	206	206	--	412
T-38C	412	412	--	824
T-6	146	146	--	292
UH-60A	62	62	--	124
JBSA-Randolph Total				248,049
Seguin AAF Assigned Aircraft				
T-6	5,022	5,022	50,220	60,264
T-38C	3,500	3,500	35,000	42,000
Seguin AAF Total				102,264

Notes:

Closed Patterns count as two operations each.

3.5 FLIGHT TRACKS AND RUNWAY UTILIZATION

Each runway has designated flight tracks that provide for the safety, consistency, and control of an airfield. A flight track is a route an aircraft follows while conducting an operation at the airfield, between airfields, or to/from training areas. Flight tracks typically include departures, arrivals, and local area patterns to depict where the aircraft fly in relation to the airfield.

While flight tracks are graphically represented as single lines in this study, the actual flight track over the ground is much broader due to aircraft performance, pilot technique, and weather conditions. Flights are idealized representations based on pilot and ATC input. Figures 3-2 through 3-7 illustrate the arrival, departure, and pattern flight tracks, respectively, for JBSA-Randolph. Figures 3-8 through 3-10 illustrate the arrival, departure, and pattern flight tracks, respectively, for Seguin AAF.

3.5.1 JBSA-RANDOLPH FLIGHT TRACK AND RUNWAY UTILIZATION

Predominant runway usage at JBSA-Randolph occurs on Runway 15L for T-1 and T-38 training (80 to 85 percent), with the exception of T-38 Depot training departures, which occur on Runway 15R (83 percent). The predominant runway used for T-6 is Runway 15R (80 percent). The remaining runway use is divided between Runway 33R (14 to 20 percent for T-1 and T-38) and Runway 33L (20 percent for T-6 and 14 percent for T-38 Depot departure). Transient flight runway usages are split between Runway 15L (85 percent) and Runway 33R (15 percent).

3.5.2 SEGUIN AAF FLIGHT TRACK AND RUNWAY UTILIZATION

Predominant runway usage at Seguin AAF occurs on Runway 13 (80 percent); the remaining 20 percent occurs on Runway 31.

Table 3-4 presents the combined runway utilization at both JBSA-Randolph and Seguin AAF.

Table 3-4: Runway Utilization at JBSA-Randolph and Seguin AAF

Runway	Aircraft Using Runway	Arrivals (percent)	Departures (percent)	Patterns (percent)
JBSA-Randolph				
15L	T-1, T-38C, T-38 IFF, T-38 Depot, Transient	50	50	28
33R	T-1, T-38C, T-38 IFF, T-38 Depot, Transient	8	8	13
15R	T-6, T-38 Depot	32	32	53
33L	T-6, T-38 Depot	10	10	6
Seguin AAF				
13	T-6, T-38C	80	80	80
31		20	20	20

3.6 NOISE ABATEMENT PROCEDURES

The Air Force strives to be a good neighbor and actively pursues operational measures to minimize aircraft noise. Noise abatement procedures apply to flight operations, as well as to engine run-up and maintenance operations conducted on station. To the greatest extent possible, flights are routed over sparsely populated areas to reduce the exposure to noise. Through Air Force regulations, commanders are required to periodically review existing traffic patterns, instrument approaches, weather constrictions, and operating practices in relation to populated areas and other local situations.

The JBSA-Randolph Inflight Guides provide detailed noise abatement procedures for departures, patterns, and arrivals, including:

- Commanders brief flight crews (pilots and ground maintenance) before each flight on the existing patterns designed to minimize disruption to the communities and the need to maintain the patterns;
- Pilots avoid noise-sensitive areas for low-level routes and avoid airspace conflicts with flight operations from San Antonio International Airport; and
- Pilots and maintenance crew conduct high-power turns, to the extent possible, between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 1:00 p.m. and 4:00 p.m. on Sundays.

At Seguin AAF, the flight tracks were designed to avoid overflying the City of Seguin.

3.7 NOISE COMPLAINTS

All noise complaints are evaluated to ensure that future operations, where possible, do not generate unacceptable noise, and that the results from noise investigations are provided back to the complainant as soon as practical. The Public Affairs Officer will inform local officials about upcoming events and post notifications on the base website. Concerned citizens are encouraged to contact the 12 FTW Public Affairs Office at 210-652-1272 with any noise complaints.

