Tyndall Air Force Base
Air Installations Compatible Use Zones (AICUZ)

STUDY (Final)

U.S. AIR FORCE

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Tyndall Air Force Base
Air Installations Compatible Use Zones (AICUZ) Study

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Acronyms and Initializations

ID	Definition
AAD	average annual day
AADT	Average Annual Daily Traffic
ABD	average busy day
ACC	Air Combat Command
ADNL	A-weighted day–night average sound level
AF	Air Force
AFB	Air Force Base
AFDTC	Air Force Development Test Center
AFH	Air Force Handbook
AFI	Air Force Instruction
AGL	above ground level
AICUZ	Air Installations Compatible Use Zones
Air Force	U.S. Air Force
APZ	Accident Potential Zone
AST	Air Superiority Target
CFR	Code of Federal Regulations
CY	Calendar Year
CZ	Clear Zone
dB	decibel
dBA	decibels A-weighted
dBC	decibels C-weighted
DNL	day–night average sound level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoT	Department of Transportation
EPA	Environmental Protection Agency
ETR	Engine Thrust Request
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FHWA	Federal Highway Administration
FICUN	Federal Interagency Committee on Urban Noise
FLUM	Future Land Use Map
FS	Fighter Squadron
FTS	Fighter Training Squadron
FW	Fighter Wing
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
INM	Integrated Noise Model
JLUS	Joint Land Use Study
Lmax	maximum sound level
LUPZ	Land Use Planning Zone
Metro	Metropolitan

Acronyms and Initializations (concluded)

ID	Definition
Metro	Metropolitan
MSA	Metropolitan Statistical Area
MSL	Mean Sea Level
NLR	noise-level reduction
NPODSD	Noise Program Operational Data Support Documentation
NZ	Noise Zone
RNM	Rotorcraft Noise Model
RPA	Remotely Piloted Aircraft
SEL	sound exposure level
SLUCM	Standard Land Use Coding Manual
TRSS	Training Support Squadron
UFC	Unified Facilities Criteria
UHF	Ultra High Frequency
U.S.	United States
VFR	Visual Flight Rule
WG	Wing
WEG	Weapons Evaluation Group
WPS	Weapons Squadron

Key Terms

Operation – one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because it has a takeoff component and a landing component.

Sortie - 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).

Decibel – Ten times the common logarithm of two like quantities. For aircraft noise, the two quantities are sound pressures – the sound pressure of the source and a reference sound pressure.

Maximum Sound Level (L_{max}) – the highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight). At any given time during the event, the measured sound level is actually an average taken over one-eighth of a second.

> **Sound Exposure Level (SEL)** – a composite metric which represents the total sound energy of an event normalized to a duration of one second. SEL combines both the intensity of a sound and its duration. For an aircraft flyover, SEL includes the maximum and all lower noise levels produced as part of the overflight, together with how long each part lasts.

Day-Night Average Sound Level (DNL) - a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to events occurring during the acoustical nighttime period (10 p.m. through 7 a.m.). See Section 4.5 for additional information.

Flight Track – an aircraft's path over the ground. Flight tracks are modeled for each type of flight operation, e..g, arrival, departure, and closed pattern, accomplished at Tyndall AFB. Flight tracks may vary due to air traffic control, weather, and other reasons (e.g. one pilot may fly the track on one side of the depicted track, while another pilot may fly the track slightly to the other side).

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

1.0 Introduction

Section 1.1 discusses the Air Installations Compatible Use Zones program background and Section 1.2 provides the purpose, scope and authority of the program. Previous studies and changes requiring and updated are presented in Section 1.3 and 1.4, respectively.

1.1 AICUZ Program

1.1.1 Background

This Air Installations Compatible Use Zones (AICUZ) Study reaffirms the U.S. Air Force (Air Force) policy of assisting local, regional, state, and Federal officials. This study applies to the areas surrounding Tyndall Air Force Base (AFB). It promotes compatible development within the AICUZ area of influence while protecting Tyndall AFB operational capability from the effects of land use that are incompatible with installation operations. Information presented in this report regarding military operations and associated noise and accident potential is provided to assist local communities and to serve as a tool for future planning and zoning activities.

This study is an update of the 2008 Tyndall AFB AICUZ Study (US Air Force 2008). This study presents changes in aircraft operations since the last study and provides noise contours and compatible use guidelines for land areas neighboring the installation based on the projected CY2018 operations to assist local communities and to serve as a tool for future planning and zoning activities.

1.1.2 Concept

Federal legislation, national sentiment, and other external forces, which directly affect the U.S. Department of Defense (DoD) mission, greatly increase the role of the DoD in environmental and planning issues. Problems of airfield and range encroachment from incompatible land uses surrounding installations, as well as air and water pollution and socioeconomic impact, require continued and intensified DoD involvement. The nature of these problems dictates direct DoD participation in comprehensive community and land use planning. Effective and coordinated planning, that bridges the gap between the federal government and the community, requires establishment of good working relationships with local citizens, local planning officials, and state and Federal officials. Good working relationships depend on creating an atmosphere of mutual trust and helpfulness. The Air Installations Compatible Use Zones (AICUZ) concept has been developed in an effort to:

- Protect local citizens from noise exposure and accident potential associated with flying activities and
- Prevent degradation of the capability of the DoD to achieve its mission by promoting compatible land use planning.