Figure 3-2: Arrival Flight Tracks, JBSA-Randolph Runway 33R and 15L

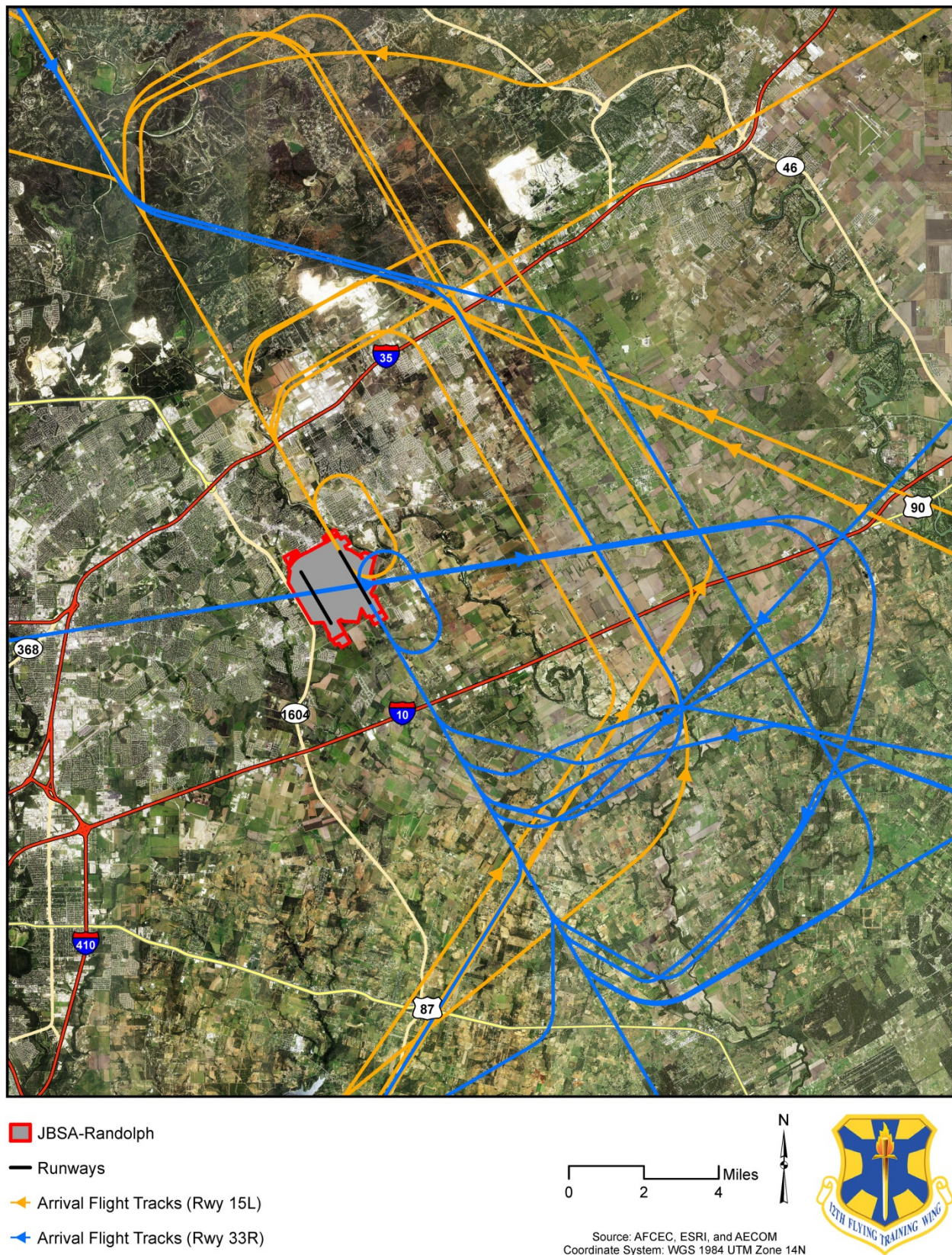


Figure 3-3: Arrival Flight Tracks, JBSA-Randolph Runway 33L and 15R

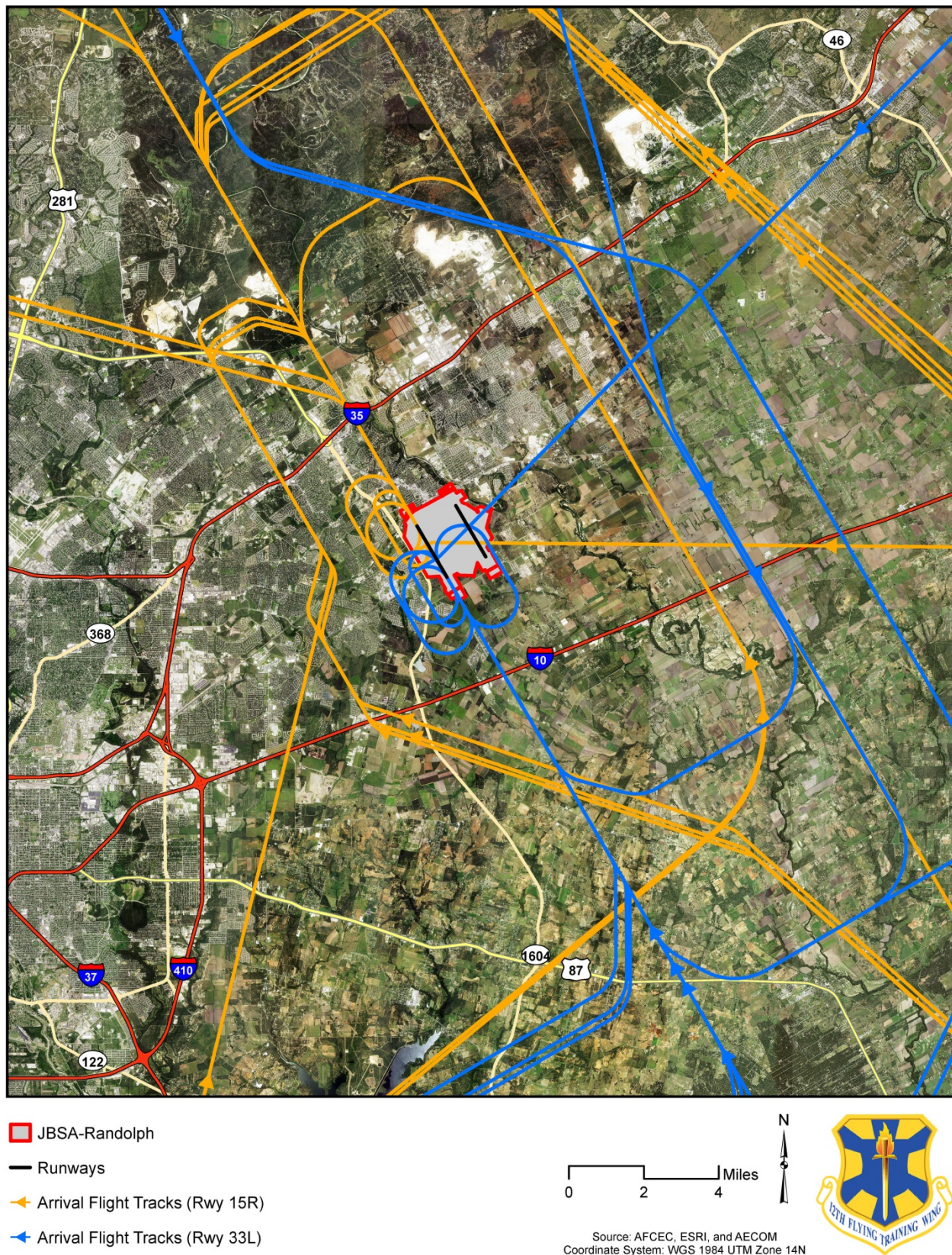


Figure 3-4: Departure Flight Tracks, JBSA-Randolph Runway 33R and 15L

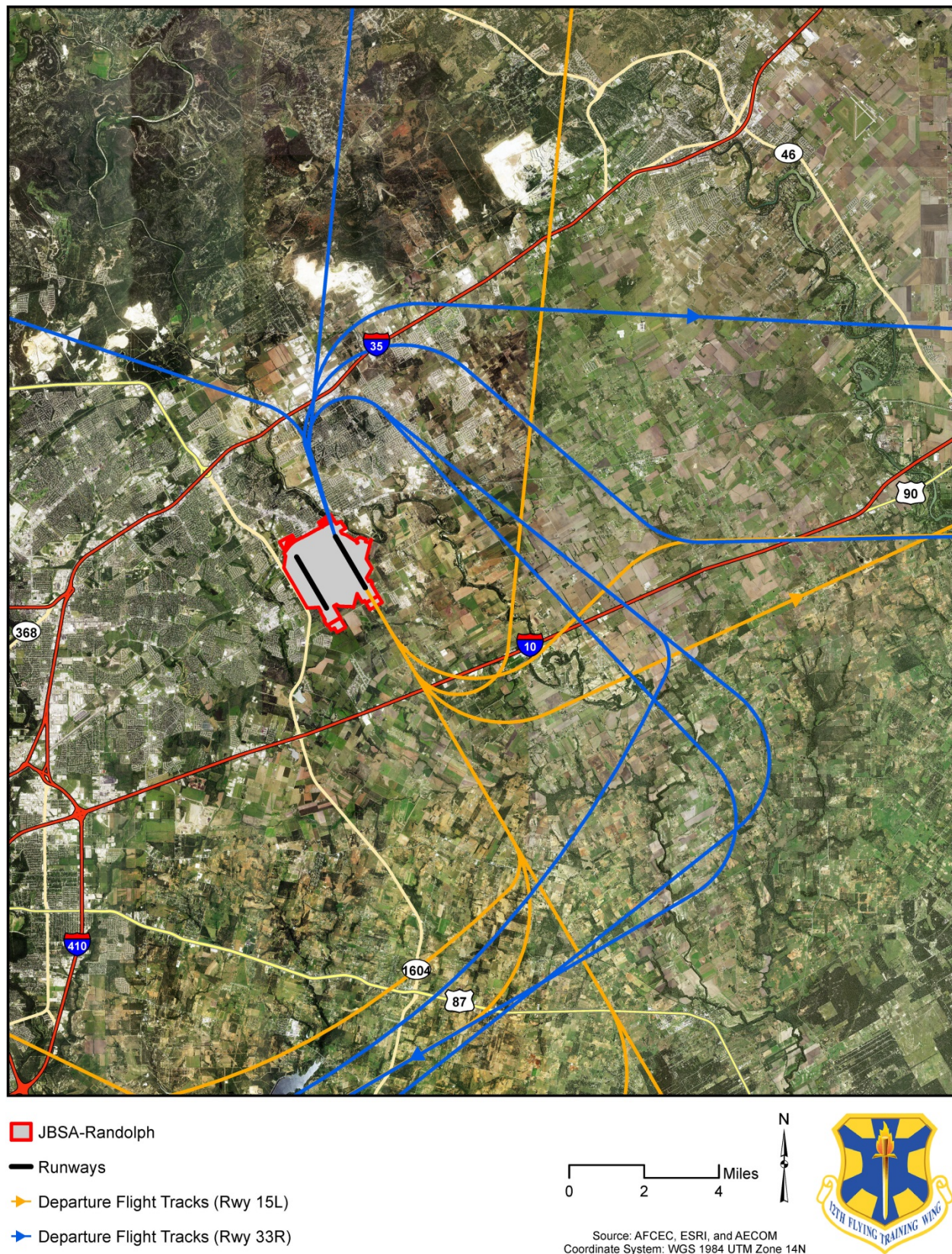


Figure 3-5: Departure Flight Tracks, JBSA-Randolph Runway 33L and 15R

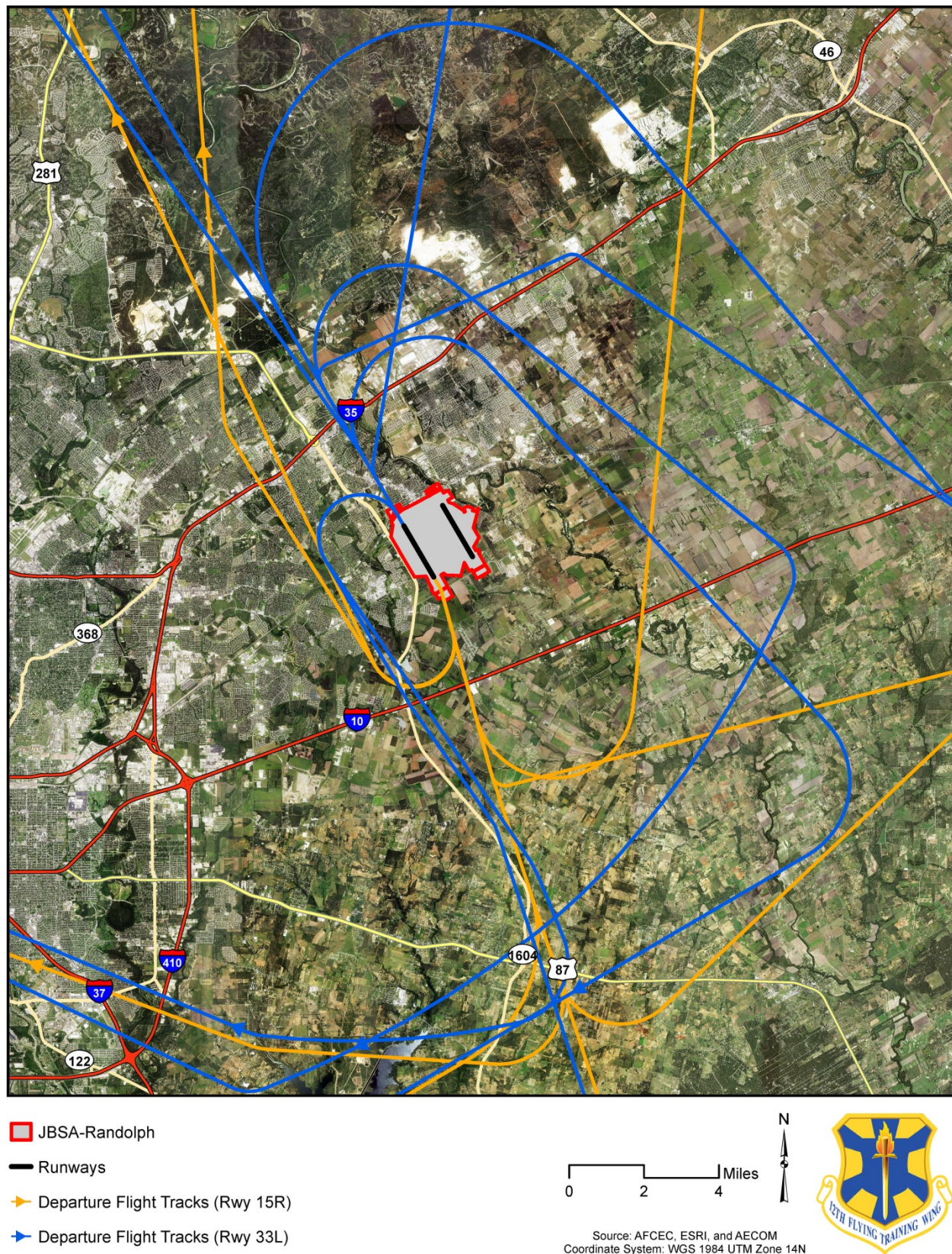


Figure 3-6: Pattern Flight Tracks, JBSA-Randolph 33R and 15L

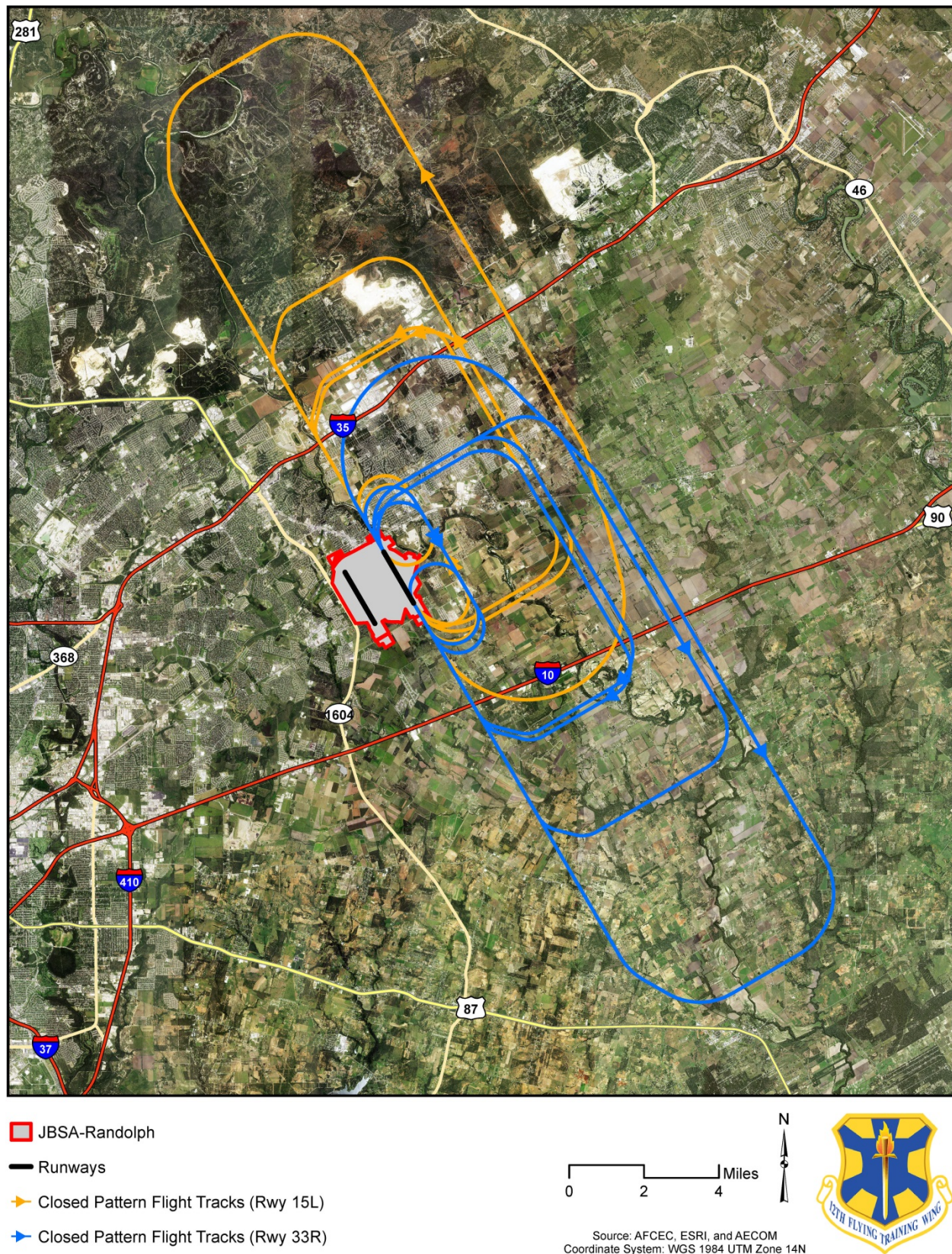


Figure 3-7: Pattern Flight Tracks, JBSA-Randolph 33L and 15R

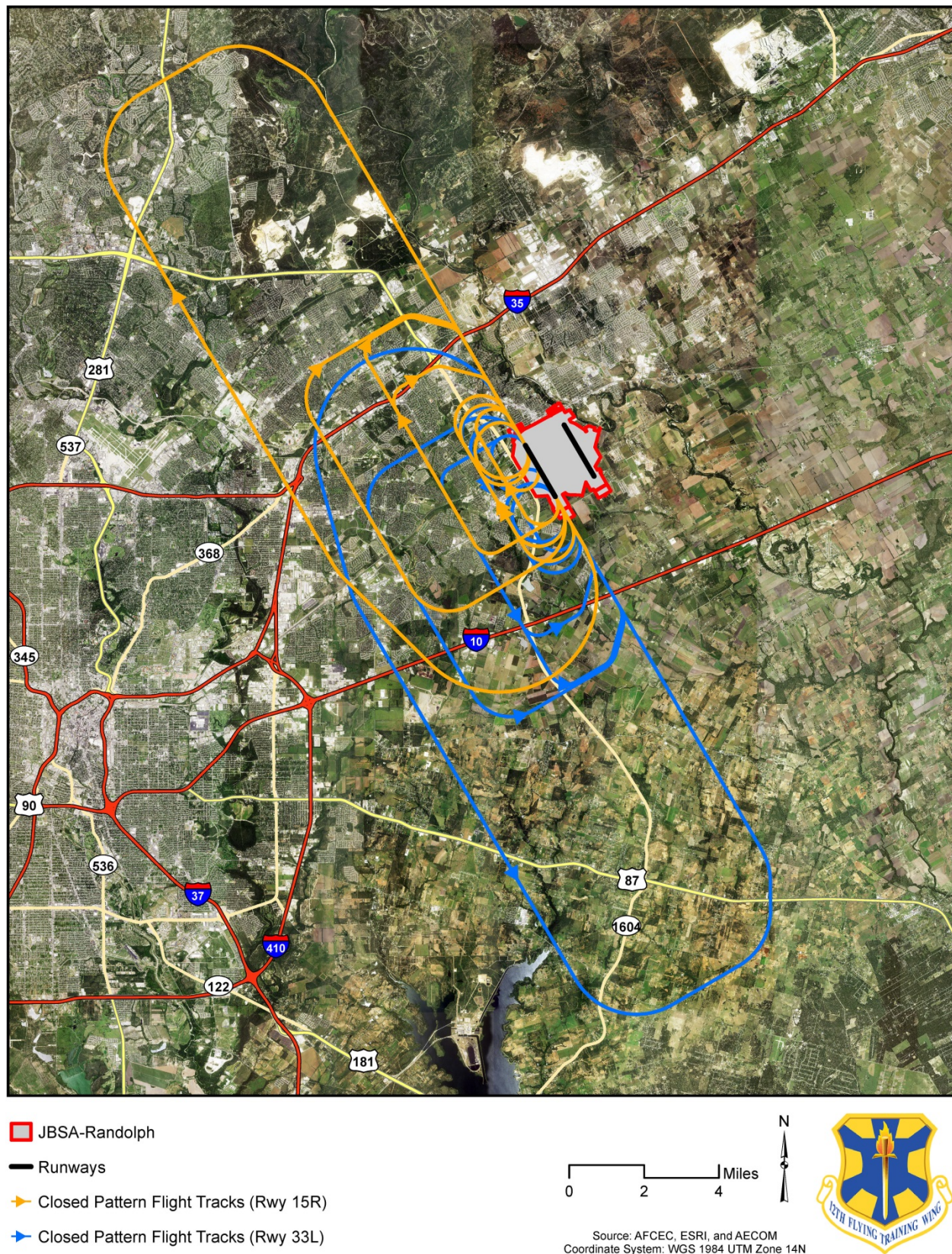


Figure 3-8: Arrival Flight Tracks, Seguin AAF

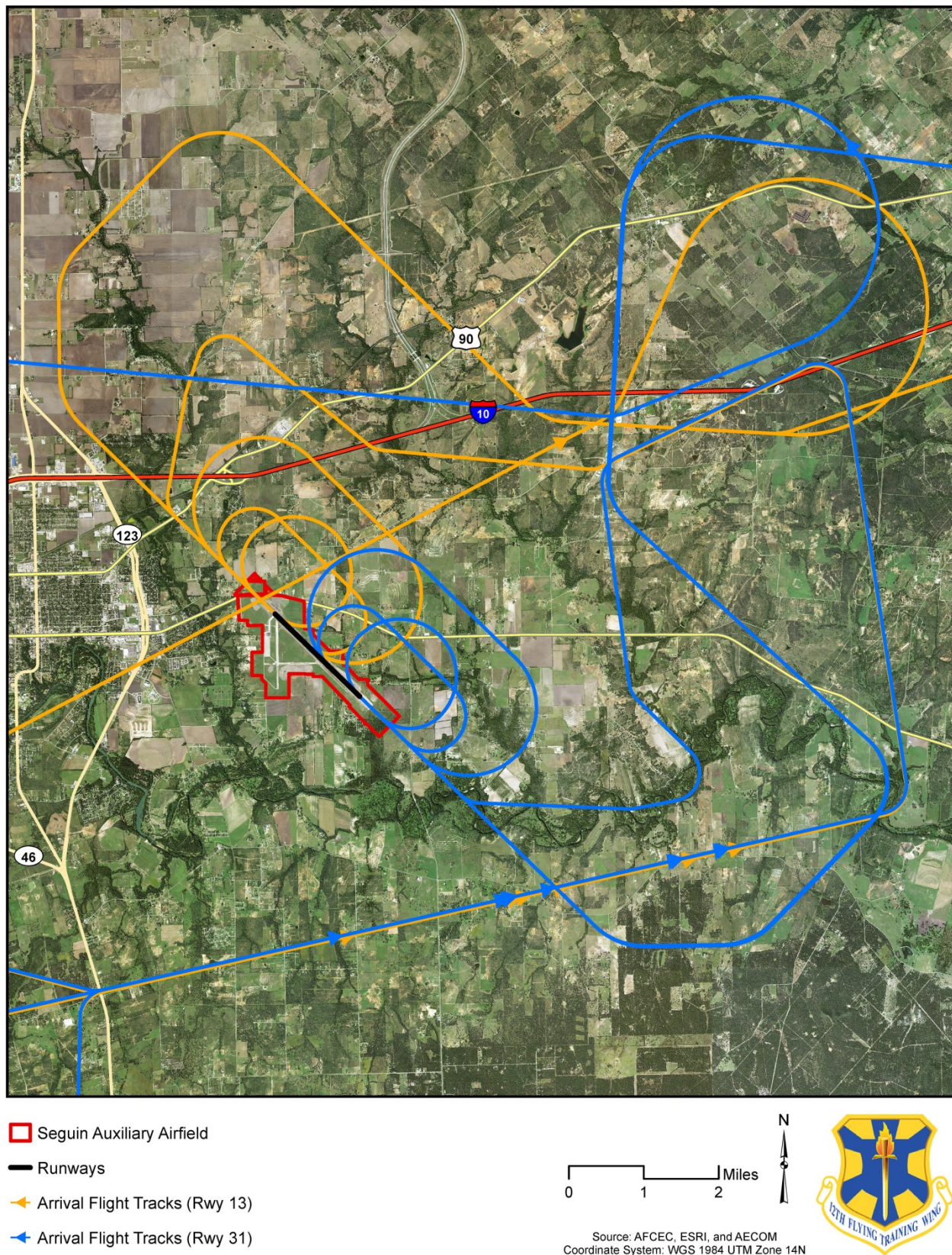


Figure 3-9: Departure Flight Tracks, Seguin AAF

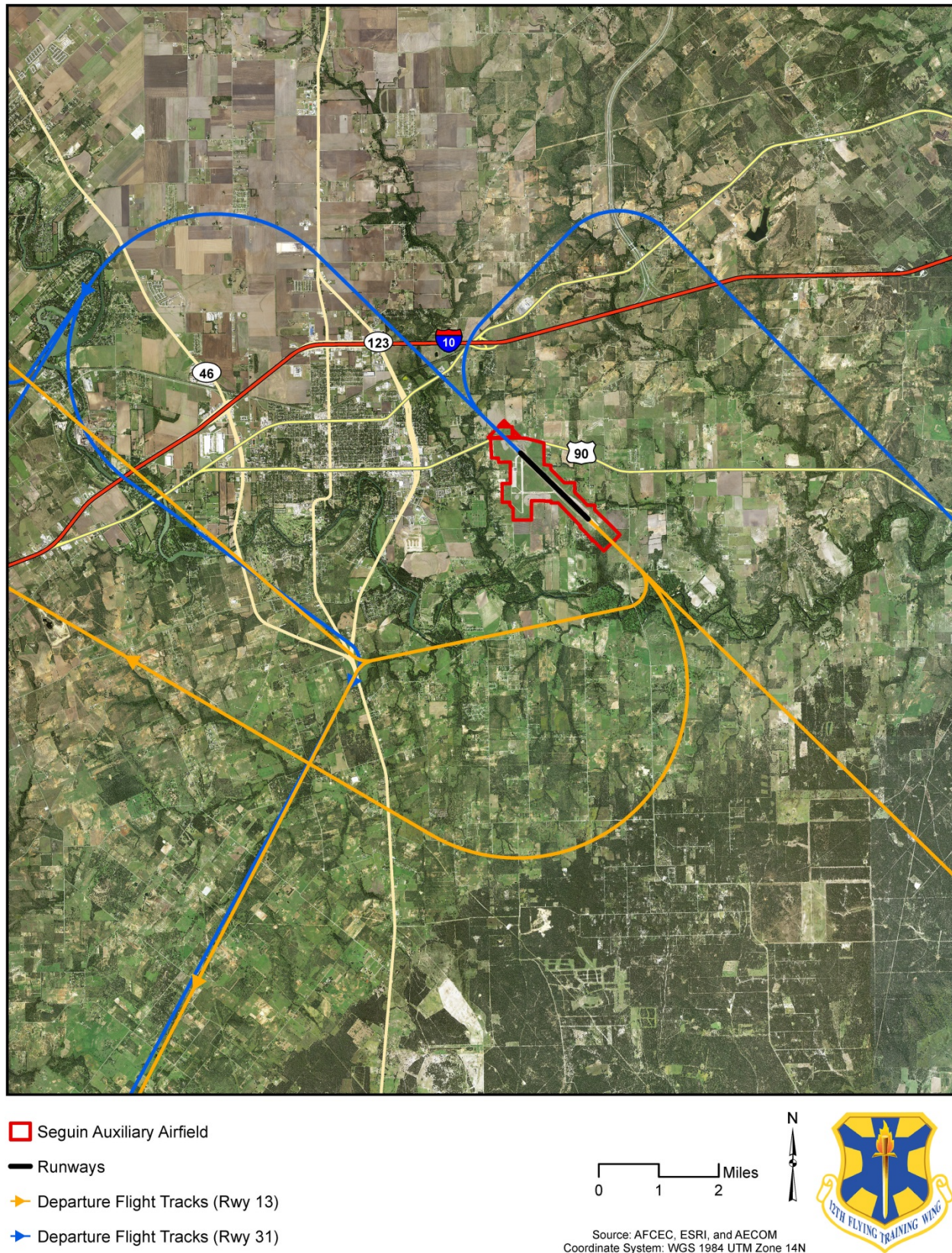
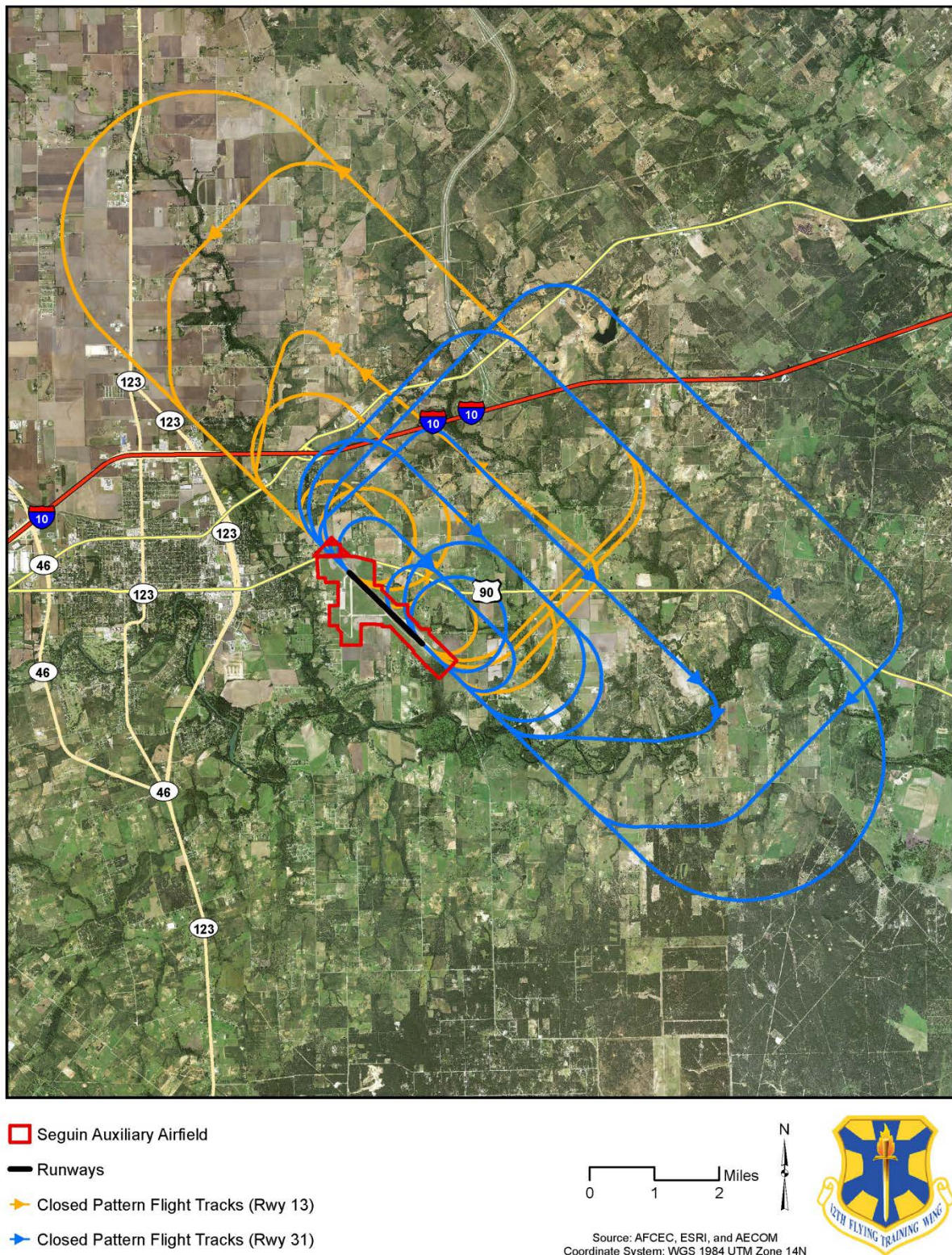


Figure 3-10: Pattern Flight Tracks, Seguin AAF



4 AIRCRAFT NOISE

How an installation manages aircraft noise can play a key role in shaping the installation's relationship with the adjacent communities. Aircraft noise management is also a key factor in local land use planning. Because noise from aircraft operations may significantly affect areas surrounding the installation, JBSA-Randolph has defined noise zones using the guidance provided in the AICUZ Instruction. The AICUZ noise contours are based on aircraft type, type of flight operations (i.e., arrivals, departures, and patterns), and time of day that aircraft are flown.

4.1 WHAT IS SOUND/NOISE?

Sound is vibrations in the air, which can be generated by a multitude of sources to include roadway traffic, a barking dog, a radio—or aircraft operations. The vibrations are known as compression waves. Just like a pebble dropped into a pond creates ripples, the compression waves—formed of air molecules pressed together—radiate out, decreasing with distance. If these vibrations reach our eardrum at a certain rate and intensity, we perceive it as sound. When the sound is unwanted, we refer to it 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 is related 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 the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. Sound frequency is measured in terms of cycles per second or hertz (Hz). While the range of human hearing goes from 20 to 20,000 Hz, we hear best in the range of 1,000 to 4,000 Hz. For environmental noise, we use A-weighting, which focuses on this range, to best represent human hearing. While A-weighted decibels may be written as “dBA”, if it is the only weighting being discussed, the “A” is generally dropped.
- Duration is the length of time the sound can be detected.

4.2 HOW IS SOUND PERCEIVED

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because such large numbers become awkward to use, we measure noise in decibels (dB), which uses a logarithmic scale that doubles the noise energy every three decibels.

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 begin to be felt inside the human ear as discomfort, while sound levels between 130 and 140 dB are felt as pain.

Figure 4-1: Sound Levels of Typical Sources and Environments

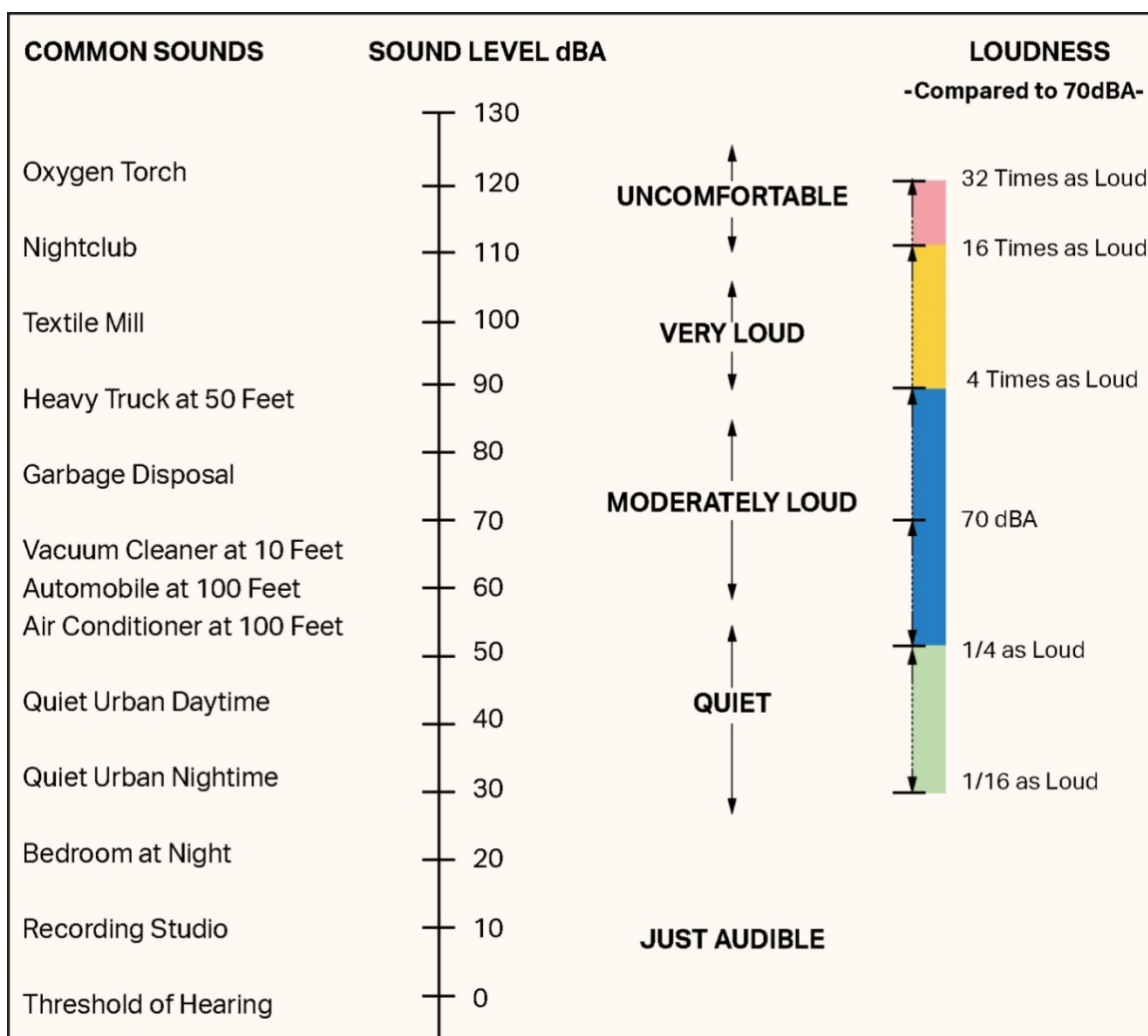


Table 4-1 tabulates the subjective responses with change in (single-event) sound level. While noise energy doubles or halves with every three-dB change, we do not perceive all that noise energy. It takes a 10 dB increase or decrease for our ear to perceive a doubling or halving of loudness.