1.2 Purpose, Scope, and Authority

1.2.1 Purpose

The purpose of the DoD's AICUZ program is to promote compatible land development in areas subject to increased noise exposure and accident potential due to aircraft operations. The principal goals of the AICUZ program are to protect the health, safety, and welfare of neighbors while preserving the defense flying mission. The inclusion of recommendations from this AICUZ study will help Bay County and other local planning entities meet goals of preventing incompatible uses that might compromise Tyndall AFB's ability to fulfill its mission requirements.

Land use guidelines for an Air Force AICUZ outlined in Air Force Handbook (AFH) 32-7084 AICUZ Program Manager's Guide reflect preferred land use recommendations for areas underlying Clear Zones (CZs), Accident Potential Zones (APZs) I and II, as well as for the following five DNL zones (a description of these areas can be found in Chapter 3):

- 65-70 dB
- 70-75 dB
- 75-80 dB
- 80-85 dB
- 85+ dB

DNL contours are created by connecting points of equal DNL. Noise zones cover a range of noise exposure between two DNL contours. Land use recommendations for these noise exposure zones have been established on the basis of sociological studies prepared and sponsored by several federal agencies, including the U.S. Department of Housing and Urban Development (HUD), the U.S. Environmental Protection Agency (EPA), the U.S. Department of Transportation (DoT), and the Air Force, as well as state and local agencies. The guidelines recommend land uses that are compatible with airfield operations while allowing maximum beneficial use of adjacent properties.

Additionally, guidelines for the maximum height of artificial structures are provided to protect the navigable airspace around an airfield, particularly the approach/departure corridors extending along the axis of the runway. The Air Force strives to recommend land use regulations that minimize negative impacts to land owners while ensuring its obligation to defend the citizens of the United States as well as the public investment in the installation itself.

The AICUZ program uses the latest technology to define noise levels in areas near Air Force installations. An analysis of Tyndall AFB's anticipated flying operations was performed, including types of aircraft, flight patterns, variations in altitude, power settings, number of operations, and hours of operations. This information was used to develop the noise contours contained in this study. The DoD NOISEMAP modeling software, with Version 7.2 of the core NOISEMAP program (NMAP), and the previously mentioned DNL metric was used to define the noise exposure zones at Tyndall AFB.

1.2.2 Scope

This study summarizes the current Tyndall AFB flight operations along with the resulting noise contours. Clear zone and accident potential zones associated with Tyndall AFB runways are provided with recommendations for compatible land use 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.

1.2.3 Authority

Department of Defense Instruction (DoDI) 4165.57 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 implements DoDI 4165.57 and applies to all Air Force installations with active runways located in the United States and its territories. This AFI provides guidance to Major Commands (MAJCOMs) and installations with a framework to comply.

AFH 32-7084 provides MAJCOM and base level Commanders and managers an overview of the Air Force's AICUZ Program. The AICUZ Program Manager's Guide provides specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ program. It is written in a "how to" format to guide a person through the five phases of an AICUZ study. It also includes a generic AICUZ Study Report, Citizen Brochure, and an Implementation and Maintenance Plan. The guide summarizes the data collection steps and procedures for developing USAF-approved noise contours. This publication aligns with AFI 32-7063.

1.3 Previous AICUZ Efforts and Related Studies

The following five studies are relevant to this document:

- 1994 Tyndall AFB, Florida AICUZ Study (US Air Force 1994) is the initial compatible land use study completed for Tyndall AFB.
- Initial F-22 Operational Wing Beddown Final Environmental Impact Statement, November 2001 which described the action to bring F-22 aircraft to Tyndall AFB.
- The 2008 update to the AICUZ amendment for the period 1994-2008 which was based on the March 2007 aircraft operational condition (US Air Force 2008) and accounts for potential changes to compatible land use due to the addition of the F-22.
- Replacement of QF-4 Full-Scale Aerial Targets (FSATs) with QF-16 FSATs at Tyndall AFB, FL, Environmental Assessment, May 2013. This study resulted in the QF-16 aircraft operating at Tyndall which became part of the based aircraft and are included in this AICUZ.
- Supplemental Environmental Impact Statement (SEIS) for F-35 Beddown at Eglin Air Force Base, Florida, June 2014. This SEIS reviewed the beddown of 59 Primary Authorized Aircraft (PAA) F-35 at Eglin AFB and possible mitigations. The study included 6,862 F-35 flight operations expected to occur at Tyndall AFB.

1.4 Changes that Require an AICUZ Update

Based on the reasons listed below, this 2016 AICUZ Study updates the 2008 AICUZ Study and provides flight track, APZ, and noise zone information that reflects the most accurate picture of the installation's aircraft activities as projected for 2018.

1.4.1 Operational Changes

DoD aircraft fleet mix and training requirements may change over time. The resulting flight operations change affects the DNL contours. The primary operational changes since the previous AICUZ Update are:

- Retirement of the based F-15C of the 325th Fighter Wing (325 FW),
- Addition of T-38 to the 2nd Fighter Training Squadron (2 FTS) in 2014,
- Replacement of the 53rd Weapons Evaluation Group (53 WEG) QF-4 RPA with the QF-16A/C RPA, and
- Addition of transient F-35 operations. Additional F-35 aircraft are in the process of being delivered to Eglin AFB which already conduct some closed pattern training at Tyndall AFB and will do so with increased frequency in the next few years. The 2018 planning contours reflect the anticipated noise environment at Tyndall AFB after the additional F-35 aircraft are delivered to Eglin AFB.

1.4.2 Update of AFI

Previous Tyndall AFB AICUZ studies analyzed the "average flying day" concept in which annual operations for each aircraft type are averaged over the number of flying days per year by that aircraft type or squadron. Non-flying days (e.g. weekends or holidays) are not used in computing the "average busy-day" operations. The 2008 AICUZ modeled flying units ranging from 136 days per year (53 WEG) to 365 days per year (transient aircraft). Adhering to the most recent Air Force Instruction (AFI), this study uses "average annual day" (US Air Force 2015a). The primary reason for the change to average day is to be consistent with the land use recommendations guideline.

2.0 Tyndall AFB, Florida

Sections 2.1 and 2.2 describe the location and history of the base. Sections 2.3 and 2.4 provide details on the mission of the base and installation activities. Section 2.5 discusses relevant operational areas. Section 2.6 concludes the chapter presenting the local economic impacts of the base.

2.1 Location

As shown in Figure 2-1, Tyndall AFB is located entirely within Bay County, Florida. The installation is geographically divided by U.S. Highway 98, which runs east to west through the installation. The area north of U.S. 98 supports the primary mission of the installation with two parallel runways and facilities to support five operational activities. Tyndall contains four primary active runways and two secondary runways. The installation is on a peninsula and includes 128 miles of shoreline with 19 miles of barrier islands. Tyndall AFB is bordered by the Gulf of Mexico, St. Andrews Bay, East Bay and unincorporated county land.

2.2 History

Tyndall Field originally opened in 1941 as a gunnery range named after 1st Lt Frank Benjamin Tyndall who was a World War I pilot, Silver Star recipient, and commander of the 22nd Aero Squadron. Shortly after the Air Force was established in 1947, the field was renamed Tyndall Air Force Base.

In 1950 Tyndall became an Air Training Command base. Several schools were assigned, including Weapons Controllers, USAF Air Police, and USAF Instrument Instructor Pilot. The next year Air Training Command began aircrew (interceptor) training at Tyndall using F-86, F-89, and F-94 aircraft. This continued until 1957 when Tyndall became part of the Air Defense Command.

A major reorganization occurred in 1981 with the activation of the 325th Fighter Weapons Wing. The wing began its mission at Tyndall with the F-101, F-106, and T-33 aircraft. By 1983 the first F-15 aircraft arrived at Tyndall while the F-101 and F-106 were phased out.

Over the years, Tyndall gained additional missions as other units were stationed on the base. The Air Force Engineering and Services Center was formed at Tyndall as a part of a major reorganization. In 1991, it was renamed the Air Force Civil Engineering Agency. The 23rd Air Division, renamed the Southeast Air Defense Sector, also relocated to Tyndall. It had the responsibility for the air defense of the southeastern United States.

As the base entered its fiftieth year, Tyndall underwent reorganization in response to the DoD effort to streamline defense management. Headquarters, First Air Force moved from Langley Air Force Base, Virginia, to Tyndall, and the 325th Fighter Wing became the installation host.

Transition continued for the base as it transferred from being an Air Combat Command installation to an Air Education and Training Command installation in 1993. This move emphasized Tyndall's commitment to training. The 325th Fighter Wing remained the sole F-15 air superiority training wing until October 2010. The 337th Air Control Squadron remains the only air battle manager training unit in the United States Air Force.

On Oct. 1, 2012, the 325th Fighter Wing transitioned to Air Combat Command and the Ninth Air Force. The wing remains committed to its goal to "Train and Project Unrivaled Combat Air Power."

Figure 2-1. Regional Setting

Tyndall AFB was selected as the center for training the Air Force's newest F-22 Raptor and received its first aircraft in 2004. The 43rd Fighter Squadron provides training for new, pipeline students, and pilots transitioning from other airframes. As Tyndall's newest mission ramped up, its "bread and butter" mission, training F-15 pilots, began a gradual phase out. The 1st Fighter Squadron deactivated in 2006, while both the 2nd and 95th Fighter Squadrons shuttered in 2010. In 2013, Tyndall received a combat-coded, operational F-22 squadron designated the 95th Fighter Squadron (Tyndall 2015).

2.3 Mission

The host unit at Tyndall is the 325th Fighter Wing (325 FW), a subordinate unit of 9th Air Force and the Air Combat Command. Known as the "Home of Air Dominance," the 325 FW's mission is to "Train and Project Unrivaled Combat Air Power." The wing also provides training for F-22 maintainers, intelligence analysts, air traffic controllers, and other specialties. The 43rd Fighter Squadron of 325th Operations Group accomplishes flying training in the F-22 and the 95th Fighter Squadron is a fully operational F-22 unit. The 2nd Fighter Training Squadron, flying the T-38, provides adversarial support for the F-22. The 337 Air Control Squadron trains Air Battle Managers with contracted MU-2 twin turboprop aircraft. The 82 Aerial Targets Squadron flies the QF-16A/C full-scale and the BQM-167 subscale remotely piloted aircraft. The 83rd Fighter Weapons Squadron of the 53rd Weapons Evaluation Group conducts flying in conjunction with the Air-to-Air Weapon System Evaluation Program. Flying associated with the Program is accomplished primarily by QF-16, unmanned aerial vehicles and other aircraft that deploy to Tyndall AFB.

2.3.1 Flying Units (US Air Force 2015b)

The based operating unit and host wing is the 325th Fighter Wing of the Air Combat Command (ACC).