Table 4-1: Subjective Responses to Changes in A-Weighted Decibels

Change	Change in Perceived Loudness
1 dB	Requires close attention to notice
3 dB	Barely perceptible
5 dB	Quite noticeable
10 dB	Dramatic, perceived as twice or half as loud
20 dB	Striking, fourfold change

4.3 THE DAY-NIGHT AVERAGE SOUND LEVEL

When we hear an aircraft fly overhead, the question may be asked, “How loud was that?” While we may often find ourselves concerned over the loudness of a sound, there are other dimensions to the sound event that draw our interest. For instance, does one overflight draw the same interest as two separate overflights – or as 20 overflights? Also, does the 30-second engine run-up prior to takeoff draw the same interest as a 30-minute maintenance run? Additionally, is an overflight more noticeable at 2 p.m. or at 2 a.m., when the ambient noise is low and people are trying to sleep?

The length and number of events – the total noise energy – and the time of day play key roles in our perception of noise. To reflect these concerns, the Air Force uses the day-night average sound level (DNL) metric to describe the cumulative noise exposure that results from all aircraft operations. DNL is a standard noise metric created by the United States Environmental Protection Agency to describe the effects of noise on humans, and is used throughout the United States.

DNL, when used as a metric for aircraft noise, represents the accumulation of noise energy from all individual aircraft noise events in a 24-hour period. Because aircraft operations at military airfields fluctuate from day to day, the DNL value is typically based on an entire year of operations and thus represents the annual average day of aircraft events. Additionally, for all operations between 10:00 p.m. and 7:00 a.m., 10 decibels are added to each event to account for the intrusiveness of nighttime operations.

DNL is not a level of noise heard at any given time, but represents long-term noise exposure. Scientific studies of community response to numerous types of environmental noise have found strong correlation between the level of annoyance and the level of average noise exposure measured in DNL.

DNL is depicted visually as a noise contour that connects points of equal value. The noise contours in this document are depicted in 5-dB increments (60, 65, 70, 75, 80, and 85 dB DNL).

The area between two noise contours is the noise exposure area. Calculated noise contours do not represent exact measurements. Noise levels inside a contour may be similar to those outside a contour line. When the contour lines are close, the change in noise level is greater. When the contour lines are far apart, the change in noise level is gradual.

4.4 AICUZ NOISE CONTOURS

Noise contours provide the installation, local community planning organizations, and the general public with maps of the modeled noise-related impacts of aircraft operations. Noise contours, when overlaid with local land uses, can help identify areas of incompatible land uses and help plan for future development around an air station.

4.4.1 PLANNING CONTOURS

This AICUZ Study provides planning noise contours. Local land use planning involves long-range strategies that influence the present and future uses of land, and frequent AICUZ Study updates can undermine a community's planning assumptions for comprehensive planning. To assist communities, the Air Force provides planning contours that describe the long-term aircraft noise environment for projected aircraft operations to be more consistent with the planning horizon used by state, tribal, regional and local planning bodies.

These projections are based on the best available, realistic projections of unclassified estimates of future mission requirements, including reasonable projections of future operations based on trends in operational tempo, retirement of legacy aircraft, and new aircraft entering the inventory. These long-range projections are not commitments of future operations. Inclusion of planning contours in the AICUZ Study does not eliminate the need to conduct appropriate environmental analysis if an assumption used in the development of the contours becomes a proposed Air Force action.

Figures associated with the discussions provided in this section are presented at the conclusion of the respective subsections, and include:

- 2017 AICUZ noise contours with gradient for JBSA-Randolph (Figure 4-2) and Seguin AAF (Figure 4-4); and
- Comparison overlays for the 2008 and 2017 AICUZ noise contours for JBSA-Randolph (Figure 4-3), and comparison overlays for the 2000 and 2017 AICUZ noise contours for Seguin AAF (Figure 4-5).

4.4.2 JBSA-RANDOLPH AICUZ NOISE CONTOURS

The AICUZ noise contours align with the runways and follow the dominant flight tracks for arrivals, departures, and patterns at each airfield; noise propagates outward from those paths. As expected, the highest noise levels are concentrated over the airfield and along the runways. Touch-and-go patterns and departures have the greatest effect on the shape of the noise contours. Departures and the ascending portion of pattern operations require a greater power setting, which generates greater noise and influences the shape of the contours. Figure 4-2 presents the 2017 AICUZ noise contours (based on 2016 operations at JBSA-Randolph). Figure 4-3 shows a comparison of the 2017 AICUZ noise contours and the 2008 AICUZ noise contours.

The contours on Runway 15R/33L extend approximately 0.9 mile to the southeast and 0.8 mile to the northwest. T-6 flight pattern operations dominate the contour shape along Runway 15R/33L. Because the majority of T-6 operations (80 percent) occur on Runway 15 and the departure and pattern flight tracks turn slightly to the west to remain clear of traffic on Runway 15L, the contours extend slightly westward at the southern end of the runway. The T-6 is a single-engine turboprop aircraft, which is smaller and quieter than jet trainer aircraft. Consequently, the contours on Runway 15R/33L are smaller than the contours on Runway 15L/33R.

The contours on Runway 15L/33R extend approximately 3.7 miles to the southeast and 2.8 miles to the northwest. The contours on Runway 15L/33R are essentially driven by T-38 training operations, based on an 85 percent usage on Runway 15L and 15 percent usage on Runway 33R. T-38C departures from Runway 33R result in the longer contours on the northern side of the airfield, and the T-38C departures from Runway 15L result in elongated contours eastward and to the south of the airfield. The T-38 is a twin-engine fighter trainer aircraft and generates more noise than the T-6, resulting in larger contours on Runway 15L/33R than the contours on Runway 15R/33L.

Table 4-2 presents the off-base land acreage and estimated population within the JBSA-Randolph AICUZ noise contours; the population estimates are based on 2010 Census block-level data (United States Census Bureau 2010). A geometric proportion method was used to determine the estimated population within the contour bands. This method assigns population based on the portion of a census block that falls within the contour. The population across census blocks is assumed to be evenly distributed.

Table 4-2: Off-Base Land Area and Estimated Population within the 2017 AICUZ Noise Contours at JBSA-Randolph

Noise Zone	Acres	Population
65 to 69 dB DNL	1,941	1,243
70 to 74 dB DNL	644	420
75+ dB DNL	156	37
TOTAL	2,741	1,700

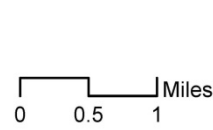
Although flight operations have slightly increased at JBSA-Randolph in comparison to the 2008 AICUZ operations, the overall off-base noise exposure area (65 dB DNL and greater) is approximately 513 acres less than the 2008 AICUZ noise exposure area.

As shown in Figure 4-3, differences in noise exposure areas occur:

- To the south of Runway 15R/33L, where the 2008 AICUZ noise contours curve slightly farther to the west;
- To the south of Runway 15L/33R, where the 2008 AICUZ noise contours extend farther than the 2017 AICUZ noise contours; and
- To the north of Runway 15L/33R, where the 2017 AICUZ noise contours are shallower but slightly greater.

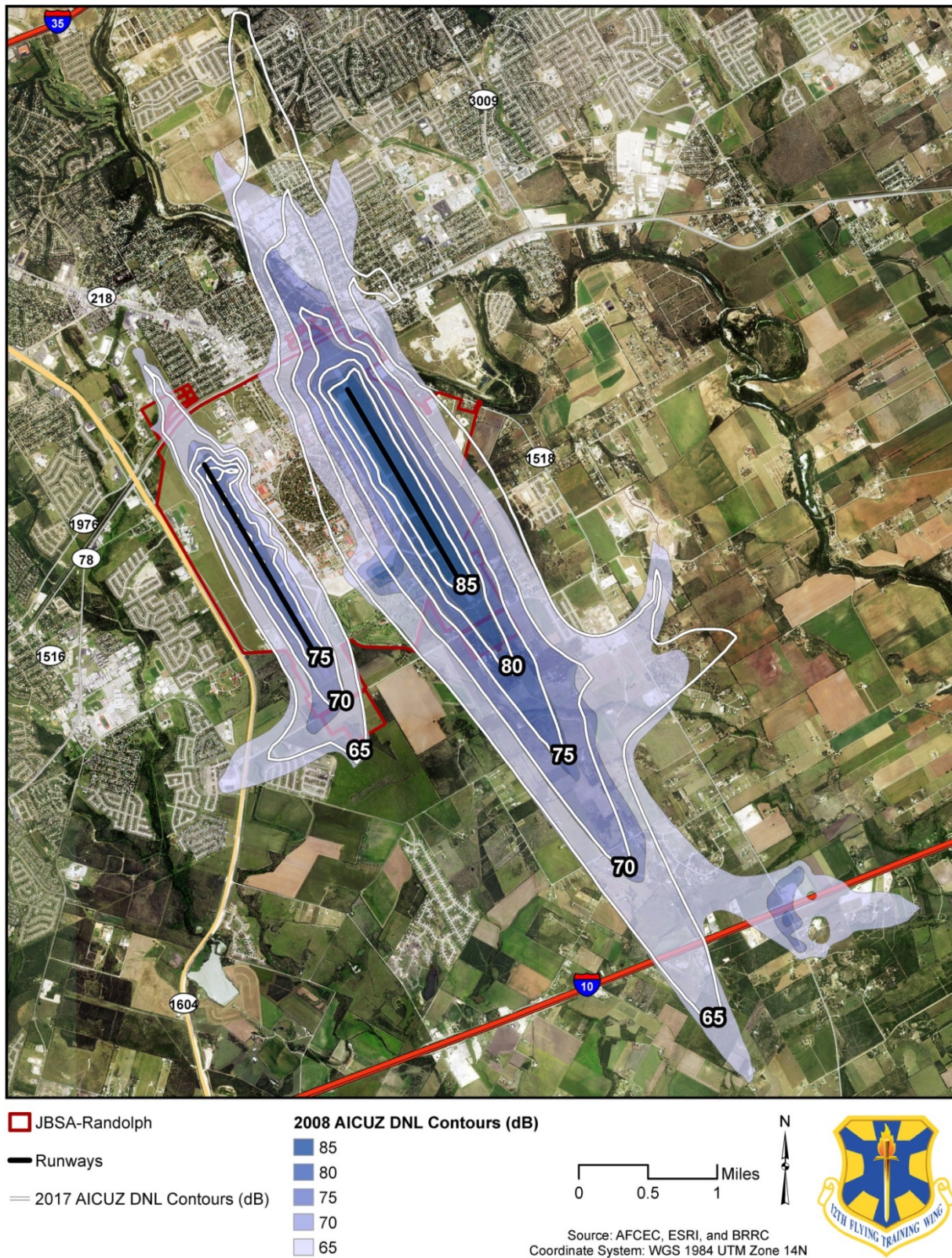
Generally, flight patterns have not changed significantly at JBSA-Randolph since the 2008 AICUZ Study. The difference in the geographic extent of the noise contours is attributed to a slight increase in annual operations (an approximate 5 percent increase), changes in runway utilization, modified flight tracks to avoid noise-sensitive areas, and/or improvements of operational parameters such as new aircraft models equipped with quieter engines. Additionally, the near elimination of night flight operations contributes to reducing the size of the noise contours.

Figure 4-2: 2017 AICUZ Noise Contours with Gradient, JBSA-Randolph



Source: AFCEC, ESRI, and BRRC
Coordinate System: WGS 1984 UTM Zone 14N

Figure 4-3: Comparison of the 2008 and 2017 Noise Contours, JBSA-Randolph



4.4.3 SEGUIN AAF AICUZ NOISE CONTOURS

The noise contours at Seguin AAF extend approximately 1.5 miles to the southeast and 1.3 miles to the northwest from the ends of Runway 13/31. Departures and the ascending portion of pattern operations require a greater power setting, which generates greater noise and influences the shape of the contours. Figure 4-4 presents the noise contours based on 2016 operations at Seguin AAF. Figure 4-5 shows a comparison of the 2017 AICUZ noise contours and the 2008 AICUZ noise contours.

T-6A and T-38C sorties originating from JBSA-Randolph also conduct training at Seguin AAF. Runway usage at Seguin AAF is distributed on Runway 13 (80 percent) and Runway 31 (20 percent). The runway usage and subsequent pattern flight track distribution shape the AICUZ noise contours at Seguin AAF. The majority of T-38C operations occur on Runway 13, and the departure portion of patterns results in the “boot-shaped” contours extending eastward at the southern end of the runway. Arrivals to Runway 13 in combination with the departures from Runway 31 result in the elongated contours to the north of the airfield.

Table 4-3 presents the off-base land acreage and estimated population within the Seguin AAF AICUZ 2017 noise contours; the population estimates are based on 2010 Census block-level data (United States Census Bureau 2010). A geometric proportion method was used to determine the estimated population within the contour bands. This method assigns population based on the portion of a census block that falls within the contour. The population across census blocks is assumed to be evenly distributed.

Table 4-3: Off-Base Land Area and Estimated Population within the 2017 AICUZ Noise Contours at Seguin AAF

Noise Zone	Acres	Population
65 to 69 dB DNL	1,263	88
70 to 74 dB DNL	409	29
75 to 79 dB DNL	21	1
TOTAL	1,693	118

The 2017 AICUZ noise contours are similar in both shape and extent of coverage when compared to the 2000 AICUZ noise contours at Seguin AAF. The projected flight operations at Seguin AAF have doubled in comparison to flight operations reported in the 2000 AICUZ Study, resulting in slightly larger noise contours. The overall off-base noise exposure area (65 dB DNL and greater) for the 2017 AICUZ noise contours is approximately 366 acres more than the 2000 AICUZ noise exposure area; however, the area surrounding Seguin AAF is generally rural, and the larger contours do not result in a significant increase of people in the noise exposure zones.

Generally, flight patterns that are low to the ground and have the most influence on the noise contours have not changed significantly at Seguin AAF since the 2000 AICUZ Study. The difference in the geographic extent of the noise contours is attributed to an increase in annual operations; changes in runway utilization; modified flight tracks to avoid noise-sensitive areas; and/or improvements of operational parameters, such as new aircraft models equipped with quieter engines.

Figure 4-4: 2017 AICUZ Noise Contours with Gradient, Seguin AAF

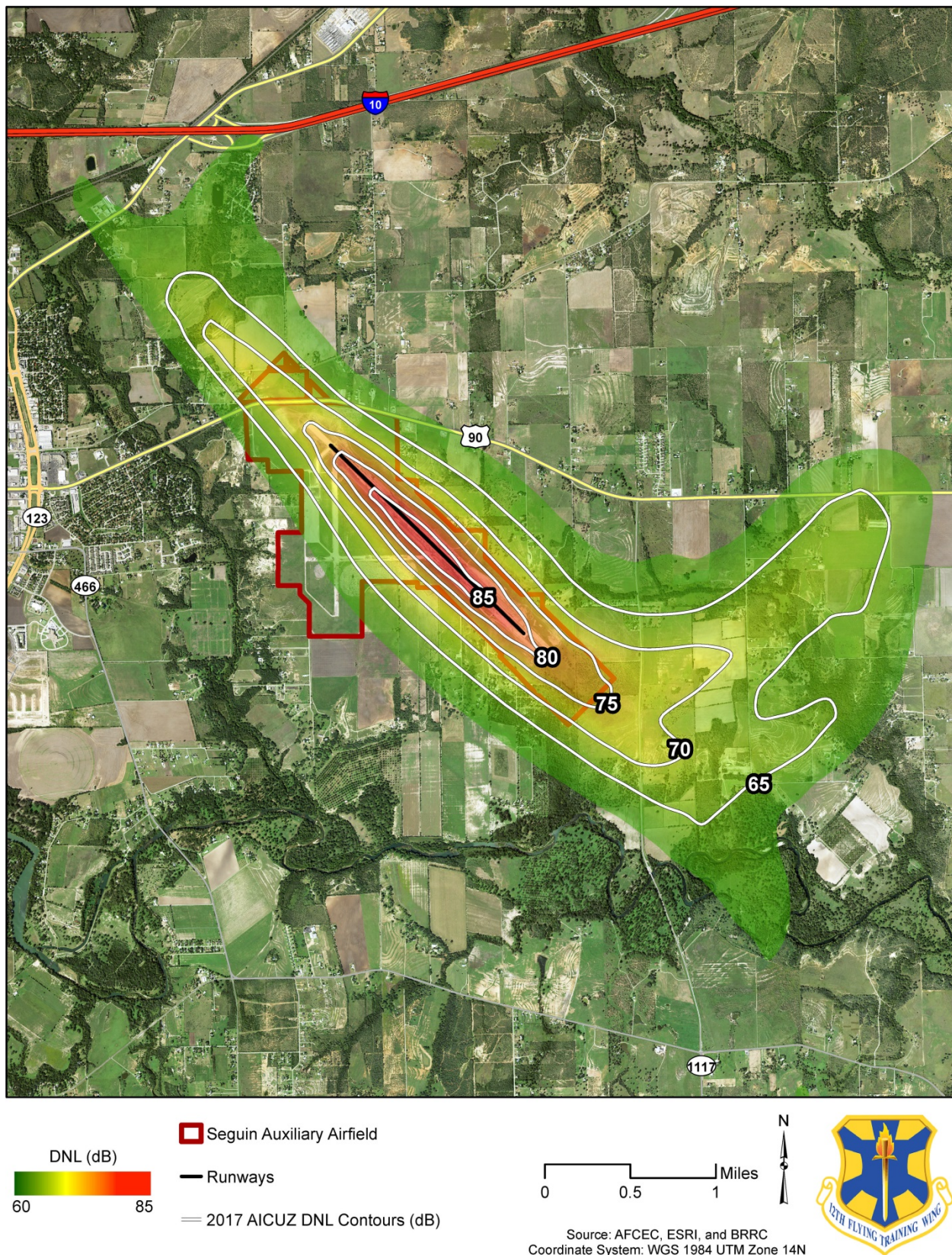
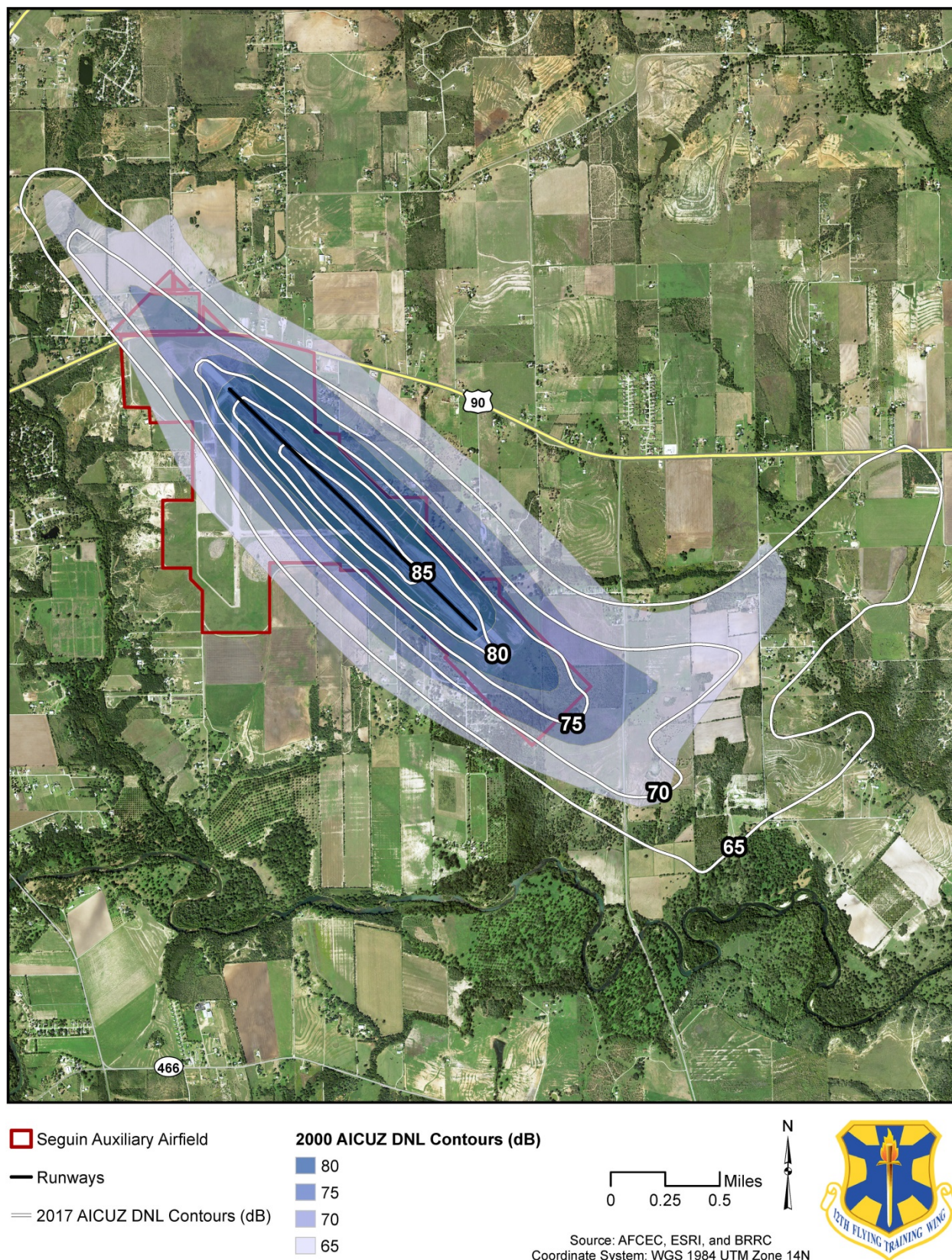


Figure 4-5: Comparison of the 2000 and 2017 Noise Contours, Seguin AAF



5 COMMUNITY AND AIRCRAFT SAFETY

As development increases near an airfield, more people may be exposed to the potential risks from nearby aircraft operations. Airfield safety is a shared responsibility between the Air Force and the surrounding communities, 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 around military airfields. Accordingly, 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 the people living near the airfield. This AICUZ Study provides the information needed, in part, to reach the shared safety goal.

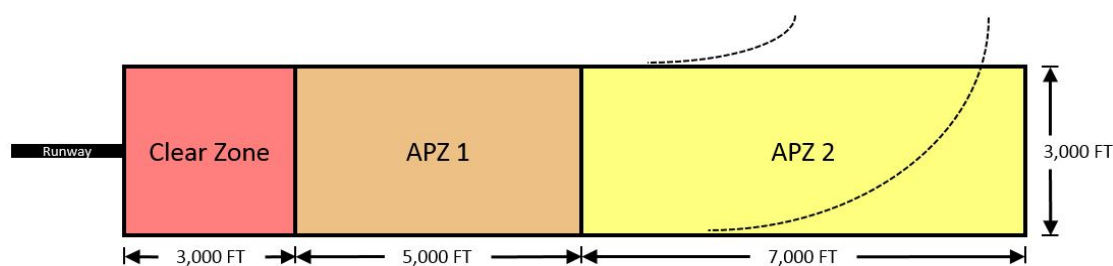
Identifying safety hazards and areas of accident potential can help communities with land use compatibility planning for airfield operations. As part of the AICUZ program, the Air Force defines areas of accident potential, imaginary surfaces, and hazards to aircraft flight.