325th Fighter Wing

The 325th Fighter Wing is host to more than 30 tenant organizations located at Tyndall Air Force Base, Florida. The wing consists of the 325th Operations Group, 325th Maintenance Group, 325th Mission Support Group and 325th Medical Group.

The Operations Group includes the 2nd Fighter Training Squadron (2 FTS), 43rd Fighter Squadron (43 FS), 95th Fighter Squadron (95 FS), 325th Operations Support Squadron (325 OSS), and the 325th Training Support Squadron (325 TRSS).

Associate units at Tyndall AFB include: 1st Air Force; Southeast Air Defense Sector; North American Aerospace Defense Command System Support Facility; 53rd Weapons Evaluation Group; Detachment 2, 28th Test Squadron; Air Force Civil Engineer Support Agency; Detachment 2, Air Force Research Laboratory; Detachment 1, 823rd Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers Squadron; Detachment 4, 372nd Training Squadron; and Noncommissioned Officer Academy.

The 2nd Fighter Training Squadron

The 2 FTS was reactivated in 2014 to operate the T-38 Talon aircraft and conduct adversary training for F-22 Raptor pilots in air superiority missions.

43rd Fighter Squadron

The 43rd Fighter Squadron is responsible for providing air dominance training for the F-22 Raptor. The 43rd FS, a subordinate unit of the 325th Fighter Wing, Tyndall AFB was the first squadron to receive the F-22 and will continue to serve as the primary training location.

95th Fighter Squadron

The 95th Fighter Squadron projects unrivaled combat air power supporting national military objectives and Combatant Commander requirements through strategic application of 5th generation air dominance fighter aircraft and personnel. The 95 FS had been initially deactivated when the F-15 was retired it was recently reactivated in 2013 to operate a F-22 Raptor unit.

53rd Weapons Evaluation Group

The 53rd Weapons Evaluation Group is an Air Combat Command tenant organization that reports to the 53rd Wing, Eglin AFB, FL. Although the WEG is comprised of five squadrons and two detachments, only its squadrons are relevant to flying activities Tyndall. This includes the 53rd Test Support Squadron, the 81st Range Control Squadron, the 82nd Aerial Targets Squadron, the 83rd Fighter Weapons Squadron all located at Tyndall and the 86th Fighter Weapons Squadron, located at Eglin AFB. Its two detachments are located in New Mexico and Utah.

The group conducts the Air Force's air-to-air Weapon System Evaluation Program, known as Combat Archer, and the Air Force's air-to-ground Weapon System Evaluation Program, known as Combat Hammer.

82nd Aerial Targets Squadron

The 82nd operates DoD's only full-scale aerial target program, maintaining modified QF-16 A/C aircraft for this purpose. Squadron members also operate the Air Force's only two DeHavilland E-9A Widget airborne surveillance and telemetry relay aircraft.

33rd Fighter Wing

The 33rd Fighter Wing is a training-flying unit of Air Education and Training Command's 19th Air Force and is a major tenant unit on Eglin AFB. The 33 FW operates the new F-35 aircraft which conducts airfield training at Tyndall AFB.

337th Air Control Squadron

The 337th Air Control Squadron is assigned to the 33rd Operations Group, 33rd Fighter Wing, Eglin AFB, Florida operating out of Tyndall AFB. The squadron's primary responsibility includes training all U.S. Air Force, Air National Guard and Air Force Reserve officers in command and control mission execution as air battle managers in a variety of weapons systems in support of air expeditionary forces worldwide and provides command and control support for the F-22 Raptor initial and transition

training. Additionally, the squadron provides training for international officers in tactical command and control operations in a coalition environment. This is accomplished with the Mitsubishi MU-2 twin turboprop aircraft.

2.4 Operational Areas

Tyndall AFB comprises the peninsula that extends to the northwest of Mexico Beach with Highway 98 running through it. As shown in Figure 2-2, the main airfield includes four runways (14L/32R and 14R/32L) located northeast of Highway 98 which handle nearly all of the aircraft operations. Although there are only two paved rectangular areas for aircraft landing and takeoff they represent four named runways[1].

The aircraft hangers and parking areas are located to the west of the runways. Tyndall AFB includes a Hush House, which is an enclosed structure for jet engine testing that includes the ability to suppress the noise generated by engine runs, also located to the west of the runways. Additionally, Runway 01/19 is located on the eastern portion of the base primarily used for DF- 16/QF-16 RPA aircraft operations.

2.5 Local Economic Impacts

During FY2013 Tyndall AFB employed over 11,000 personnel, as tabulated in Table 2-1. Tyndall included a serving population of 3,342 active military personnel, and 9,257 retirees from all service branches. Civilian employees and military dependents accounted for 2,799 and 4,551 people, respectively (AFD 140717-046).

Table 2-1. Personnel by Classification and Housing - FY 2013

Classification	Total
Active Duty Military	3342
Air Nat'l Guard / Reserve (ANG)	247
Traditional Guard / Reserve (DSG)	83
Total Miliatry	3672
Civilian Employees	2799
Military Dependents	4551
Total Civilian Personnel	7350
Total Personnel	**11022**

Source: AFD-140717-046

[1] Runway 14L and Runway 32R share the same physical pavement on the ground but represent the different directions of aircraft use. Runways derive their name from their magnetic heading divided by 10 which is rounded to a whole number. In the case of Runway 14L it has a magnetic heading of 138 degrees while Runway 32R has a magnetic heading of 318 degrees. Runways 14R and 32L follow the same convention with the suffixes 'L' for 'left' and 'R' for 'right' to differentiate between the parallel runways.

Table 2-2. Summary of Annual Gross Payroll - FY 2013

Classification	Category	
Appropriated Fund Military Payroll	Active Duty Military	$ 208,951,947
	Air Nat'l Guard / Reserve (ANG)	$ 20,389,094
	Traditional Guard / Reserve (DSG)	$ 1,996,004
	Subtotal	$ 231,337,045
Appropriated Fund Civilian Payroll	General Schedule	$ 85,877,614
	Other	$ 6,640,379
	Subtotal	$ 92,517,993
Non-Appropriated Fund, Contract Civilian and Private Business Payroll	Civilian NAF	$ 6,363,759
	Civilian BX	$ 2,674,103
	Contract Civilian (not included elsewhere)	$ 120,660,219
	Branch Banks / Credit Union	$ 162,281
	Subtotal	$ 129,860,362
Expenditures	Contracts and Procurement	$ 12,051,908
	Material, Equipment and Supplies	$ 14,888,515
	Construction	$ 49,991,391
	Subtotal	$ 76,931,814
Indirect Jobs	Estimated Value	$ 83,539,680
Total	**Total Economic Impact Estimate**	**$ 614,186,894**

Source: AFD-140717-046

Figure 2-2. Installation Layout

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3.0 Aircraft Operations

Aircraft types are the subject of Section 3.1. Sections 3.2 and 3.3 present aircraft operations, and runway/flight track utilization, respectively.

3.1 Aircraft Types

3.1.1 Based Aircraft

Table 3-1 presents the based aircraft along with the associated flying unit. Both the F-22 and the T-38 are operated by the 325th Fighter Wing while the QF-16 and E-9 are operated by the 53 WEG. The MU-2 operations are contracted by the 337th Air Control Squadron.

Table 3-1. Based Aircraft

Flying Group	Aircraft Type	Description
2d Fighter Training Squadron	T-38A	Supersonic Jet Trainer, twin-engine
43d Fighter Squadron	F-22	Fighter Jet, twin turbofan engine
95th Fighter Squadron	F-22	Fighter Jet, twin turbofan engine
53d Weapons Evaluations Group	QF-16	Fighter Jet, single jet engine, remotely piloted aircraft
	E-9	Twin Turbo prop, based on Dash-8 commuter transport
337th Air Control Squadron	MU-2	High-wing, twin engine turboprop aircraft

The F-22 Raptor is a 5th generation fighter capable of simultaneously conducting air-to-air and air-to-ground combat missions with near impunity. Tyndall AFB based F-22 aircraft currently account for the majority of airfield operations.

The F-22 was developed for the USAF with the focus on air superiority. The F-22 is powered by two Pratt and Whitney low bypass after-burning turbofan F119-100 engines capable of 35,000 lbs of thrust each.

F-22 at Tyndall AFB
Source: U.S. Air Force (www.tyndall.AF.mil)

The T-38 Talon is a twin-engine, high-altitude, supersonic jet trainer used for a variety of roles because of its design, economy of operations, ease of maintenance, high performance and exceptional safety record. The T-38 is powered by two General Electric J85-GE-5 turbojet engines with afterburners capable of 3,300 lbs of thrust each.

T-38 over Tyndall AFB
Source: U.S. Air Force (www.tyndall.af.mil)

Under the QF-16 Air Superiority Target (AST) program the USAF converted Block 15, 25, and 30 F-16s into full-scale target remotely piloted aircraft. The QF-16 operates using 1 of 3 conventional F-16 engines, which is capable of 28,000 lbs of thrust.


QF-16 during First unmanned flight at Tyndall AFB
Source: U.S. Air Force (www.AF.mil)

The E-9A twin turbo prop aircraft, based on the Bombardier de Havilland Dash-8 commuter transport, is used in the weapons evaluation program primarily as a surveillance platform to ensure the Gulf Coast waters are clear of civilian boaters and aircraft during live missile launches and other hazardous military activities. Two E-9A aircraft operating from Tyndall AFB are used for telemetry and ultra-high frequency relay and surface.


E-9A takeoff during combat archer exercise
Source: U.S. Air Force (www.AF.mil)

The MU-2 Peacock is a high-wing, twin-engine turboprop aircraft. It is designed as a small transport vehicle for civil and military roles. At Tyndall AFB these aircraft are used to train pilots simulating fighter tactics as a safer and simpler introduction to realistic mission training prior to moving onto the fighter jet.


MU-2 taking off at Tyndall AFB
Source: AIR 1st Aviation Companies, Inc.

3.1.2 Transient Aircraft

Aircraft that are temporarily at an airfield other than their home base are considered to be 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 various transient aircraft that utilized Tyndall AFB during 2015. The most frequent is the F-35 which performs Instrument Landing System (ILS) approaches.