5.1 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

In the 1970s and 1980s, the DoD conducted studies of historical accident and operations data throughout the military to identify patterns of accident occurrence. The studies showed that most aircraft accidents occur on or near the runway, diminishing in likelihood with distance from the runway. Based on these studies, the DoD identified Clear Zones (CZ) and Accident Potential Zones (APZ) as areas where an aircraft accident is most likely to occur if an accident were to take place; however, these zones are not a prediction of accidents. The studies identified three areas—the CZ, APZ I, and APZ II—that, because of accident potential, should be considered for density and land use restrictions. These zones are illustrated in Figure 5-1 and described below:

- **Clear Zone.** The CZ is the square area beyond the end of the runway and centered on the runway centerline, extending outward 3,000 feet. A CZ is required for all active runways and should remain undeveloped.
- **APZ I.** APZ I is the rectangular area beyond the CZ. 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 and 7,000 feet in length along the extended runway centerline.

Figure 5-1: Accident Potential Zones for Class B Runways



Most land uses in the CZ are considered incompatible with military aircraft operations. For this reason, the Air Force's policy, where possible, is to acquire real property interests on land in the CZs 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, or churches) should be restricted because of the greater risk in these areas. Existing land uses in the CZs and APZs at each airfield and recommendations for addressing incompatibility issues are discussed in Chapter 6 *Land Use Compatibility Analysis*.

5.1.1 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES FOR JBSA-RANDOLPH

Figure 5-2 depicts the CZs and APZs for Runways 15L/33R and 15R/33L at JBSA-Randolph. Table 5-1 tabulates the off-base land acreage and estimated population within the CZs and APZs.

Table 5-1: Off-Base Land Acreage and Estimated Population within the APZs and CZs at JBSA-Randolph

Zone	Land Acreage	Population
CZ	167	256
APZ I	1,377	2,192
APZ II	1,928	3,357
TOTAL	3,472	5,805

All CZs at JBSA-Randolph measure 3,000 feet long and 3,000 feet wide (1,500 feet to either side of the runway centerline). The CZs were originally 3,000 feet long and only 2,000 feet; however, the CZs were amended in 2015 to be in compliance with the AFI 32-7063 (Air Force 2015) and Unified Facilities Criteria (UFC) 3-260-01 (DoD 2008). The CZs now extend beyond the installation boundary and include property in Universal City and the City of Schertz to the north and property in the cities of Converse and Schertz to the south. CZ easements have not been acquired for each runway at JBSA-Randolph, and the increased area of the CZs has resulted in incompatible land uses. Areas of incompatible developments are further discussed in Chapter 6, *Land Use Compatibility Analysis*.

All runways at JBSA-Randolph have one set of APZs. APZ I measures 5,000 feet in length from the CZ and is 3,000 feet in width. APZ II measures 7,000 feet in length from APZ I and is 3,000 feet in width.

Figure 5-2: 2017 AICUZ Clear Zones and Accident Potential Zones for JBSA-Randolph



- JBSA-Randolph
- Runways
- 2017 AICUZ APZs**
- Clear Zone
 - Accident Potential Zone I
 - Accident Potential Zone II

0 0.5 1 Miles

Source: AFCEC and ESRI
Coordinate System: WGS 1984 UTM Zone 14N



5.1.2 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES FOR SEGUIN AAF

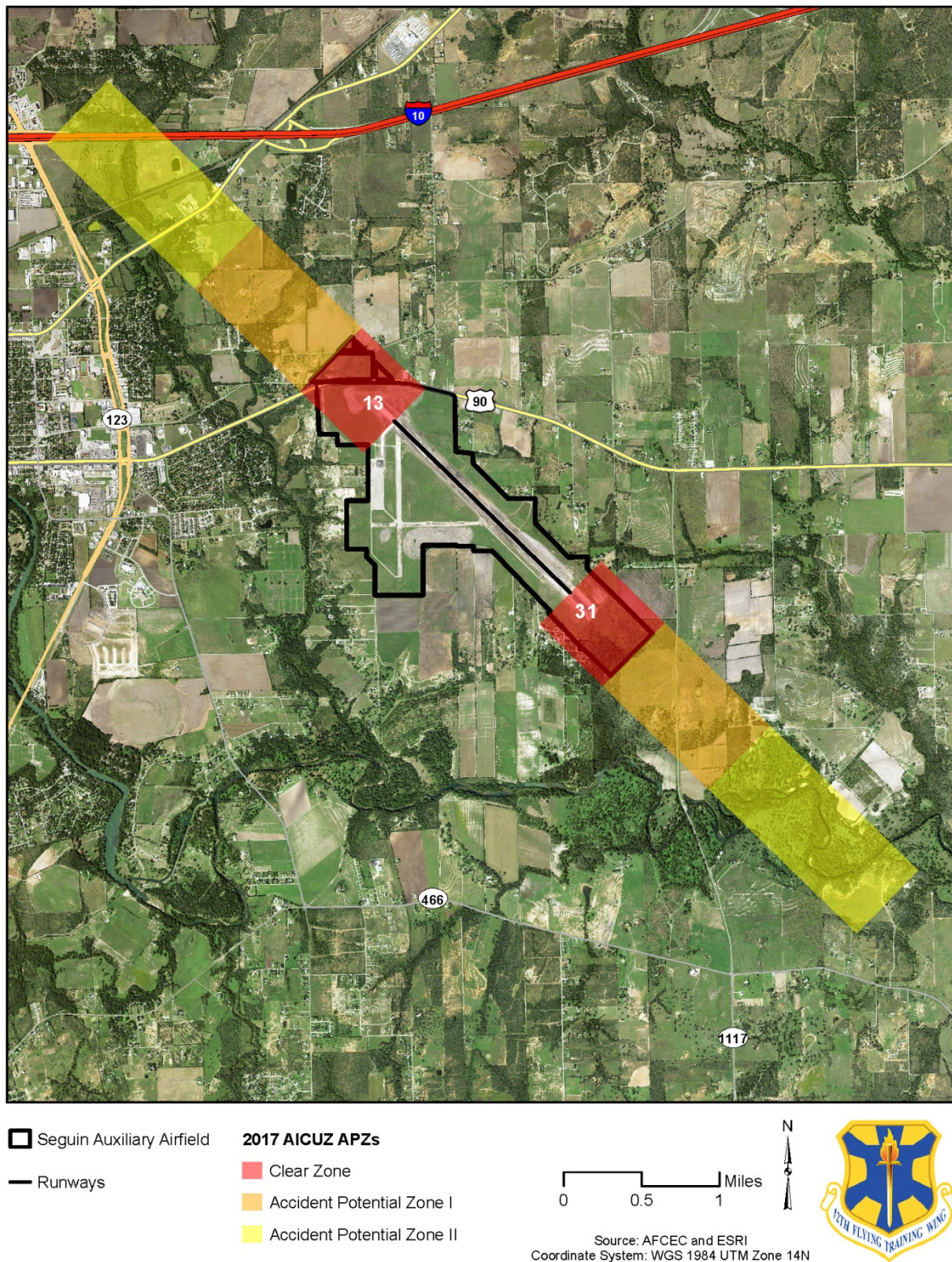
Figure 5-3 depicts the CZs and APZs for Runway 13/31 at Seguin AAF. Table 5-2 tabulates the off-base land acreage and estimated population within the CZs and APZs.

Table 5-2: Off-Base Land Acreage and Estimated Population within the APZs and CZs at Seguin AAF

Zone	Land Acreage	Population
CZ	115	8
APZ I	689	44
APZ II	964	115
TOTAL	1,768	167

CZs at Seguin AAF measure 3,000 feet long and 3,000 feet wide (1,500 feet to either side of runway centerline). Each runway end at Seguin AAF has APZs. APZ I measures 5,000 feet in length from the CZ and is 3,000 feet in width. APZ II measures 7,000 feet in length from APZ I and is 3,000 feet in width.

Figure 5-3: 2017 AICUZ Clear Zones and Accident Potential Zones for Seguin AAF



5.2 IMAGINARY SURFACES

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

Imaginary surfaces for fixed-wing Class B runways are described in Table 5-3 and illustrated in Figure 5-4. Imaginary surfaces for each runway at JBSA-Randolph as well as the combined imaginary surfaces of both runways are depicted in Figure 5-5, and imaginary surfaces for Seguin AAF are depicted in Figure 5-6.

In general, no above-ground structures are permitted in the primary surface of CZs, and height restrictions apply to transitional surfaces and approach and departure surfaces. Height restrictions are more stringent as one approaches the runway and flight path.

Figure 5-4: Imaginary Surfaces for Air Force Class B Fixed Wing Runways

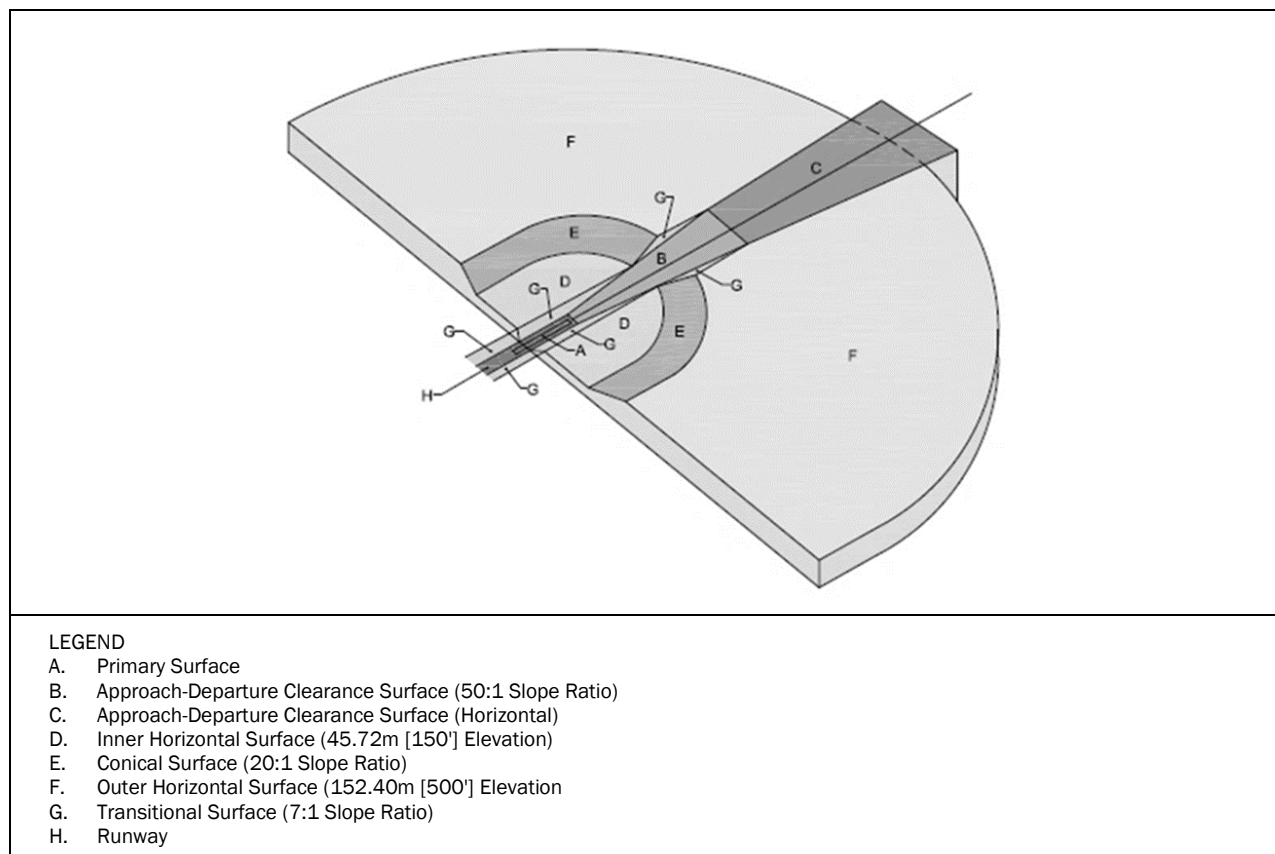


Table 5-3: Description of Imaginary Surfaces

Planes and Surface	Geographical Dimensions
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 in the vicinity of 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	This imaginary surface is 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 point.
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	This is 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	This imaginary surface 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	This imaginary surface extends outward and upward at right angles 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.

Source: DoD 2008

Figure 5-5: Imaginary Surfaces and Transition Planes for JBSA-Randolph

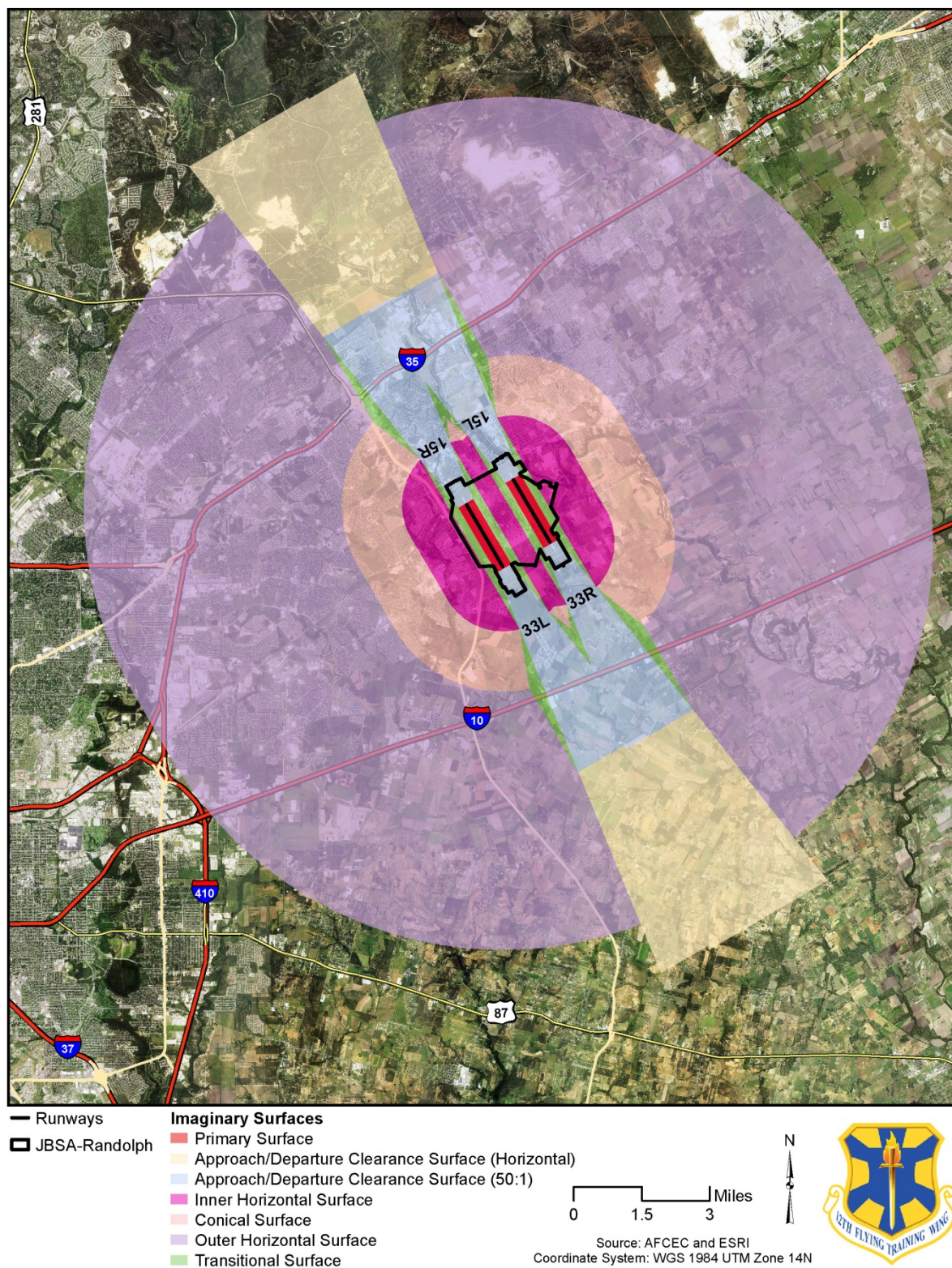
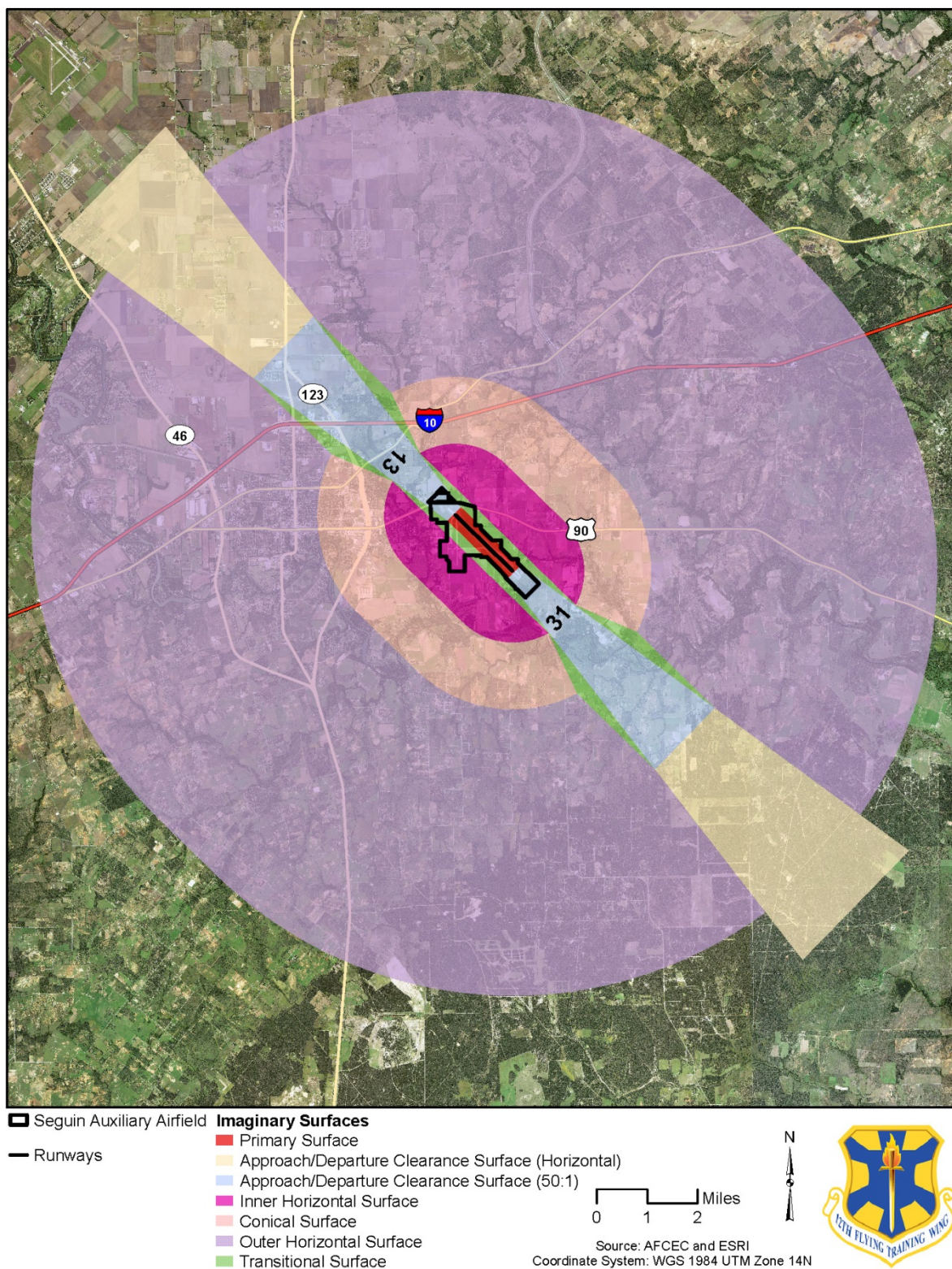


Figure 5-6: Imaginary Surfaces and Transition Planes for Seguin AAF



5.3 HAZARDS TO FLIGHT ZONE

Certain land uses and activities around an airfield can pose potential hazards that can obstruct or interfere with aircraft arrivals and departures, pilot vision, communications, or aircraft electronics. Evaluating and addressing the causes of flight hazards before mishaps occur can help eliminate these sources and prevent future mishaps. The Air Force has defined a “Hazards to Flight Zone” (HAFZ) that includes, at minimal, the area within the imaginary surfaces; however, other factors such as specific aircraft flight tracks (especially pattern entries less than 3,000 feet above ground level [AGL]) may also be considered when determining the size and scope of the HAFZs. Unlike noise and safety zones, the AICUZ guidelines do not provide specific land use compatibility recommendations for the HAFZ; instead, the HAFZ is used as a “consultation zone.” Developers and local planning bodies are encouraged to consult with the Air Force to evaluate proposed projects in the HAFZ to ensure compatibility with military operations. Potential hazards to flight operations are discussed in the following sections.

5.3.1 HEIGHT OBSTRUCTIONS

Tall objects can pose significant hazards to flight operations or interfere with navigational equipment (including radar). Aircraft operations can be constrained by the surrounding natural terrain and by human-made features such as buildings, towers, poles, and other potential vertical obstructions to navigation. Federal Aviation Regulations, Title 14 of the Code of Federal Regulations (CFR), Part 77, *Objects Affecting Navigable Airspace*, outlines a notification procedure for proposed construction or alteration of objects near airports that could affect navigable airspace. City and county agencies responsible for approving construction permits should require developers to submit accurate measurements and calculations for any project in the vicinity of a military airfield to verify that the proposed project meets the height restriction criteria of 14 CFR Part 77.17. Height obstructions are a current compatibility issue and are further discussed in Section 6.4 *Compatibility Concerns*.