Table 3-2. Transient Aircraft

Aircraft Type	Description	Category
F-15E	Twin engines	Fighter Jet
FA-18E/F		
F-22A		
F-35A	Single engine	
F-16C		
T-38C	Twin engines	Trainer Jet
KC-10A	Based on the DC-10, three engines	Aerial Refueling Tanker
KC-135R	Based on the B-707, four engines	
C-17	Four engines	Large Military Transport
C-5A	Four engines	
B-757	Mid-size, narrow-body, twin-engine jet airliner	
C-12	Twin-engine turboprop based on Super King Air	Small Military Transport
C-130H	Four-engine turboprop	
C-21A	Twin engine, based on Learjet 35 business jet	
T-41	Single prop piston engine, based on Cessna 172	Piston Engine
T-6	Single radial engine, trainer	
UH-60A	Four-bladed, twin engine medium lift utility helicopter	Helicopter

3.2 Aircraft Operations

3.2.1 Noise Abatement

Tyndall strives to have well-maintained aircraft and well-trained aircrews to ensure that aircraft accidents are avoided. To the greatest extent possible, flights are routed over sparsely populated areas and water as regularly as possible 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. This requirement is a direct result and expression of Air Force policy that all AICUZ plans must include an analysis of flying and flying-related activities designed to reduce and control the effects of such operations on surrounding land areas.

3.2.2 Noise Complaints

Tyndall has historically experienced a minimum of noise complaints due to its location away from main public use areas. All noise complaints are worked to ensure future operations, where possible, do not generate unacceptable noise and provide results from noise investigations back to the complainant as soon as practical.

3.2.3 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 it has a takeoff component and a landing component. Annual (calendar year) flight operations for the past six years are presented in Table 3-3. Total flight operations have ranged from approximately 22,000 (2012) to nearly 61,000 (2015)

Table 3-3. Flight Operations – 6-year Summary

Calendar Year	Based operations	Transient Operations	Total
2015	56,706	3,954	60,660
2014	45,795	3,286	49,081
2013	41,084	4,664	45,748
2012	19,141	2,656	21,797
2011	35,186	5,558	40,744
2010	48,555	6,513	55,068

This study focuses on the projected activity that is anticipated to occur during Calendar Year (CY) 2018 (CY18) but CY15 activity provides a baseline condition from which the CY18 is forecasted. Tyndall AFB is expected to conduct approximately 66,000 annual aircraft operations during 2018 as shown in Table 3-4. The CY18 scenario accounts for the final build out and full operational capability of transient 33rd FW F-35 squadrons which are expected to only conduct operations during day and nearly all, approximately 99 percent, of those 6,900 flight operation would be closed patterns.

Consistent with Air Force policy, aircraft operations are modeled on an average-day basis, thus the annual operations in Table 3-4 are divided by 365 resulting in a total of 182 average daily flight operations as detailed in Table 3-5.

Table 3-4. Annual Projected Aircraft Flight Operations for 2018

Category	Squadron / Unit / Group	Aircraft	Modeled Type (if different) or engine designation	Departure			Arrival			Closed Pattern[2]			Total		
				Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total	Day (0700-2200)	Night (2200-0700)	Total
Based	95 FS	F-22A		3,399	17	3,416	3,399	17	3,416	342	2	344	7,140	36	7,176
	2FTS	T-38A		5,314	54	5,368	5,314	54	5,368	1,063	11	1,074	11,691	119	11,810
	43FS	F-22A		4,370	22	4,392	4,370	22	4,392	21,848	110	21,958	30,588	154	30,742
	53WEG	DF-16/QF-16	F-16A	750	-	750	746	4	750	699	3	702	2,195	7	2,202
		E-9	DHC-8*	220	-	220	218	2	220	-	-	-	438	2	440
	337ACS	MU-2	Cessna 441	1,932	20	1,952	1,932	20	1,952	428	4	432	4,292	44	4,336
Transient	33FW	F-35A		35	-	35	35	-	35	6,830	-	6,830	6,900	-	6,900
	Fighter	F-15E	F-15E (F100-PW-220)	264	5	269	264	5	269	59	9	68	587	19	606
		F-16C	F100-PW-220	198	2	200	198	2	200	-	-	-	396	4	400
		FA-18	FA-18E/F	55	-	55	55	-	55	-	-	-	110	-	110
		F-22A		198	2	200	198	2	200	-	-	-	396	4	400
		T-38	T-38C	109	1	110	109	1	110	218	2	220	436	4	440
	Large Cargo	C-17		15	-	15	15	-	15	-	-	-	30	-	30
		C-5	C-5A	4	-	4	4	-	4	-	-	-	8	-	8
	Tanker	KC-10	KC-10A	24	4	28	24	4	28	-	-	-	48	8	56
		KC-135R		79	2	81	79	2	81	-	-	-	158	4	162
	Small Jet	C-21	C-21A	46	1	47	46	1	47	-	-	-	92	2	94
	Jet Airliner	B-757	B-757-200-RR	32	-	32	32	-	32	-	-	-	64	-	64
	4-eng Prop	C-130	C-130H&N&P	59	-	59	59	-	59	-	-	-	118	-	118
	2-eng Prop	C-12		48	1	49	48	1	49	-	-	-	96	2	98
	1-eng Prop	T-41		13	-	13	13	-	13	-	-	-	26	-	26
		T-6		17	3	20	17	3	20	-	-	-	34	6	40
	Helicopter	H-60 [1]		48	3	51	48	3	51	-	-	-	96	6	102
Based				15,985	113	16,098	15,979	119	16,098	24,380	130	24,510	56,344	362	56,706
Transient				1,244	24	1,268	1,244	24	1,268	7,107	11	7,118	9,595	59	9,654
Total				**17,229**	**137**	**17,366**	**17,223**	**143**	**17,366**	**31,487**	**141**	**31,628**	**65,939**	**421**	**66,360**

Notes 1) H-60 operations not modeled

2) Each circuit counted as two operations

Table 3-5. Annual Average Daily Aircraft Flight Operations Projected for 2018

Category	Squadron / Unit / Group	Aircraft	Average Daily Arrival and Departure Operations	Average Daily Closed Operations	Total Average Daily Operations
Based	95 FS	F-22A	18.72	0.94	20
	2FTS	T-38A	29.41	2.94	32.35
	43FS	F-22A	24.07	60.16	84.23
	53WEG	DF-16/QF-16	4.11	1.92	6.03
	53WEG	E-9	1.21	-	1.21
	337ACS	MU-2 (1)	10.70	1.18	11.88
Transient	33FW	F-35A	0.19	18.71	18.90
	Fighter	F-15E	1.47	0.19	1.66
	Fighter	F-16C	1.10	-	1.10
	Fighter	F-18E/F	0.30	-	0.30
	Fighter	F-22A	1.10	-	1.10
	Fighter	T-38C	0.60	0.60	1.20
	Large Cargo	C-17	0.08	-	0.08
	Large Cargo	C-5A	0.02	-	0.02
	Tanker	KC-10A	0.15	-	0.15
	Tanker	KC-135R	0.44	-	0.44
	Small Jet	C-21A	0.26	-	0.26
	Jet Airliner	B-757	0.18	-	0.18
	4-eng Prop	C-130H	0.32	-	0.32
	2-eng Prop	C-12	0.27	-	0.27
	1-eng Prop	T-41	0.07	-	0.07
	1-eng Prop	T-6	0.11	-	0.11
	Helicopter	UH-60A(2)	0.28	-	0.28
Based			88.22	67.14	155.36
Transient			6.94	19.50	26.44
Total			**95.16**	**86.64**	**181.80**

Notes 1) 337 ACS MU-2 is flown by retired Air Force Pilots operated by a contracted company

2) UH-60A operations not modeled

3) Each circuit counted as two options

3.2.4 *Run-Up Operations*

To the maximum extent possible, aircraft maintenance engine run-up locations have been established in areas to minimize noise for people in the surrounding communities, as well as for those on base as depicted in Figure 3-1. All run-ups are located to the southwest of the main runways (towards the ocean) except for the two remotely piloted aircraft run-up locations just west of Runway 19/01.

Aircraft maintenance and pre-flight run-up operations and profiles were gathered and utilized for this analysis and summarized in Table 3-6. The F-22 and T-38 aircraft account for 51 and 24 percent of all run-up activity, respectively. Less than five percent of aircraft maintenance run-ups at Tyndall AFB occur during nighttime (10:00 p.m. to 7:00 a.m.).

Table 3-6. Summary of Modeled Run-up Operations Projected for 2018

Category	Aircraft	Description	Location	Annual Events	Night % (2200-0700)
Based	F-22	Checks (Preflight, leak, hot pit), Trouble Shooting, Acceptance Run, Core Operations, Functional Operations	Pads, Hot Pit#1, Hush House	12,756	0-5%
	T-38C	Preflight, Low Power, and Engine Wash	Pads and Trimpad	5,934	0-10%
	QF-16	Preflight checks, Engine Change	Pads, Trans Alert 1-4, and Drone runway	854	0%
	E-9	Preflight checks-Main runway	Pads	218	0%
	MU-2	Preflight check, Post-flight cooldown, Maintenance on pads	Pads	3,954	0%
Transient	F-35A	Preflight check, Post-flight cooldown	Trans Alert 1-4	12	0%
	F-16	Preflight check, Post-flight cooldown	Trans Alert 1-4	400	0%
	F-18	Preflight check, Post-flight cooldown	Trans Alert 1-4	110	0%
	F-15	Preflight check, Post-flight cooldown	Trans Alert 1-4	540	0%
	C-21A	Preflight check, Post-flight cooldown	Trans Alert 1-4	94	0%