5.3.2 VISUAL INTERFERENCE

Industrial or agricultural sources of smoke, dust, or steam in the airfield vicinity can obstruct the pilot’s vision during takeoff, landing, or other periods of low-altitude flight. These concerns can often be mitigated with close coordination between the base and the landowner. For example, irrigating before plowing can greatly reduce dust concerns.

5.3.3 LIGHTING

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 at night when the flash can diminish the eye’s adaption to darkness. Partial recovery of this adaptation is usually achieved in 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 can be potentially harmful to a pilot's vision during the day and night.
- The increasing use of energy-efficient Light Emitting Diode (LED) lights also poses potential conflicts in areas where pilots use night vision goggles (NVGs). NVGs can exaggerate the brightness of these lights, interfering with pilot vision.
- The use of red LED lights to mark obstructions 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.

5.3.4 BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD

Wildlife represents a significant hazard to flight operations. Wildlife, 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. Although most bird/wildlife aircraft strike hazard (BASH) occurrences do not result in a total loss of aircraft, they can cause structural and mechanical damage to aircraft, as well as loss of flight time. Most collisions with wildlife occur when the aircraft is at an elevation of less than 3,000 feet AGL; due to the speed of the aircraft, these collisions can happen with considerable force.

To reduce the potential of a BASH occurrence, the Air Force recommends locating land uses that attract birds farther away from the airfield's most active movement areas. These land uses include transfer stations, landfills, golf courses, wetlands, stormwater ponds, and dredge disposal sites. Wildlife in search of resources, such as food, water, and shelter, will flock the aforementioned areas, increasing the probability of BASH occurrences. Design modifications also can be used to reduce the attractiveness of these types of land uses to birds and other wildlife.

The 2015 JLUS delineates a five-mile radius "BASH Military Influence Area" subzone from the center of the runway at JBSA-Randolph and Seguin AAF where land uses should be subject to additional regulations to prevent attractants of birds and wildlife that could increase the risk of safety to pilots and aircraft flying at lower speeds and altitudes. However, a constant radius surrounding the airfield or runway may not be sufficient to combat BASH threats. Flight tracks, especially pattern entries below 3,000 feet AGL, and synergistic effects (non-co-located feeding and roosting areas) must be considered when determining areas that may be subject to BASH impacts. BASH occurrences are a current issue at JBSA-Randolph and are further discussed in the following section.

5.3.4.1 BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD OCCURRENCES AT JBSA-RANDOLPH

JBSA-Randolph has experienced a 250 percent increase in bird strikes from 2010 through 2015. The large population of birds at the base, including an estimated population of 12,000 to 20,000 white winged doves alone, causes a serious BASH issue for flight operations. Old-growth urban

forest on base (primarily made up of live oak, pecan, ash, and other vegetative species) provides habitat for the white-winged doves; the thick canopy on the trees provides safe roosting, nesting, loafing, and feeding locations for the doves, out of reach of predators.

BASH incidents at JBSA-Randolph during take-offs are higher than the Air Force average, where BASH incidents are more prevalent during landings. Birds fly across the runway to Cibolo Creek and agricultural fields to feed shortly after sunrise; depending on the severity of bird conditions, flight activity during this time can be restricted on the east runway to minimize BASH potential. Holding ponds on base also attract birds and wildlife. Larger waterfowl (e.g., ducks, cormorant, and heron) are present at the installation's golf course and at Woman Hollering Creek.

5.3.4.2 BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD OCCURRENCES AT SEGUIN AAF

Because Seguin AAF was closed for three years and has just recently re-opened, minimal BASH data are available for the airfield. Wildlife threats at Seguin include deer, coyote, and feral dogs. Wildlife can access the airfield through burrows and large gaps along the airfield's fence line. Turkey vultures, black vultures, and meadowlarks are also a BASH concern at Seguin AAF.

5.3.4.3 BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD MANAGEMENT

JBSA-Randolph employs a full-time Wildlife Hazard Management Biologist from the United States Department of Agriculture to develop management strategies and determine actions to reduce bird densities at JBSA-Randolph and Seguin AAF. BASH management strategies focus on four pillars: habitat management, avoidance, harassment, and depredation. The base implements several methods to control the bird population, including grass and tree management, noise makers, and pyrotechnics. Flight operations are scheduled and adjusted on an "as needed basis" to avoid known bird migration patterns and reduce the potential for BASH incidents. The Wildlife Hazard Management Biologist also conducts public outreach to the local community to promote public awareness of BASH concerns. The base installed a radar tracking system in November 2015 to track bird movement near the airfield. The radar aids in operational avoidance of the birds and documents bird flying patterns. JBSA-Randolph continues to conduct BASH observations and scientific studies off-base at locations such as farmlands, Cibolo Creek, and new commercial and residential developments.

5.3.5 ELECTROMAGNETIC INTERFERENCE

Electromagnetic Interference (EMI) is defined by the American National Standards Institute as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. EMI may be caused by atmospheric phenomena, such as lightning or precipitation static, and by non-telecommunications equipment, such as vehicles and industrial machinery.

New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, care should be taken in siting any activities that create EMI. Electronic devices, such as cell phones, FM radios, television reception, and garage door openers, can also generate EMI. Many of these sources

are low-level emitters of EMI; however, when multiple sources are combined, they have an additive quality. In some cases, the source of interference occurs when consumer electronics use frequencies set aside for military use.

5.4 WIND FARMS

Wind turbines may restrict training operations, reduce the quality of training, and compromise pilot safety if sited near military airfields and in the direct course of low-level training routes. Wind turbines located in or near training areas may encroach upon low-level flight aviation training and testing. Wind turbines sited in conflict with military training routes and designated special use airspace can reduce training quality and compromise pilot safety. Obstructions may ultimately lead to costly changes in training and flight paths. As wind energy development increases, future training may be significantly restricted or ineffective.

Wind turbines may significantly affect the effectiveness of military air defense radar systems, navigation systems, weather radar systems, and ATC radar systems, while compromising security, aviation safety, and military readiness. Factors contributing to radar interference include the radar cross-section of a wind turbine, the number of turbines and their configuration, and Doppler-shift.

- **Radar Cross-Section (RCS).** The RCS of a wind turbine blade is significantly larger than many target aircraft. The RCS of rotating wind turbines blocks the radar signal and creates a “shadow” behind the wind farm where target objects may not be detected. RCS effects include false weather depiction, actual weather masking, and target masking (DoD 2006).
- **Turbine Configuration.** The magnitude of the potential impact of wind turbines on radar depends upon the placement and number of turbines within the radar line-of-sight. The obstruction from multiple turbines and the intermittent rotation of the blades causes diffraction. When turbines are closely aligned, radar waves reflect/diffract from multiple rotating blades, distorting the target aircraft signals and increasing the shadow effect (DoD 2006). Increased shadowing impacts the ability to detect low-flying aircraft and target aircraft at a long range.
- **Doppler Shift.** When rotating turbines are within or close to the radar line-of-sight, the radar signal may be reflected from the rotating blades, causing a Doppler shift or clutter effect. Clutter refers to unwanted reflected signals sent to the radar receiver that interfere with target tracking abilities. The Doppler shift impacts the ability of radar to discriminate the wind turbine from an aircraft. The effects of Doppler shift include false target generation, scintillation, and spontaneous appearance or disappearance of aircraft targets (DoD 2006).

Loss of communication from radar interference raises safety concerns for aircraft control and command, and continual interference may limit the development of training activities and future capabilities. Continual communication and radar interference may compromise training standards.

As mentioned in Section 5.3.1, 14 CFR Part 77 identifies the maximum allowable height of a structure in the vicinity of an airport and requires FAA notification prior to construction or alteration of objects near an airport. However, airspace restrictions are not always enforced, and the FAA cannot monitor all construction activities that may obstruct air navigation. Although the FAA may issue a Notice of Presumed Hazard, they do not have regulatory authority to prohibit development. Height obstructions, such as wind turbines, are monitored by the FAA through the Obstruction Evaluation/Airport Airspace Analysis notification process; however, the process is focused on communication and not enforcement. The military can only advise against proposed incompatible development and does not have the authority to restrict development.

6 LAND USE COMPATIBILITY ANALYSIS

The AICUZ area of influence or the “AICUZ footprint” of an airfield is the combination of noise contours, CZs, APZs, and the HAFZ, and is used as the basis for the land use compatibility analysis. The AICUZ footprint defines the minimum acceptable area in which land use control measures are recommended to protect the public’s health, safety, and welfare and to preserve the flying mission of the base. 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 guide compatible development near JBSA-Randolph and Seguin AAF, local municipalities should incorporate the 2017 AICUZ footprint into land use studies, regulations, and planning initiatives (Figures 6-1 and 6-2).

6.1 LAND USE COMPATIBILITY GUIDELINES AND CLASSIFICATIONS

To establish long-term land use compatibility for lands in the vicinity of military air installations, the DoD has developed guidelines, based on the Federal Highway Administration’s Standard Land Use Coding Manual, for compatible development and land use within an airfield’s AICUZ APZs and noise zones. These guidelines are used by DoD personnel for on-base planning and for engaging with the local community to foster compatible land use development. Suggested land use compatibility guidelines within the CZs, APZs, and noise zones are shown in Table A-1 and Table A-2 of Appendix A. These are the minimum requirements for land use compatibility, and each base may require stricter guidelines.

Table 6-1 provides common land use classifications and their compatibility recommendations within AICUZ noise zones and APZs. Land use classifications in this table are generalized and do not represent the local communities’ land use designations.

Figure 6-1: 2017 Composite AICUZ Map, JBSA-Randolph

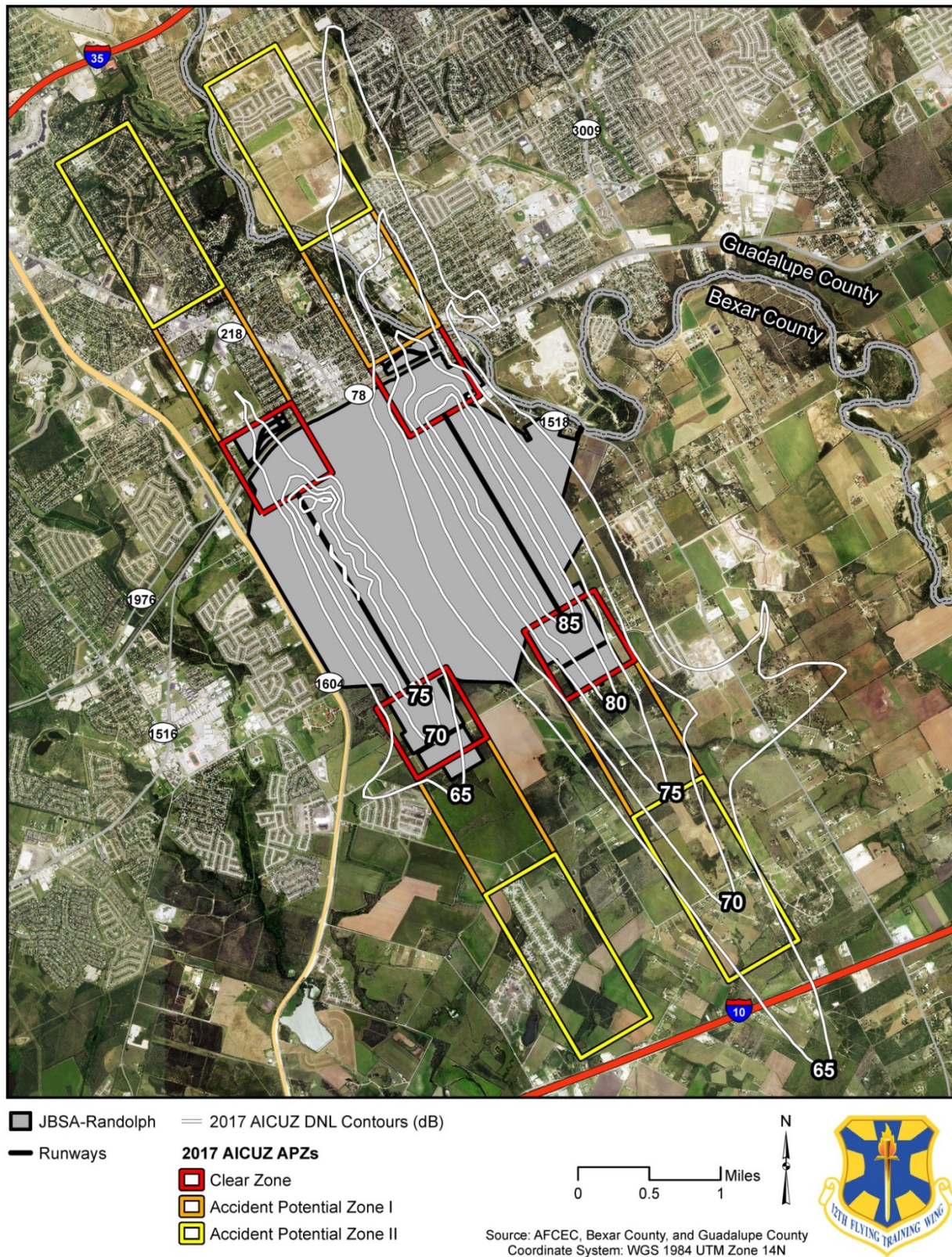


Figure 6-2: 2017 Composite AICUZ Map, Seguin AAF

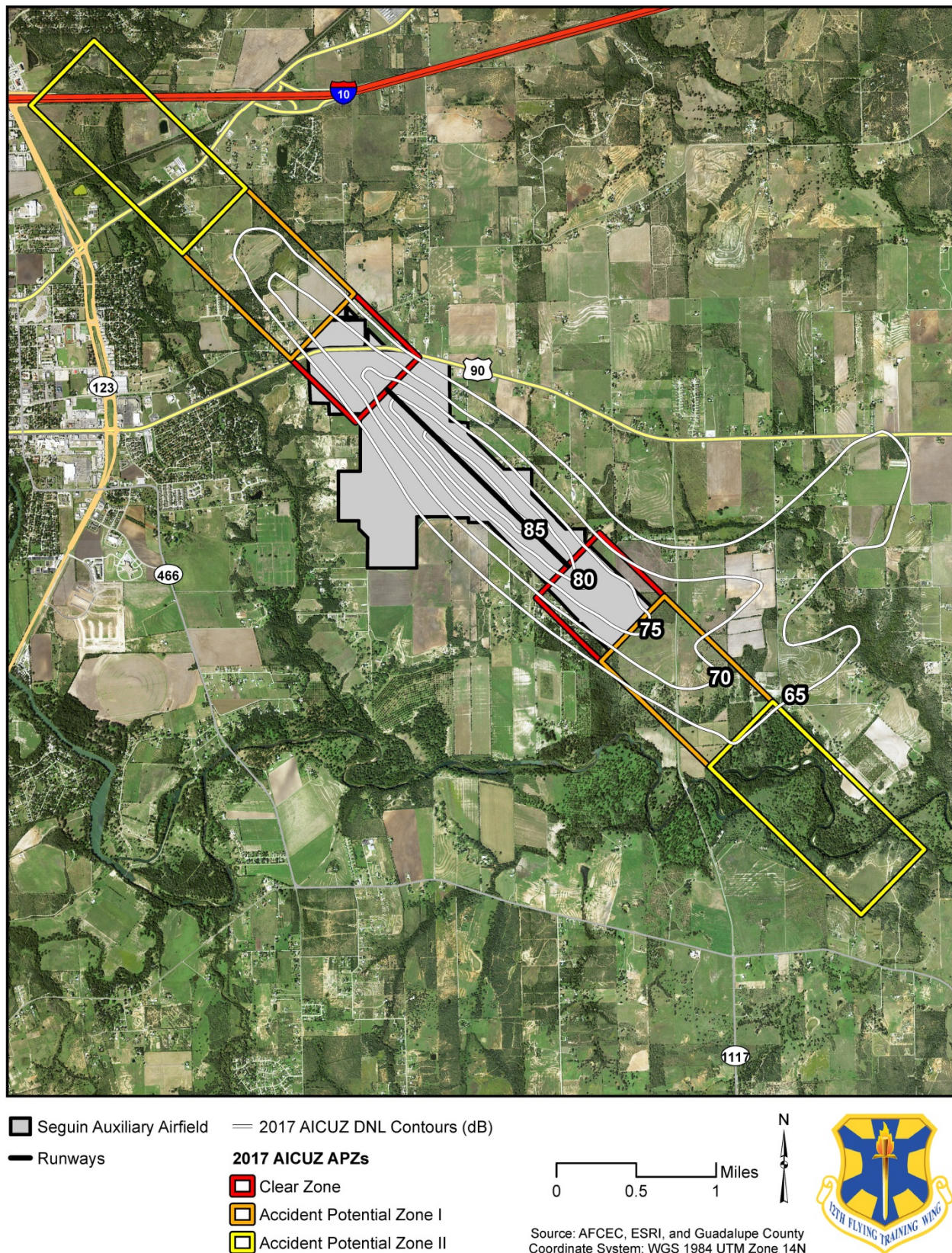


Table 6-1: Land Use Classification and Compatibility Guidelines

Land Use	Noise Zones (dB DNL)						CZ	APZ I	APZ II
	<65	65-69	70-74	75-79	80-84	85+			
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 Assembly/Public Use	Yes	Yes ²	Yes ²	Yes ²	No	No	No	No	Yes ²
Outdoor Parks and Recreation Areas	Yes	Yes ²	Yes ²	Yes ²	No	No	No	Yes ²	Yes ²
Agriculture, Open Area, Low-Density Development	Yes	Yes ²	Yes ²	Yes ²	Yes ²	Yes	No	Yes ²	Yes ²
Undesignated	Yes	No	No	No	No	No	No	No	No

Source: Adapted from AFI 32-7063 (Air Force 2015)

Notes: This generalized land use table provides an overview of recommended land use. Specific land use compatibility guidelines are provided in Appendix A.

¹ Incompatible with Exceptions

² Compatible with Restrictions

6.2 PLANNING AUTHORITIES

6.2.1 TEXAS MILITARY PREPAREDNESS COMMISSION

The Texas Military Preparedness Commission (TMPC) offers assistance and leadership on defense-related issues to defense communities, military installations, and related businesses. The TMPC consists of 13 members appointed by the Texas Governor with the mission to preserve military installations in Texas. The TMPC produces a periodic Master Plan update with recommendations regarding policies and plans to support the long-term military mission viability, including best methods for communities to enhance their relationship with military installations. Additionally, military commanders may request TMPC assistance to coordinate with state agencies to prepare base evaluation criteria for incoming missions and tenants.

Texas Government Code 436.001 formally recognizes the Texas Commanders Council (TCC) in state law, and requires the TMPC to serve as a liaison between the TCC and state agencies whose work may affect the military throughout Texas. The TCC is a coalition of commanders at major military installations in Texas that provides an information-sharing forum to formulate comprehensive resolutions for common encroachment concerns among the bases in Texas. The TCC provides the installations with an effective avenue to communicate and coordinate with state legislators.

6.2.2 ALAMO AREA COUNCIL OF GOVERNMENT

The Alamo Area Council of Governments (AACOG) is a regional planning agency that was established to assist local governments within a 13-county region with planning for common needs, cooperating for mutual benefit, and coordinating for sound regional development. AACOG is also responsible for regional planning activities, including economic development, transportation, air quality, community development, and homeland security.

AACOG is a voluntary association of counties and municipal governments. Bexar County, Guadalupe County, and the cities of Converse, Live Oak, San Antonio, Schertz, Selma, Seguin, and Universal City are members of AACOG. AACOG is a political subdivision of the State of Texas, but does not have the regulatory authority granted to cities, counties, or other local governments.

6.2.3 ZONING AND LAND USE REGULATIONS

Zoning is the legal tool to implement a municipality's land use plan. Through zoning regulations, cities are authorized to create zoning districts that permit or prohibit property use, construction standards, and development density. Municipalities can also establish overlay zones to protect resource areas and ensure land use compatibility for special uses or areas of unusual conditions related to noise and safety issues. Overlay zoning may apply greater restrictions for land uses and/or additional development standards and design guidelines for a designated area. Overlay zones may also allow for less restrictive standards.

6.2.4 STATE STATUTES

In Texas, municipal zoning is limited to the extent of the city limits. County governments do not have zoning authority to control land use and development in the unincorporated areas except as provided for by the Texas Local Government Code 241, "Municipal and County Zoning Authority around Airports." Cities can enforce subdivision regulations through platting approval within their extra-territorial jurisdiction (ETJ), which is the unincorporated area contiguous to the corporate boundaries of the municipality area of land. The extent of a city's ETJ varies from 0.5 mile to five miles, based on the number of inhabitants of the municipality, and cannot overlap the ETJ of another city. A city's platting authority is extended to their ETJ under the Texas Local Government Code Chapter 212.

Under House Bill 1640 (84th Legislature 2015), Texas Local Government Code §397.005 was amended to require defense communities to notify the base of proposed development within 1.5 statute miles from the centerline of the runway and five miles from each end of the paved surface of the runway. This coordination helps the base communicate concerns to the communities regarding issues of compatibility with CZs and APZs that could result in mission impacts.

Under House Bill 2232 (84th Legislature 2015), Texas Local Government Code §397A.052 was amended to allow the establishment of a regional sustainability commission to review applications for development within the ETJ of a participating municipality or in the

unincorporated areas of the county. The commission includes representatives from the base, city/county, and land owners.

6.2.5 COMPREHENSIVE PLANS

Municipalities in Texas can adopt a Comprehensive Plan to guide future development and growth, establish long-range planning policies, and ultimately provide the framework for zoning and land use regulations. Comprehensive Plans are decision-making tools to evaluate proposed development and/or land use activities in the context of the community's long-range planning policies. Although Comprehensive Plans provide guidance for future land uses and development, these plans do not constitute zoning regulations or establish zoning district boundaries. According to Texas Local Government Code §211.004, "Zoning regulations must be adopted in accordance with a municipality's comprehensive plan." Components of a comprehensive plan may include policies to address physical elements in the community such as land use, transportation systems, and housing. Bexar County and Guadalupe County do not have Comprehensive Plans. Comprehensive plans of municipalities in the vicinity of JBSA-Randolph include:

- City of Live Oak Comprehensive Plan 2022
- City of San Antonio "*San Antonio Tomorrow*" Comprehensive Plan 2016
- City of Schertz Comprehensive Land Plan 2002 (Note: Schertz is in the process of updating their comprehensive plan. Additionally, the city released a Sector Plan in April 2013 to assess growth in the northern and southern sectors of city. The Plan includes recommended revisions to existing zoning and development standards).
- City of Seguin Comprehensive Plan 2008
- City of Selma comprehensive Development Plan 2005-2020
- Universal City Comprehensive Plan 2008-2013

6.2.6 JOINT LAND USE STUDY

Through the Office of Economic Adjustment, the DoD developed the Joint Land Use Study (JLUS) Program to enhance coordination between military installations and their surrounding communities, and to address existing and future compatibility issues. The JLUS Program is a collaborative land use planning effort between the military, cities, counties, and local interest groups and organizations. In 2015, community and Air Force leaders completed a JLUS for JBSA-Randolph and Seguin AAF. Participating members included officials from Bexar County, Guadalupe County, and the cities of Cibolo, Converse, Garden Ridge, Live Oak, San Antonio, Schertz, Seguin, Selma, and Universal City.

JLUS Participating Members

Bexar County
Guadalupe County
Cibolo
Converse
Garden Ridge
Live Oak
San Antonio
Schertz
Seguin
Selma
Universal City

The JLUS provides recommendations for long-term compatible development policies and implementation actions responding to JBSA-Randolph mission and training requirements; however, the guidelines are not mandatory.

6.3 LAND USE AND PROPOSED DEVELOPMENT

The land use compatibility analysis identifies existing and future land uses near JBSA-Randolph and Seguin AAF to determine compatibility conditions. Existing land use is assessed to determine current land use activity, while future land plans are used to project development and potential growth areas. 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.

6.3.1 EXISTING LAND USES IN COMMUNITIES SURROUNDING JBSA-RANDOLPH

Land use surrounding JBSA-Randolph is generally a mix of urban development to the north and west, and agricultural and rural residential development to the south and east. Universal City, Schertz, and Converse surround JBSA-Randolph to north, east and south, and west, respectively. Land under the jurisdiction of Bexar County is interspersed among the surrounding communities to the south and west of JBSA-Randolph. The cities of Selma and Live Oak are also located within a few miles of the base boundary and are overflowed by aircraft accomplishing operations at JBSA-Randolph. Land directly affected by JBSA-Randolph operations is predominantly located in the cities of Schertz and Universal City. Existing land uses in the surrounding communities are summarized in Sections 6.3.1.1 through 6.3.1.6.

The predominant existing land uses within the JBSA-Randolph 2017 AICUZ APZs and noise contours are rural/undeveloped and residential. Figure 6-3 illustrates the existing land uses within the JBSA-Randolph AICUZ APZs, and Figure 6-4 illustrates the existing land uses within the JBSA-Randolph AICUZ noise contours. Table 6-2 summarizes the total acreage of land uses within JBSA-Randolph 2017 AICUZ APZs and noise zones. Areas of specific land use compatibility concerns within the AICUZ APZs and noise contours are further evaluated in Section 6.4.1, *JBSA-Randolph Land Use Compatibility Concerns*.

Table 6-2: Existing Off-Base Land Uses within the JBSA-Randolph AICUZ Footprint

Land Use	Noise Zones (acres)				APZs (acres)		
	65-70	70-75	75-80	80-85	CZ	APZ I	APZ II
Residential	335.4	70.3	1.2	1.5	40.2	158.5	560.6
Commercial	133.9	75.3	28.1	2.3	32.0	230.9	40.5
Industrial	0.0	2.2	0.0	0.0	0.2	0.0	1.0
Farm and Ranch	159.3	23.3	6.5	0.0	3.2	9.3	69.5
Rural/Undeveloped	1,158.7	393.6	108.3	9.6	80.3	795.1	1,043.6
Other	153.7	79.4	0.0	0.0	11.1	183.2	212.7

Figure 6-3: Existing Land Uses within the JBSA-Randolph 2017 AICUZ APZs

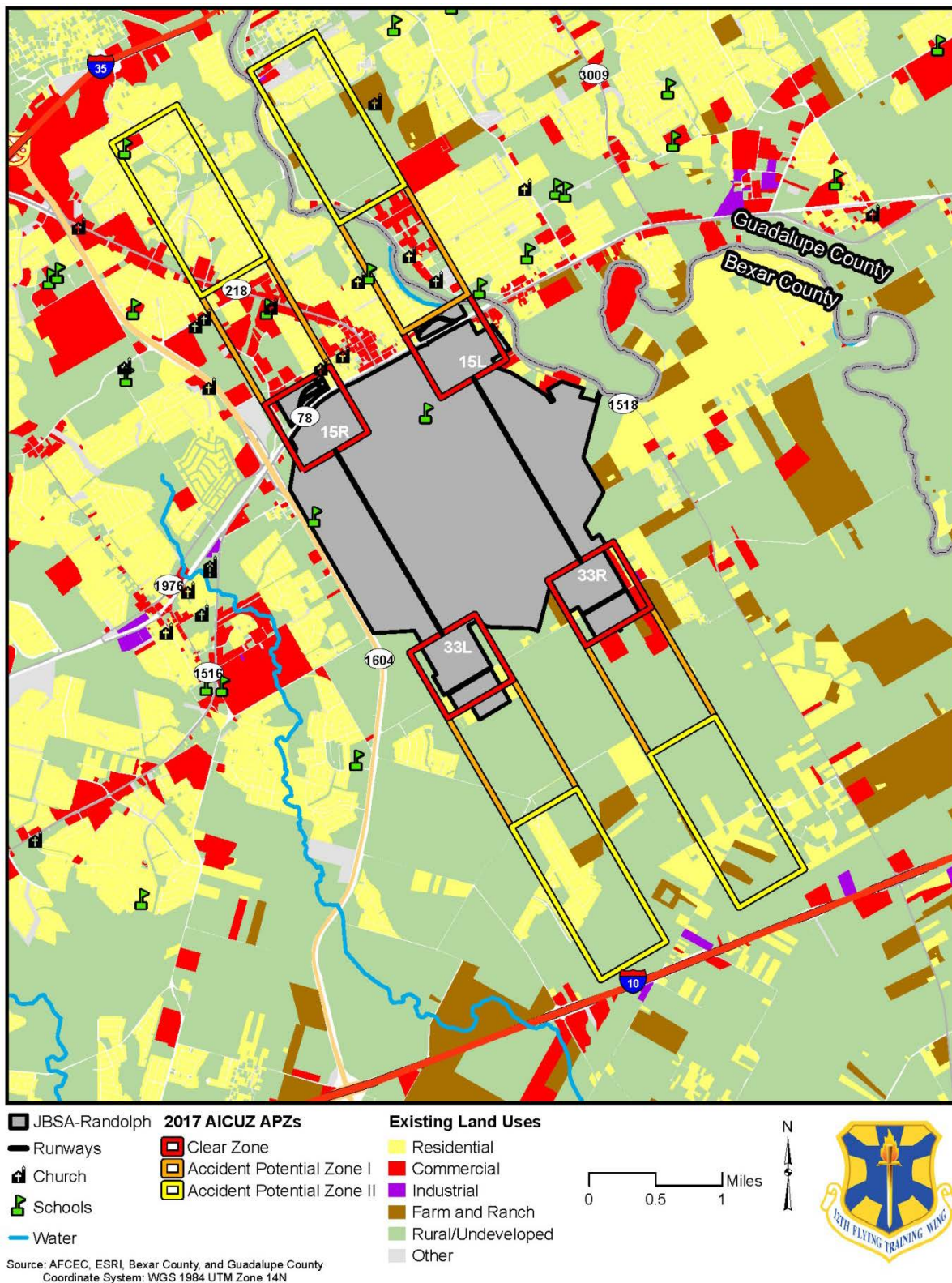
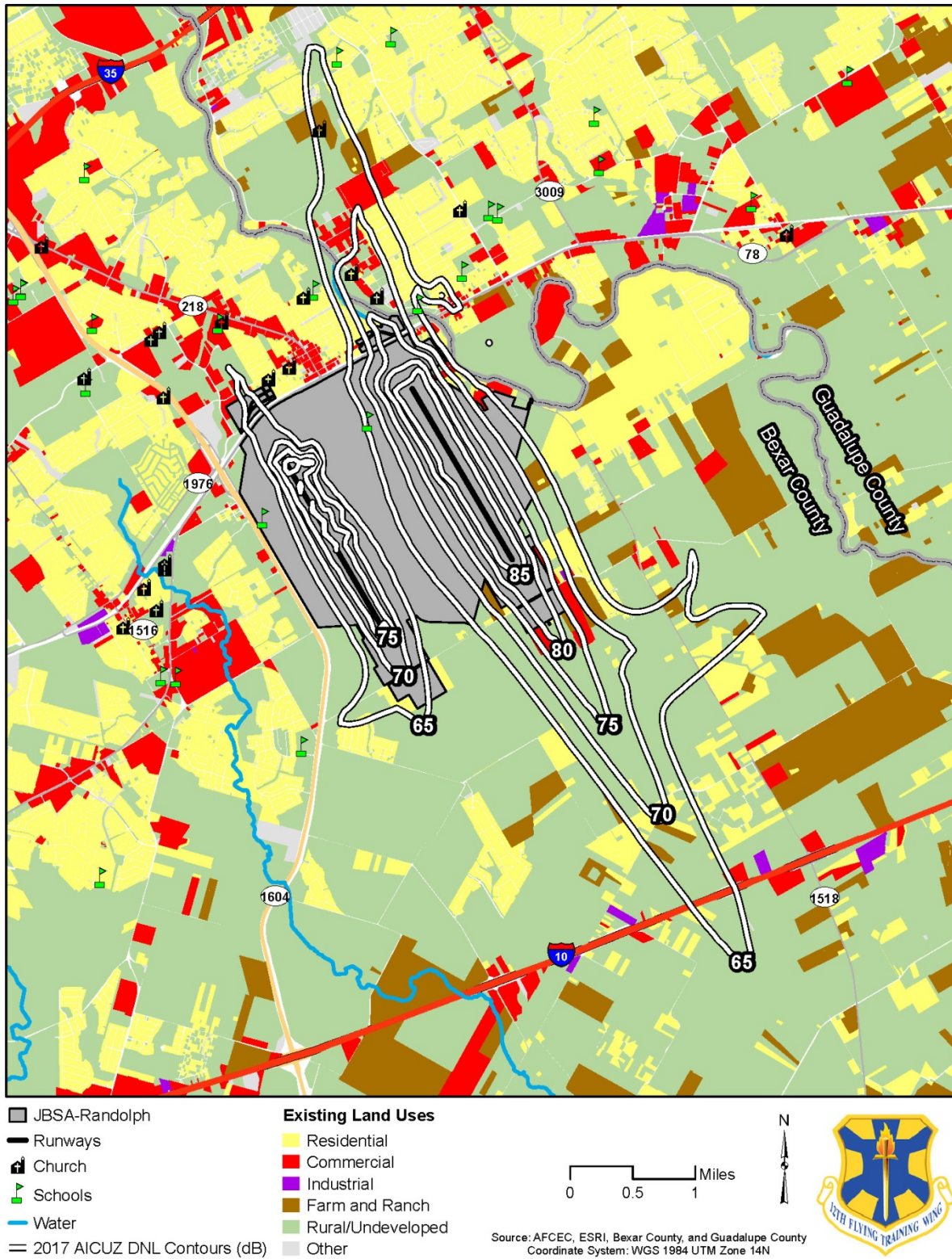


Figure 6-4: Existing Land Uses within the JBSA-Randolph AICUZ 2017 Noise Contours



6.3.1.1 *UNIVERSAL CITY*

Universal City is north of JBSA-Randolph. The city consists mostly of low- and medium-density residential and commercial land use. Retail and commercial use is concentrated along State Highway (SH) 218 (Pat Booker Road), which connects to JBSA-Randolph. Larger open space and park areas are to the east along Cibolo Creek and in the center of the city.

The city's zoning allows for general commercial use, including manufacturing, warehouse, and light industrial uses in the southwestern portion of the city along Loop 1604. Land in the northern portion of the city and east of SH 218 is largely zoned for low- to medium-density residential use. Medium- to high-density residential zoning is also located west of Loop 1604. Small pockets in the central portion of the city along SH 218 are zoned for mobile homes. Much of the land adjacent to Cibolo Creek is zoned for open space and will remain undeveloped. The city's ETJ extends into a portion of the northeast APZ II that is mostly undeveloped.

6.3.1.2 *CITY OF SCHERTZ*

The City of Schertz is east and south of JBSA-Randolph, generally between I-35 and I-10. Cibolo Creek runs near the city's western boundary with JBSA-Randolph. Land use in the city is a mix of residential, commercial, and industrial, with higher-density development in the central portion of the city. Larger areas of undeveloped land are south of JBSA-Randolph and northeast of I-35.

The northern portion of the city is predominantly zoned for light industrial and manufacturing uses and general business development, with pockets of low-density residential uses and manufactured home parks. Large tracts of undeveloped land are in this industrial area, and in the northwestern portion of the city that is zoned for planned development. Residential development mostly occurs in the central and northeastern portions of the city and along the southern side of I-35, and commercial development is concentrated at intersections and along major thoroughfares. The southern portion of the city is primarily zoned for agriculture and low-density single-family residential use. Residential development is increasing in this area, but the majority of the land is undeveloped. The city's ETJ extends to the southeast, and this area is zoned as pre-development. The city has development agreements in place to implement planning policies and standards for future development in the ETJ. Under these development agreements, the city can apply their land use policies and zoning regulations to new development of the property.

To protect the public welfare and to ensure the continued viability of JBSA-Randolph, Schertz implemented zoning regulations within the JBSA-Randolph AICUZ noise zones and APZs. The city has not adopted an AICUZ overlay district, but enforces restrictions through base-zone regulations.

6.3.1.3 *CITY OF CONVERSE*

The City of Converse is located on the western side of JBSA-Randolph, and land use consists mostly of residential and commercial development. The land north of Seguin Road and south of Schaefer Road is zoned for residential use. Higher-density development occurs in the

northern portion of the city along the Toepperwein Road corridor and to the west along the Farm-to-Market Road (FM) 78 (Seguin Road) corridor. Mobile homes are located south of the intersection of Upper Seguin Road and FM 1516. Property to the west of JBSA-Randolph on Loop 1604 is mostly zoned for commercial use. Additional commercial zoning occurs along the majority of the Loop 1604 corridor, and undeveloped land is south of Converse.

The City of Converse has a zoning overlay district that regulates building heights, solar development, and sound attenuation requirements for new construction within 1.5 miles of JBSA-Randolph's runway. The city's land use regulations restrict development of vacant land within the CZs.

6.3.1.4 CITY OF LIVE OAK

The City of Live Oak is north of Converse and east of Universal City. Land use consists largely of single-family residential uses, with commercial use along SH 218 (Pat Booker Road). Northeast Lakeview College and park/open space land use are in the southeastern portion of the city. Vacant land is mostly in the northern portion of the city between I-35 and Lookout Road; however, much of the property near the intersection of I-35 and Pat Booker Road is either under construction or proposed for development. Live Oak does not border JBSA-Randolph and the airfield's noise contours, APZs, and CZs do not extend to the city limits; however, the city is within the region's Development Coordination Area.

6.3.1.5 CITY OF SELMA

The City of Selma is approximately two miles north of JBSA-Randolph to the north of Universal City. The city is landlocked by other municipalities and does not have an ETJ. I-35 runs through the southern portion of the city, and Retama Parkway divides the eastern and western sides of the city. Large-scale industrial developments include the Retama Park racetrack and the Verizon Wireless Amphitheater in the center of the city.

The area west of Retama Parkway and north of I-10 is mostly zoned for residential use, and the area east of Retama Parkway and north of I-10 is mostly zoned for industrial use. Commercial and retail development is concentrated along I-35. There is multi-family development on the eastern side of the Retama Park racetrack and additional residential and mixed-used developments south of I-35. Kingston Ranch II, which is a residential development in the southeastern corner of the city, is the only part of the city that falls within the AICUZ footprint.

6.3.1.6 CITY OF SAN ANTONIO

The City of San Antonio is west and south of the installation. San Antonio is an urban area with a mix of land uses. Although neither the city limits nor the ETJ limits border JBSA-Randolph, a portion of the city extends west of Loop 1604 into the southern side of the installation's AICUZ footprint. This area is mostly undeveloped and rural, with a few residential communities. The area is zoned for single-family residential development.

6.3.2 EXISTING LAND USES IN COMMUNITIES SURROUNDING SEGUIN AAF

Seguin AAF is approximately 30 miles east of JBSA-Randolph in a rural area of Guadalupe County. The airfield is east of the City of Seguin and is in the city's ETJ. U.S. Route 90 (US 90) runs on the northern side of the airfield, and the Guadalupe River is approximately one mile south of the airfield runway. The area surrounding the airfield is predominantly agricultural/ranch land and low-density rural residential development.

The predominant land uses within the Seguin AAF 2017 AICUZ APZs and noise contours are rural/undeveloped and farmland, with a few isolated single-family homes. Table 6-3 summarizes the total acreage of land uses within Seguin AAF 2017 AICUZ APZs and noise zones. Figure 6-5 illustrates the existing land uses within the AICUZ APZs, and Figure 6-6 illustrates the existing land uses within the AICUZ noise contours. Areas of specific land use compatibility concerns within the AICUZ APZs and noise contours are further evaluated in Section 6.4.2, *Seguin AAF Compatibility Concerns*.

Table 6-3: Existing Off-Base Land Uses within the Seguin AAF AICUZ Footprint

Land Use	Noise Zones (acres)				APZs (acres)		
	65-70	70-75	75-80	80-85	CZ	APZ I	APZ II
Residential	71.8	19.8	0.0	0.0	15.6	38.4	17.5
Commercial	5.9	7.7	3.1	0.0	8.2	3.1	13.7
Industrial	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Farm and Ranch	401.6	155.1	9.7	0.0	17.6	175.2	304.9
Rural/Undeveloped	746.9	188.4	2.5	0.0	54.4	388.5	451.3
Other	37.1	38.4	5.6	0.0	19.2	83.7	176.6

6.3.2.1 CITY OF SEGUIN

The City of Seguin includes a mix of commercial, residential, industrial, and public land uses. Higher-density development and residential land use is concentrated in the central portion of the city on the southern side of I-10. Commercial zoning and development is concentrated along major thoroughfares, including SH 46 on the western side of the city, SH 123 on the eastern side, US 90, and I-10. Designated Planned Unit Development areas are west of the intersection of FM 78 and I-10, northeast of the intersection of SH 123 and I-10, and southeast of the intersection of SH 123 and US 90. Agricultural and ranching is mostly zoned north of I-10. Property directly west of the airfield and within the city limits is zoned for residential and agriculture use.

Figure 6-5: Existing Land Uses within the Seguin AAF 2017 AICUZ APZs

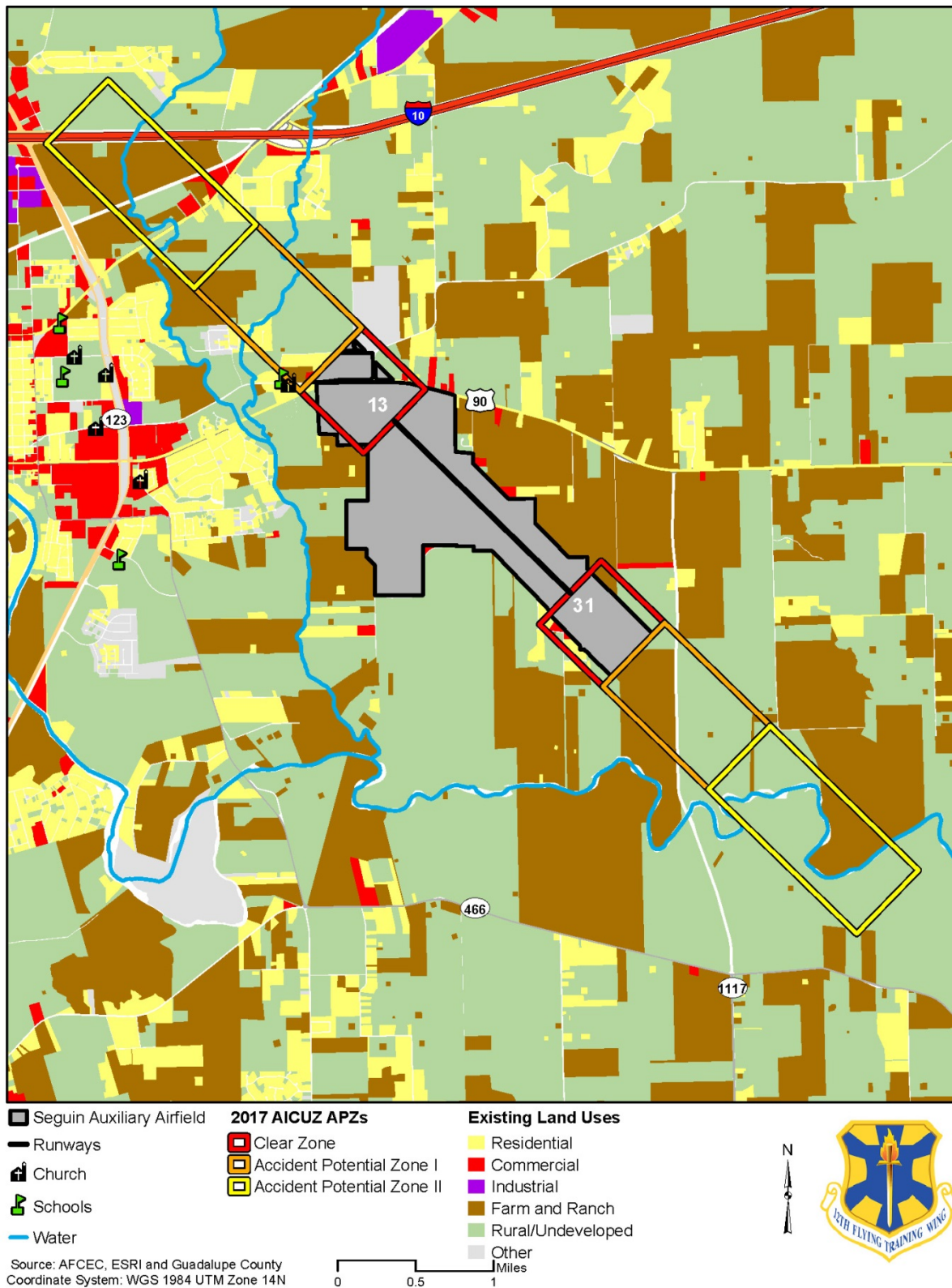
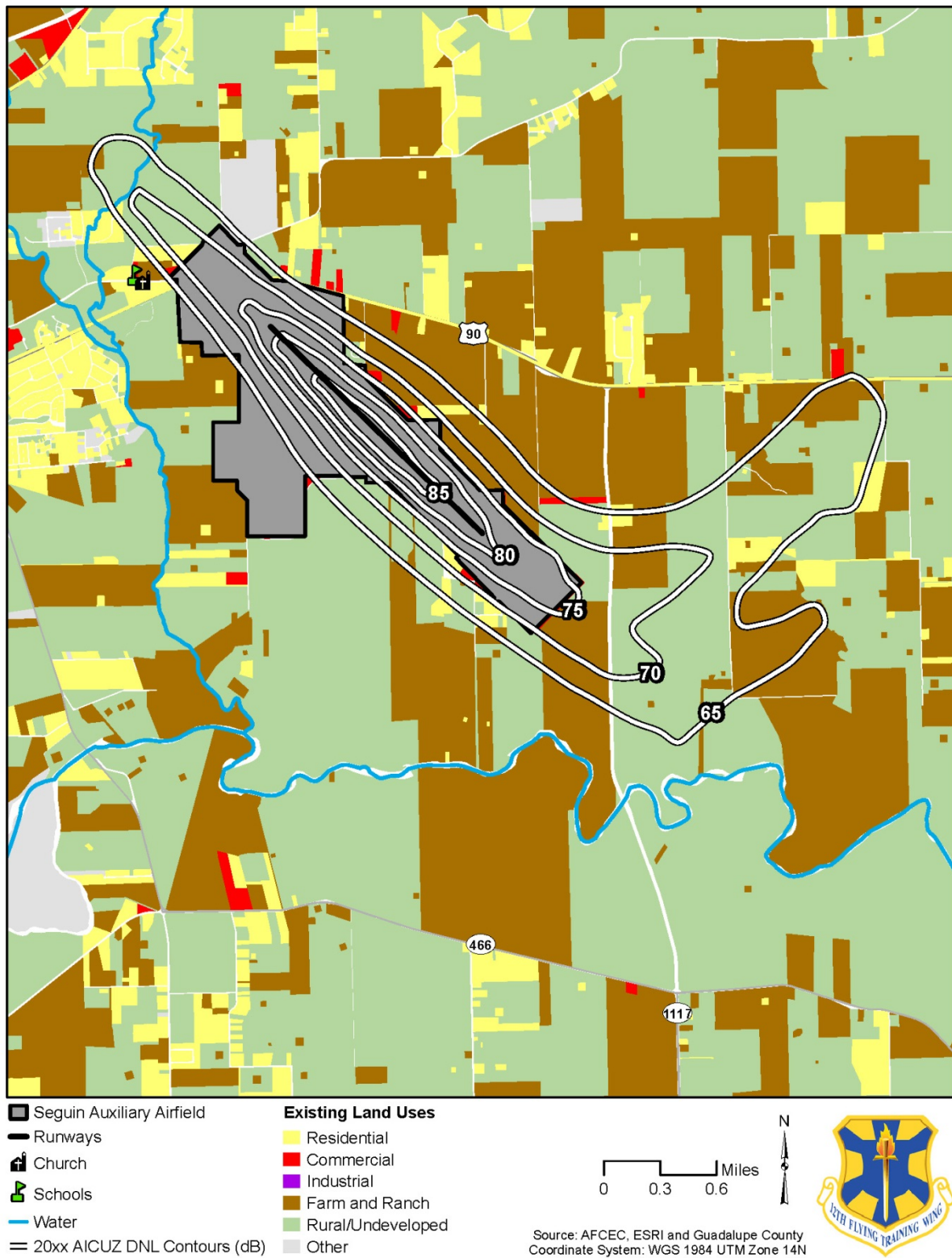


Figure 6-6: Existing Land Uses within the Seguin AAF AICUZ 2017 Noise Contours



6.3.3 FUTURE LAND USE SURROUNDING JBSA-RANDOLPH

6.3.3.1 UNIVERSAL CITY

Future development in Universal City will mostly consist of infill development, with several small developments occurring in the city. The majority of property zoned for residential development is fully developed. The North Lake Business Park, in the southwestern portion of the city, is expected to continue to develop with light industrial, office-warehouse, professional services, and research/technical laboratories. Commercial development is proposed along Kitty Hawk Road all the way to the City of Converse. The Kitty Hawk Subdivision master plan will continue in eight phases, increasing residential development in the southwestern portion of the city.

JBSA-Randolph owns restrictive easements around Runway 15R/33L, within the limits of Universal City, to control development and land uses that may be incompatible with military activities. The easements are discussed further in Section 6.4.1, *JBSA-Randolph Compatibility Concerns*.

6.3.3.2 CITY OF SCHERTZ

Future development in the City of Schertz is constrained by the 100-year floodplain through central downtown and the northern and southern portions of the city. The city's future land use plan supports an increase in industrial development and business parks on the northern side of I-35, although residential development is increasing in the northeastern corner of the city. Much of the area south of JBSA-Randolph is currently agricultural and rural land, but several master-planned communities—including Crossvines, Laura Heights, Willow Grove, Graystone Estates, Rheine Valley, and Schertz Forest—are developing. Future development includes a mix of rural residential homes and traditional single-family homes. The city is working with developers to modify future development plans as necessary to ensure compliance with AICUZ compatibility guidelines. Additionally, the city is proposing to acquire easements in this area to prevent future incompatible development. A new Wastewater Treatment Plant will be constructed near the intersection of I-10 and FM 1518 to service existing and future development on the eastern side of JBSA-Randolph. Utility services will likely encourage future growth in the southeastern portion of the city. Undeveloped land on the southwestern side of JBSA-Randolph is in the city's ETJ. Schertz has development agreements with property owners to control growth in their vacant or agricultural land in the ETJ. Development regulations are not enforced as long as the property is used for farm land.

6.3.3.3 CITY OF CONVERSE

Residential development is increasing in the northwestern and southeastern portions of the city of Converse. Single-family homes are currently under construction in the northwestern area, where the city has also received proposals to develop more homes. Additionally, a multi-family development and Wal-Mart are under construction in this area at the intersection of Kitty Hawk Road and Toepperwein Road. Residential development is also projected to increase along FM 1516 and FM 78 where there are larger tracts of undeveloped land.

The city completed the *1604 Commercial Corridor Plan* to guide the revitalization and development of Loop 1604 from FM 78 to I-10 (City of Converse 2014). Proposed land uses along Loop 1604 include commercial, retail, and industrial development directly west of JBSA-Randolph; and a mix of hospitality services, medical offices, retail, and entertainment development along Loop 1604 from Schaeffer Road to I-10. Proposed improvements will likely increase commercial, professional office, light industrial, and housing development in the city. Additionally, the corridor plan proposes to expand the city's ETJ boundary farther south to add recreational use areas.

6.3.3.4 CITY OF LIVE OAK

The City of Live Oak is surrounded by other municipalities and will not be able to grow geographically. The city's future land use plan supports mixed nonresidential and retail development along major roadways and intersections. More vacant land is available north of I-35 for future development. Commercial development is projected at the intersection of Pat Booker Road and I-35. An assisted living facility with doctor offices and additional retail is proposed at the shopping center at the northeast intersection of I-35 and Loop 1604. Live Oak recently announced plans to construct an IKEA retail store at the northwestern corner of the I-35 and Loop 1604 intersection. The store is expected to be built and operational by 2019. More retail development and office buildings are anticipated for future land uses at this intersection and the adjacent lot. Vacant land south of Lookout Road, which is designated for retail development in the future land use plan, will not likely be developed until the roadway is improved. Property to the west is also vacant and will not likely be developed for another five to six years. In the southern portion of the city, a multi-family development is under construction, with government financial assistance, to the southwest of the intersection of I-35 and Loop 1604.

6.3.3.5 CITY OF SELMA

The City of Selma is projected to reach full buildout within five to six years. Larger tracts of vacant land are in the northeastern corner of the city. This area is zoned for industrial use, but no future development is proposed. Commercial development will likely continue on I-35. Residential infill development will likely continue on the eastern side of Retama Parkway.

6.3.3.6 CITY OF SAN ANTONIO

The City of San Antonio's future land use plan projects low-density residential and neighborhood commercial development on the western side of Loop 1604, south of the installation. Several large-scale master-planned communities have been developed or have been approved for development to the west and south of the base, in the ETJ of San Antonio. The Parc at Escondido and Notting Hill are upscale subdivisions in the San Antonio I-10 East Annexation Area. The Parc at Escondido has started construction, and the Master Development Plan includes approximately 450 homes. The Notting Hill Master Development Plan, near the intersection of FM 1516 and I-10, includes more than 500 single-family homes and some commercial development. The Liberte Ventura Plan is a larger-lot residential development

west of Notting Hill. The Paloma Master Development Plan includes approximately 1,200 residential units on the southern side of I-10. Construction has not started. The city is anticipating annexation along the I-10 corridor, which may encourage future commercial development farther south of the installation. San Antonio is proposing a zoning overlay for the annexation area to regulate lighting and building heights.

Developers are proposing to build single-family homes on large tracts of land southwest of the base. The city has approved plats for residential development north of the intersection of Graywood Road and Boeing Drive. Approximately 27 acres of undeveloped property in the northeast portion of the proposed development area are within APZ I of Runway 33L and may be susceptible to future residential use.

6.3.4 FUTURE LAND USES IN COMMUNITIES SURROUNDING SEGUIN AAF

6.3.4.1 CITY OF SEGUIN

The City of Seguin has experienced significant growth in the past few years, which is largely attributed to its active economic development council, an increase in available housing, and an increase in manufacturing jobs. Development is expected to grow in the northeastern and southwestern portions of the city and along I-10 and US 90. The city has designated Planned Unit Development areas for large-scale mixed-used developments. In the northwestern portion of the city, a 400-home residential development is proposed in the Planned Unit Development area between FM 78 and I-10. Residential development is also occurring farther north on Cordova Road. The Planned Unit Development area on the northeastern side of the intersection of Highway 123 and I-10 is proposed for future residential and commercial development. The Meadows at Nolte Farms master-planned development, which would include approximately 380 single-family homes, is proposed in the Planned Unit Development area on the southeastern side. Just north of this residential area, the city has approved the plat for the Oak Hollow Apartments.

To control growth, the city has established non-development agreements with various property owners in the ETJ. Under a non-development agreement, the property is granted immunity from annexation; however, when the property owner sells or proposes to develop the land, the property will be annexed into the city. Once annexed, the city will provide municipal services and can appropriately tax the property. The City of Seguin does not enforce any development regulations in the ETJ as long as the property is used for farm land.

6.4 COMPATIBILITY CONCERNS

Land use compatibility conditions determined in the analysis are derived from the Air Force land use recommendation for both AICUZ noise zones and APZs (Appendix A). To assess whether existing land use is compatible with flight operations at JBSA-Randolph and Seguin AAF, the 2017 AICUZ noise contours and the 2017 AICUZ APZs were overlaid on property parcel data, land use data, and/or aerial photographs. The land use compatibility analysis of these areas includes an assessment of developed properties, as well as the identification of properties

that are currently vacant or have development potential. Generally, vacant property is compatible with the land use compatibility guidance; however, if vacant properties are developed, they may not remain compatible. Vacant properties with obstructions, such as trees, that penetrate the imaginary surfaces are compatibility concerns. Areas of compatibility concern at JBSA-Randolph and Seguin AAF are illustrated in Figures 6-7 and 6-8, respectively.

6.4.1 JBSA-RANDOLPH COMPATIBILITY CONCERNS

6.4.1.1 CLEAR ZONES

In 2015, JBSA-Randolph amended the width of all CZs to 3,000 feet to comply with Air Force regulations. The new dimensions resulted in incompatible land uses within the all CZs. Although the Air Force has acquired property rights for some of the amended areas that are now designated as CZs, the Air Force should, whenever practicable, own and maintain all land within the airfield CZs by acquiring sufficient fee and/or appropriate easements to prevent incompatible development or to prohibit uses that would generate increased incompatibility (Air Force 2015). Any structure or obstruction within the CZ, whether permanent or temporary, is a safety threat.

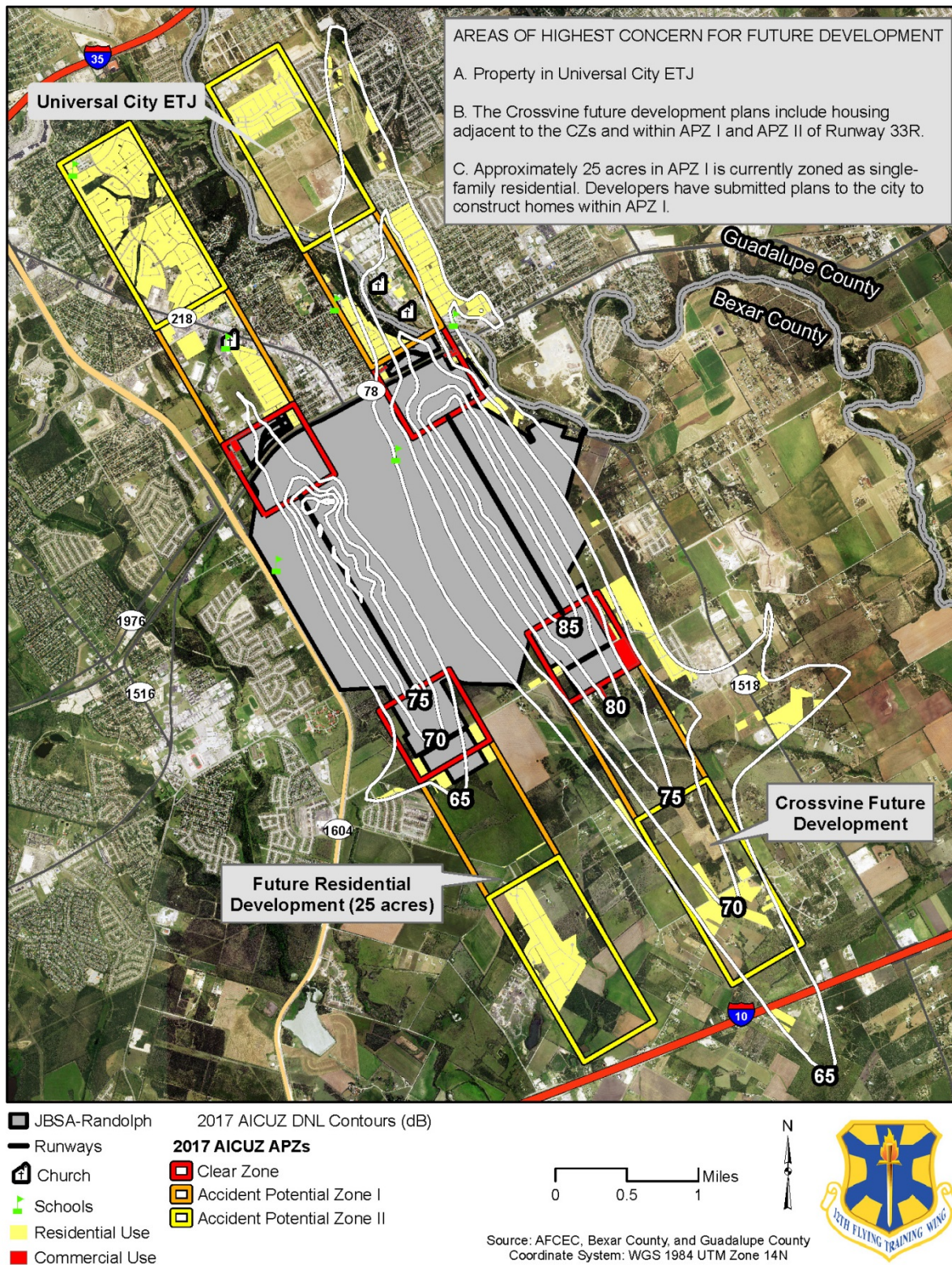
Incompatible land uses were identified within all CZs at JBSA-Randolph, both within the boundary of the base and off-base. Approximately 40 acres of residential development and 32 acres of commercial development are within the JBSA-Randolph CZs (Bexar County 2014; Guadalupe County 2016), along with other structures and roadways. Most land uses in the CZs are considered incompatible with military aircraft operations, and the CZ should remain free of any potential obstructions.

Off-base property in the northern CZs is mostly within the city limits of Universal City. Approximately 40 single-family homes are in the eastern portion of the northwestern CZ and a few commercial businesses are in the western portion. Converse's city limits now extend into a small portion of the northwestern CZ. Within the boundary of the base, fuel tanks, hospital parking, and water towers are in the northwestern CZ.

In 1988, JBSA-Randolph purchased perpetual CZ easement on property that is partially in the CZ and APZ I of Runway 15R/33L. This easement prohibits new construction or alteration of existing structures that is incompatible with AICUZ guidelines. As specified in the easement record "Any proposed construction must allow for a 60-day notification to the base commander during which time, the United States of America will determine if the proposed construction is in accordance with the AICUZ guidelines." The perpetual CZ easement area is on land in Universal City. The 60-day advance notice requirement is not incorporated into the city's development review process (Bexar County 2015).

FM 78 and various local roads (including East Aviation Boulevard, East Lindbergh Boulevard, North Street, Elvira Avenue, and Gladys Avenue) traverse the northwestern and northeastern CZs. Single-family homes, apartments, various commercial businesses and services, and a portion of the Universal City Veteran's Park are in the northeastern CZ. On base, baseball fields and a liquid oxygen storage facility are in the northeastern CZ. A landfill is on the eastern side of the CZ, and garbage trucks often park in the CZ.

Figure 6-7: Areas of Compatibility Concerns, JBSA-Randolph



The southern CZs are mostly within the city limits of Schertz, and a portion of the southwestern CZ is in the city limits of Converse. Residential and commercial developments are located in both the southeastern and southwestern CZs. Lower Seguin Road traverses both of the southern CZs. This road provides access to the South Gate entrance and is primarily used by JBSA-Randolph tenants. The on-base firing range and the South Gate entrance are also in the southwestern CZ.

6.4.1.2 *NORTHERN APZs AND NOISE CONTOUR AREAS*

Land to the north of JBSA-Randolph is generally more developed than property south of the airfield. The northern APZs include land within the jurisdiction of Universal City, Schertz, and Selma. APZ I of Runway 15R (northwestern APZ I), which is entirely within the city limits of Universal City, consists mostly of commercial development along SH 218 (Pat Booker Road) and high-density and single-family residential development in the eastern portion of APZ I. The First Baptist Church and First Baptist Academy are located along SH 218 (Pat Booker Road) in the APZ I of Runway 15R. Mobile homes are located near the intersection of Kitty Hawk Road and SH 218. The 65- to 69-dB DNL noise contours on Runway 15R extend slightly off-base, but no residential or noise-sensitive land uses are directly affected. Small industrial/commercial use parcels are within the northeastern APZ I. APZ II of Runway 15R (northwestern APZ II) consists mostly of single-family residential land use, and pockets of multi-family residential use are located along Universal City Boulevard. Olympia Elementary School is located within the northern portion of Runway 15R APZ II.

APZ I of Runway 15L (northeastern APZ I) is partially within the city limits of Universal City and Schertz. Residential and commercial areas are located within APZ I and the 65- to 69-dB DNL and the 70- to 74-dB DNL noise contours of Runway 15L. The 65- to 69-dB DNL noise contours also extend to residential areas on the eastern side of the APZs. Additionally, at least two churches and one school are identified in APZ I of Runway 15L and the 70- to 74-dB DNL noise zone. Several local parks are within APZ I and along the eastern side of APZ I. APZ II of Runway 15L (northeastern APZ II) consists mostly of undeveloped land. Universal City's ETJ extends into a portion of the northeast APZ II. Kingston Ranch II, a residential area in the City of Selma, is in the northern portion of APZ II; the city limits are not within the noise zones. There is a soccer field in APZ II. The area is zoned for general business; however, development in the near future is unlikely because of a lack of existing sewer and water services in the area, and the extension of water and sewer to this property would be costly. Vacant land along the eastern edge of APZ II is zoned for single-family residential. This area is part of a larger tract that goes beyond the boundary of APZ II. Vacant land may be vulnerable to development pressures and future incompatibility concerns.

Residential land use is incompatible within APZ I, and the maximum density for single-family housing in APZ II is one to two dwelling units per acre. Existing residential development in APZ II exceeds the density limits. Property in the Universal City's ETJ would initially be zoned as Large Lot Residential (R1) Zoning District classification upon annexation. R1 zoning allows single-family housing that does not exceed three dwelling units per acres, which exceeds the maximum density under the AICUZ guidelines (Universal City 2016). Single-family residential

land use is discouraged within the 65- to 69-dB DNL noise zone and strongly discouraged within the 70- to 74-dB DNL noise zone. Public assembly land uses such as churches and schools are not compatible within APZ I or APZ II; these land uses can be considered compatible within the 65- to 69-dB DNL and 70- to 74-dB DNL noise zones with proper noise attenuation measures. Mobile homes are incompatible in all APZs and all noise zones.

6.4.1.3 SOUTHERN APZs AND NOISE CONTOUR AREAS

Property in the footprint of the AICUZ APZs and noise contours on the southern end of JBSA-Randolph is mostly undeveloped; however, several master-planned communities are developing to the south of JBSA-Randolph. The majority of the area to the south of the base is zoned and planned for future residential use. Future development of the larger tracts of undeveloped land could be incompatible with flight operations.

Crossvines, a large-scale residential development east of Runway 33R, started construction in 2008 and has new phases of development under construction. The community's future expansion plans include housing adjacent to the CZs and within APZ I and APZ II of Runway 33R; housing in APZ II would be on larger lots. Currently, the City of Schertz does not provide utility infrastructure or services to this area, and the developers are exploring modifications to construction and site plans to be compliant with APZ recommendations. Schertz Forest, which consists of single-family homes on large acre lots, is directly south of JBSA-Randolph in APZ II of Runway 33R. These communities are also within the 65- to 69-dB DNL and 70- to 74-dB DNL noise zone. The 65- to 69-dB DNL noise contours on Runway 15L/33R extend farther east of the base and may affect existing and future residential areas in Willow Grove, a residential development east of JBSA-Randolph; and Rheine Valley Development, on the eastern side of FM 1518. A new Wastewater Treatment Plant will be constructed southeast of the base near I-10, which will service existing and future development east of the base. Facilities improvement could encourage incompatible development.

APZ I of Runway 33L (southwestern APZ I) is mostly undeveloped. A few isolated homes are adjacent to the boundary of JBSA-Randolph in APZ I, and a portion of the McArthur Park residential community is in APZ I and 65- to 69-dB DNL noise zone of Runway 33L. A 51-acre property that is partially within the Runway 33L CZ was purchased by Bexar County for a substation. The Laura Heights community is south of JBSA-Randolph and partly in APZ II of Runway 33L (southwestern APZ II). Residential land use in APZ II is considered compatible with the AICUZ guidelines, which allow for single-family housing of a maximum density of two dwelling units per acre in APZ II; however, these homes are directly along the center line of the runway. The city limits of San Antonio extend into the southwestern APZs. Approximately 25 acres of a larger parcel are in the southwestern APZ I, and this area is currently zoned as single-family residential. Developers have submitted plans to the city to construct homes within APZ I.

Residential land use is incompatible within APZ I, discouraged within the 65- to 69-dB DNL noise zone, and strongly discouraged within the 70- to 74-dB DNL noise zone. Public assembly land uses such as churches and schools are not compatible in APZ I; these land uses can be

considered compatible within the 65- to 69-dB DNL and 70- to 74-dB DNL noise zones with proper noise attenuation measures. Mobile homes are incompatible in all APZs and all noise zones.

The 75- to 79-dB DNL and 80- to 84-dB DNL noise contours extend off-base south of Runway 33R. This area is currently undeveloped and zoned as Planned Development. Residential land use is incompatible, and commercial and public uses are discouraged in these high noise exposure zones. Future land use in proximity to aircraft operations may lead to noise complaints.

Due to the high-volume trainer operations and the significant threat of bird/wildlife strike to pilot safety at JBSA-Randolph, more restrictive density and land use guidelines are necessary, especially for future development within the southern AICUZ APZs and noise contours. The 2015 JLUS, conducted jointly by the surrounding communities and the 12 FTW, includes the following recommendations:

- Urban development within southern APZ I of either the west or east runway is not compatible.
- Residential development of one house per 10 acres in a non-linear arrangement within southern APZ II of the west runway is compatible.
- Residential development of one house per 20 acres within southern APZ II of the west runway is compatible. Other uses in accordance with AICUZ criteria may be compatible.
- Residential development within the 65-dB DNL noise contour is not compatible. Residential construction in these zones presents the possibility of future training restrictions due to the sustained impact of noise on residents.

6.4.2 SEGUIN AAF COMPATIBILITY CONCERNS

Although much of the area surrounding Seguin AAF is rural and open rangeland with a few isolated single-family homes, incompatible development is identified in the CZs, APZs, and noise contour areas.

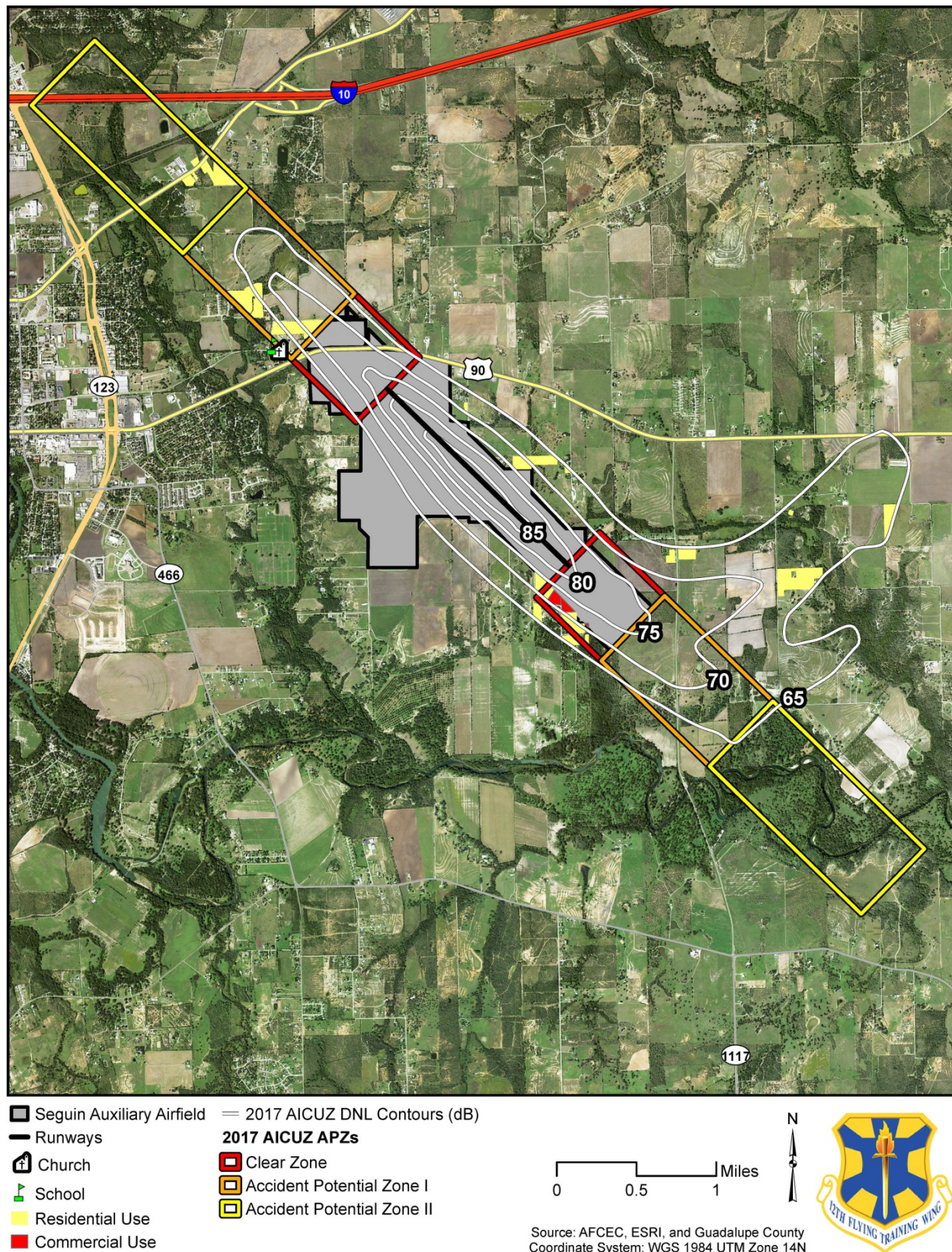
The Air Force does not own all the property within the CZs³ and has not acquired easements to prevent incompatible development. Approximately 15 acres of land classified as residential use are within the Seguin AAF CZs (Guadalupe County 2016). US 90 traverses the northern CZ, and a few homes on the northern side of the highway are within the boundary of the CZ. Low-density residential areas, including a few single-family homes and mobile homes, and one commercial property are also in the western side of the southern CZ near Aux Airfield Road. These properties are also within the 70- to 74-dB DNL noise contour area. Residential land use is incompatible within the CZ and strongly discouraged within the 70- to 74-dB DNL noise zone.

³ All related figures for Seguin AAF in this AICUZ Study reflect the standard 3,000-foot-wide CZs, and the land use compatibility analysis is based on the standard 3,000-foot-wide CZs.

Land to the north of the airfield is generally more developed than property south of the airfield. Residential areas are located within northern APZ I and within the 65- to 69-dB DNL and the 70- to 74-dB DNL noise zones. Residential development is incompatible within APZ I, discouraged in the 65- to 69-dB DNL noise zone, and strongly discouraged within the 70- to 74-dB DNL noise zone. Manufactured housing on the eastern boundary of the airfield and on the northern side of US 90 is within APZ I and the 65- to 69-dB DNL and 70-dB to 74-dB DNL noise zones. Mobile homes are incompatible in all APZs and all noise zones. In the southern portion of the AICUZ footprint, a few isolated single-family homes are in the 65- to 69-dB DNL noise zone. No residential, commercial, or public assembly areas were identified in the southern APZ I and APZ II. One church and one school are partially in the Runway 13 APZ I; no other churches, schools, or public assembly facilities were identified directly within the AICUZ footprint.

Future residential and mixed-use developments are planned in the northeastern and southwestern portions of the City of Seguin. Although these proposed developments will occur outside of the APZs and high noise exposure areas, future growth may continue closer to the airfield, and the undeveloped properties in the AICUZ footprint may be susceptible to higher-density development pressures. The City of Seguin is pursuing adoption of an overlay district for Seguin AAF that would include regulations for development review notification, height limitations, density control, and lighting.

Figure 6-8: Areas of Compatibility Concerns, Seguin AAF



7 IMPLEMENTATION

Implementation of the AICUZ Study must be a joint effort between JBSA-Randolph and surrounding communities. This AICUZ Study, in conjunction with other studies such as the JLUS, provides information to ensure that land use planning decisions made by the local municipalities are compatible with a future installation presence. This chapter discusses the roles of all the partners in the collaborative planning.

7.1 AIR FORCE ROLE

The goal of the Air Force AICUZ Program is to minimize the noise and safety concerns on the surrounding communities, and the role of the Air Force is to advise these communities on potential effects from base operations on the safety, welfare, and quality of life of their citizens.

JBSA-Randolph perceives its AICUZ responsibilities as encompassing the areas of flying safety, noise abatement, and participation in the land use planning process. Recommended actions for the Air Force include:

- Air Force should maintain aircraft and train aircrews to help ensure that the chances of an accident are remote – however, accidents do occur despite the best aircrew training and aircraft maintenance.
- The Air Force should ensure that wherever possible flights are routed over sparsely populated areas to reduce the exposure of lives and property to a potential accident.
- The Air Force should periodically review existing traffic patterns, instrument approaches, weather conditions, and operating practices, and evaluate these factors in relationship to populated areas and other local situations. This is done to limit, reduce, and control the impact of flying operations and noise on surrounding communities.
- JBSA-Randolph should establish a community forum between the installation and surrounding stakeholders to discuss land use and other issues of concern; these meetings should be held on a quarterly basis.

Preparation and presentation of this AICUZ Study is one phase of the continuing Air Force participation in the local planning process. As the local communities update their land use plans, the Air Force must be ready to provide additional input when needed.

Implementation of the AICUZ program objectives is a continuous process that requires ongoing participation and action even after initial compatibility policies are adopted. JBSA-Randolph should provide the AICUZ Study and other applicable studies to the local communities for reference as the communities update their land use plans. JBSA-Randolph personnel are prepared to engage with the surrounding communities to discuss proposed development plans and land use policies as they may affect, or may be affected by, the base. They also are available to provide information, criteria, and guidelines to state, regional, and local planning

bodies, civic associations, and similar groups to assist them in planning efforts and to ensure that Air Force input is offered in the early stages of any long-range planning initiatives.

Encroachment Partnering

Title 10 United States Code §2684a authorizes the Secretary of Defense or the Secretary of a military department to enter into agreements with an eligible entity or entities to address the use or development of real property in the vicinity of, or ecologically related to, a military airfield or military airspace, to limit encroachment or use of the property that would be incompatible with the mission of the airfield, or place other constraints on military training, testing, and operations. Eligible entities include a state, a political subdivision of a state, and a private entity that has as its principal organizational purpose or goal the conservation, restoration, or preservation of land and natural resources, or a similar purpose or goal.

Encroachment partnering agreements provide for an eligible entity to acquire fee title, or a lesser interest, in land for the purpose of limiting encroachment on the mission of a military airfield and/or to preserve habitat off the airfield to relieve current or anticipated environmental restrictions that might interfere with military operations or training at the airfield. The DoD can share the real estate acquisition costs for projects that support the purchase of fee-simple, conservation, or other restrictive easements for such property. The eligible entity negotiates and acquires the real estate interest for encroachment partnering projects with a voluntary seller. The eligible entity must transfer the agreed-upon restrictive easement interest to the United States of America upon the request of the Secretary of Defense.

Under the Readiness and Environmental Protection Integration (REPI) Program, the DoD provides funding to military services in support of partnerships that promote compatible land use and ensure the future use of military training areas. The Air Force is pursuing compatible land use partnerships to identify areas around JBSA-Randolph and Seguin AAF where land acquisition, in the form of either outright fee-simple purchase or conservation easements/covenants, would be mutually beneficial for both parties. By forming partnerships, the Air Force can be eligible for funding to share the costs of land acquisition and conservation easement efforts through the REPI Program. REPI funds cannot be used to acquire property rights in the CZs.

7.2 STATE/REGIONAL ROLES

The Air Force can work with the TMPC and the TCC to propose state-wide regulations that prohibit development that may interfere with or compromise flight operations and training. The TMPC advises state and local officials on defense-related issues and provides financial assistance through grants and loans. The TMPC produces a periodic Master Plan with recommendations regarding policies and plans to support the long-term military mission viability, including best methods for communities to enhance their relationship with military installations. The TCC is a coalition of military installations in Texas, which develops comprehensive resolutions for common encroachment concerns among the bases in Texas.

The TCC provides the installations with an effective avenue to communicate and coordinate with state legislators.

Regional planning agencies can help control incompatible growth by aiding and influencing local governments in the development of policies, plans, and regulations necessary for the physical and economic expansion of the region.

7.3 LOCAL GOVERNMENT ROLES

The development and use of lands outside of military installations is beyond the control of the Air Force. Local governments have the authority to implement regulations and policies to control development and direct growth to ensure that land use activity is compatible within the AICUZ footprint. While local planning regulations and policies may include land use restrictions in the AICUZ APZs, the AICUZ noise contours are seldom recognized. Local governments should recognize their responsibility in providing land use control in those areas encumbered by the AICUZ footprint by incorporating AICUZ information into their planning policies and regulations.

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 help protect the integrity of the installation's flying mission:

- Recommend local government planners consider AICUZ policies, guidelines, and other study recommendations when developing or revising 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.
- Recommend zoning ordinances be adopted or modified to reflect the compatible land uses outlined in the AICUZ and JLUS Studies.
- Recommend local government planners establish protocols to consult with the base on land use matters within overlapping ETJs near JBSA-Randolph.
- Recommend local governments review their capital improvement plan, infrastructure investments, and development policies to ensure they do not encourage incompatible land use patterns near JBSA-Randolph and Seguin AAF, with particular emphasis on utility extension and transportation planning.
- Recommend local governments implement height and obstruction ordinances that reflect current Air Force and 14 CFR Part 77 requirements.
- Recommend fair disclosure ordinances be enacted to require disclosure to the public for those AICUZ items that directly relate to aircraft operations at JBSA-Randolph and Seguin AAF.
- Encourage the adoption or modification of building codes to ensure that any new construction in the vicinity of JBSA-Randolph and Seguin AAF incorporates the recommended noise-level reduction measures into the design and construction of structures.

- Recommend proposals for tall structures such as wind turbines and communication towers are monitored to ensure that new construction does not pose a hazard to navigable airspace around JBSA-Randolph and Seguin AAF.
- Recommend AICUZ and/or JLUS land use guidelines for development density in APZs are reflected in local government plans and ordinances.
- Encourage local governments to consult with JBSA-Randolph on planning and zoning actions that have the potential to affect base operations.
- Invite Air Force leadership to participate as an ex officio member on boards, commissions, and regional councils addressing long-range development and other planning policy.
- Continue to inform JBSA-Randolph of planning and zoning actions that have the potential to affect base operations.
- Develop a working group representing city planners, county planners, and base planners to meet at least quarterly to discuss AICUZ concerns and major development proposals that could affect airfield operations.

7.4 COMMUNITY ROLES

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

Real Estate Professionals

- Be aware of where the noise zones and CZs/APZs encumber land near the base.
- Invite base representatives to local real estate and broker association chapter meetings to discuss the AICUZ Program goal and objectives.
- Disclose to prospective buyers when property is located within CZs/APZs or noise zone greater than 65 dB DNL.
- Require Realtor Multiple Listing Services to disclose noise zones and CZs/APZs on all listings.

Developers

- Be aware of where the noise zones and CZs/APZs encumber land near the base. Consult with JBSA-Randolph on proposed developments within the AICUZ area of influence.
- Ensure that new construction within the AICUZ area of influence has the recommended noise level reductions incorporated into design and construction codes.

Local Citizens

- Participate in local forums with the base to learn more about the base'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.
- Ask local real estate professionals, city planners, and base representatives about noise and accident potential when considering to purchase or lease properties near JBSA-Randolph and Seguin AAF.

Whereas the base and community are physically separated by a fence, Air Force activities affect the community, and conversely, community activities affect the Air Force mission. Collaborative planning, forging partnerships, open communications, and close relationships help the Air Force and its neighbors achieve their mutual goals.

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APPENDICES

Appendix A Land Use Compatibility Tables

Appendix B Key Terms

APPENDIX A LAND USE COMPATIBILITY TABLES

Land use compatibility recommendations in Tables A-1 and A-2 are from AFI 32-7063 (Air Force 2015) and reflect the Air Force's minimum compatibility requirements; however, individual circumstances at each base may require more stringent guidelines as prudent. For example, the 2015 Joint Land Use Study recommends less dense development in the southern APZs at JBSA-Randolph due to local bird threats. These types of local variations are not reflected in this Appendix.

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

LAND USE		SUGGESTED LAND USE COMPATIBILITY			
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 two dwelling units/acre
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	Manufacturing³				
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 and 0.56 in APZ II

LAND USE		SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation ¹	APZ-I Recommendation ¹	APZ-II Recommendation ¹	DENSITY Recommendation ¹
25	Furniture and fixtures; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
26	Paper and allied products; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	Manufacturing³ (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 and 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 and 0.56 in APZ II
42	Motor vehicle transportation	N	Y ⁶	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
43	Aircraft transportation	N	Y ⁶	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
44	Marine craft transportation	N	Y ⁶	Y	Maximum FAR of 0.28 in APZ I and 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 and 0.56 in APZ II

LAND USE		SUGGESTED LAND USE COMPATIBILITY			
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 and 0.56 in APZ II
47	Communication	N	Y ⁶	Y	Maximum FAR of 0.28 in APZ I and 0.56 in APZ II
48	Utilities ⁷	N	Y ⁶	Y ⁶	Maximum FAR of 0.28 in APZ I and 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 and 0.56 in APZ II
52	Retail trade – building materials, hardware, and farm equipment	N	Y	Y	See Note 8 below
53	Retail trade – 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 and 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
60	Services¹⁰				
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	

LAND USE		SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation ¹	APZ-I Recommendation ¹	APZ-II Recommendation ¹	DENSITY Recommendation ¹
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	
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 –golf courses, riding stables, water recreation, etc.	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	

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

Key:

Y (Yes) – Land use and related structures compatible without restrictions.

N (No) – Land use and related structures are not compatible and should be prohibited.

Y^x – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.N^x – No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

Notes:

- ¹ “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. 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 per acre in APZ I and 50 per acre in APZ II are considered low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ I, and maximum assemblies of 50 people per acre in APZ II. Recommended FARs are calculated using standard parking generation rates for various land uses, vehicle occupancy rates, and desired density in APZs I and II. For APZ I, the formula is $FAR = 25 \text{ people per acre} / (\text{Average Vehicle Occupancy} \times \text{Average Parking Rate} \times (43,560/1,000))$. The formula for APZ II is $FAR = 50 / (\text{Average Vehicle Occupancy} \times \text{Average Parking Rate} \times (43,560/1,000))$.
- ² The suggested maximum density for detached single-family housing is two dwelling units per acre. In a 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 in 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 aboveground passenger terminals and no aboveground 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 affect military operations through hazards to flight or electromagnetic interference. Each new development should 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-II; 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 and auditoriums are not recommended.
- ¹¹ No chapels or houses of worship are allowed 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, and large classes 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 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, or 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.

APZ	Accident Potential Zone
BASH	bird/wildlife aircraft strike hazards
DoD	Department of Defense
FAR	floor area ratio
PUD	planned unit development
SLUCM	Standard Land Use Coding Manual, United States Department of Transportation

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					
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
31	Rubber and misc. plastic products; manufacturing	Y	Y ²	Y ³	Y ⁴	N

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+
30	Manufacturing (continued)					
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
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	Y ⁶	Y	N	N
48	Utilities	Y	Y ²	Y ³	Y ⁴	N
49	Other transportation, communication, and utilities	Y	255	305	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 –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

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+
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
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

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+
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

Key:

Y (Yes) – Land use and related structures compatible without restrictions.

N (No) – Land use and related structures are not compatible and should be prohibited.

Y^x – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.

N^x – No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

25, 30, or 35 – The numbers refer to noise level reduction (NLR) levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures are generally compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.

Notes:**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, nonconforming land uses.
- ^b Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor 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.

dB decibel

DNL day-night average sound level

CNEL Community Noise Equivalent Level (normally within a very small decibel difference of DNL)

NLR noise level reduction

SLUCM Standard Land Use Coding Manual, United States Department of Transportation

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. To account for increased human sensitivity to noise at night, a 10 dB penalty is applied to events occurring during the acoustical nighttime period (10:00 p.m. through 7:00 a.m.). Noise metrics are discussed in Chapter 4: *Aircraft Noise*.
- **Decibel** – Decibel (abbreviated as dB) is the unit used to measure the intensity of a sound.
- **Flight Profiles** – Flight profiles consist of aircraft conditions (e.g., altitude, speed, power and setting.) defined at various locations along each assigned flight track.
- **Flight Track** – A flight track is the route an aircraft follows while conducting an operation at the airfield, between airfields, or to/from training areas. The flight track locations represent the various types of arrivals, departures, and closed patterns accomplished at JBSA-Randolph. Flight tracks are graphically represented as single lines, but actual flight patterns may vary due to aircraft performance, pilot technique, and weather conditions.
- **Operation** – An aircraft operation is defined as one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because the aircraft crosses over the runway threshold twice, once on arrival and once on departure. 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).