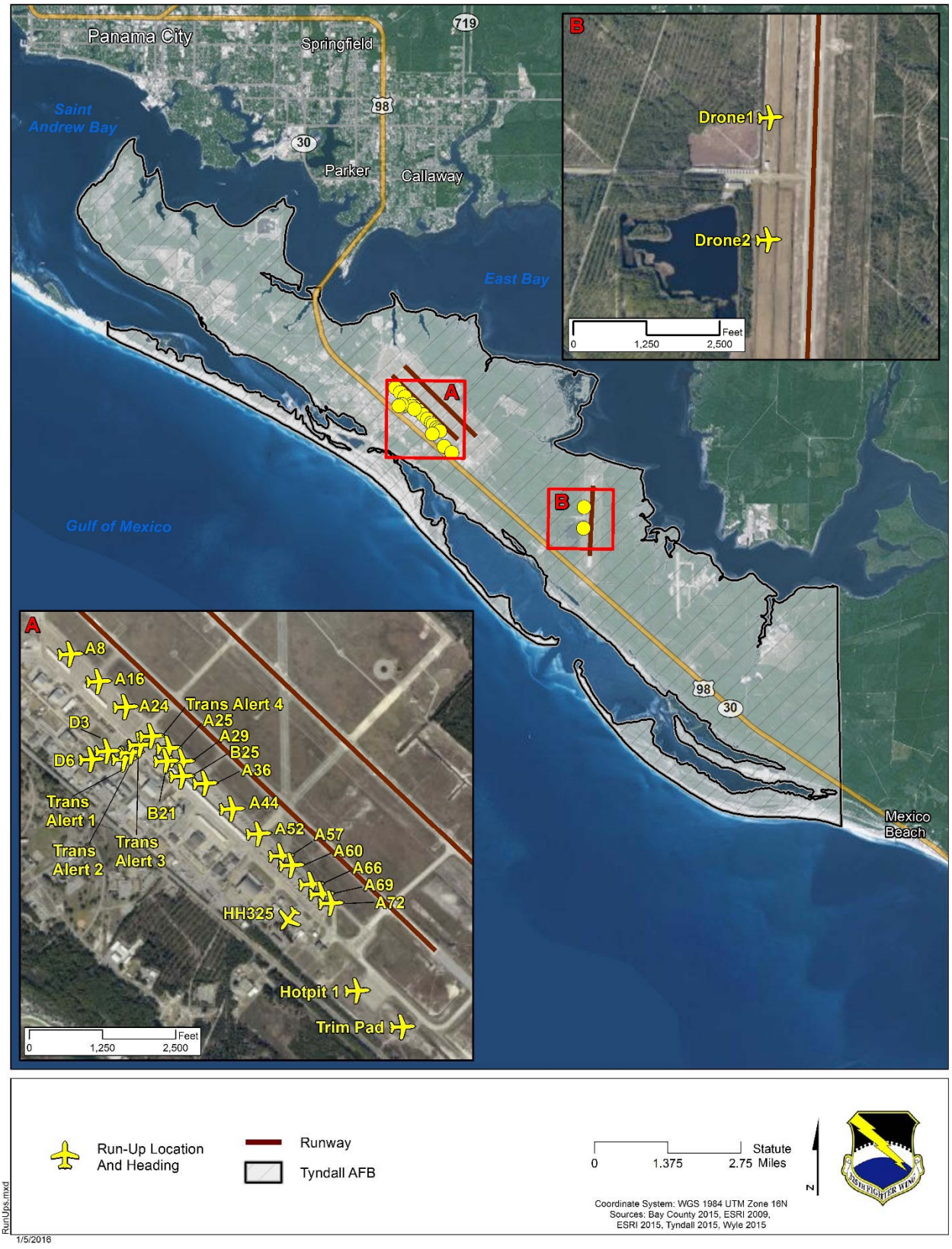


Figure 3-1. Modeled Run-up Locations

3.3 Runway and Flight Track Utilization

Runway orientation and size characteristics are presented in Table 3-7. Runways 14L/32R and 14R/32L are parallel but have different lengths. The length of Runway 14L/32R is 10,000 feet whereas the length of Runway 14R/32L is 9,135 feet. Runway 01/19, primarily used for Remotely Piloted Aircraft (RPA) operations, has a length of 7,000 feet. The Tyndall airfield elevation is 17 feet above Mean Sea Level (MSL).

Table 3-7. Runway Dimensions

Runway	Orientation	Length (ft)	Width (ft)	Overrun Length (ft)
14L / 32R	138° / 318°	10,000	200	1,000 each end
14R / 32L	138° / 318°	9,135	150	1,000 each end
19 / 01	186° / 006°	7,000	150	Rwy 19 - 750; Rwy 01 - 1,000

Table 3-8 summarizes daytime and nighttime runway utilization by operations type and aircraft type. Runway 32 is used most frequently by all aircraft with 57 percent of all operations while the remaining 43 percent occur on Runway 14. The only exception is the QF-16 which also utilizes Runway 19/01 for approximately half of its operations.

Planning for the areas surrounding an airfield considers three primary aircraft operational/land-use determinants: (1) aircraft accident potential; (2) aircraft noise; and (3) hazards to operations from land uses (e.g. height of structures). Each of these concerns is addressed in conjunction with mission requirements and safe aircraft operations to determine the optimum flight track for each aircraft type. The flight tracks depicted in Figures 3-2 through 3-4 are the result of such planning and depict the typical flight tracks for noise modeling.

Table 3-8. Average Daily Daytime and Nighttime Runway Utilization

Operation Type	Runway Direction	%	L/R	Based					Transient		Based			
											QF-16			
				T-38A	F-22 95 FS	F22 43FS	E-9	MU-2	F-35	Other	Runway Direction	%	L/R	%
Arrival	14	43%	14L	91%	84%	90%	68%	46%	100%	100%	14	25%	14L	41%
			14R	9%	16%	10%	32%	54%					14R	59%
	32	57%	32L	9%	16%	10%	33%	54%			32	33%	32L	60%
			32R	91%	84%	90%	67%	46%	100%	100%			32R	40%
	1										1	42%		
Closed Pattern	14	43%	14L	91%	80%	80%		100%	80%	100%	14	17%	14L	38%
			14R	9%	20%	20%			20%				14R	62%
	32	57%	32L	9%	20%	20%			20%		32	23%	32L	62%
			32R	91%	80%	80%		100%	80%	100%			32R	38%
	1										1	60%		
Departure	14	43%	14L	98%	30%	30%	60%	10%			14	25%	14L	10%
			14R	2%	70%	70%	40%	90%	100%	100%			14R	90%
	32	57%	32L	2%	70%	70%	39%	90%	100%	100%	32	33%	32L	90%
			32R	98%	30%	30%	61%	10%					32R	10%
	19										19	42%		

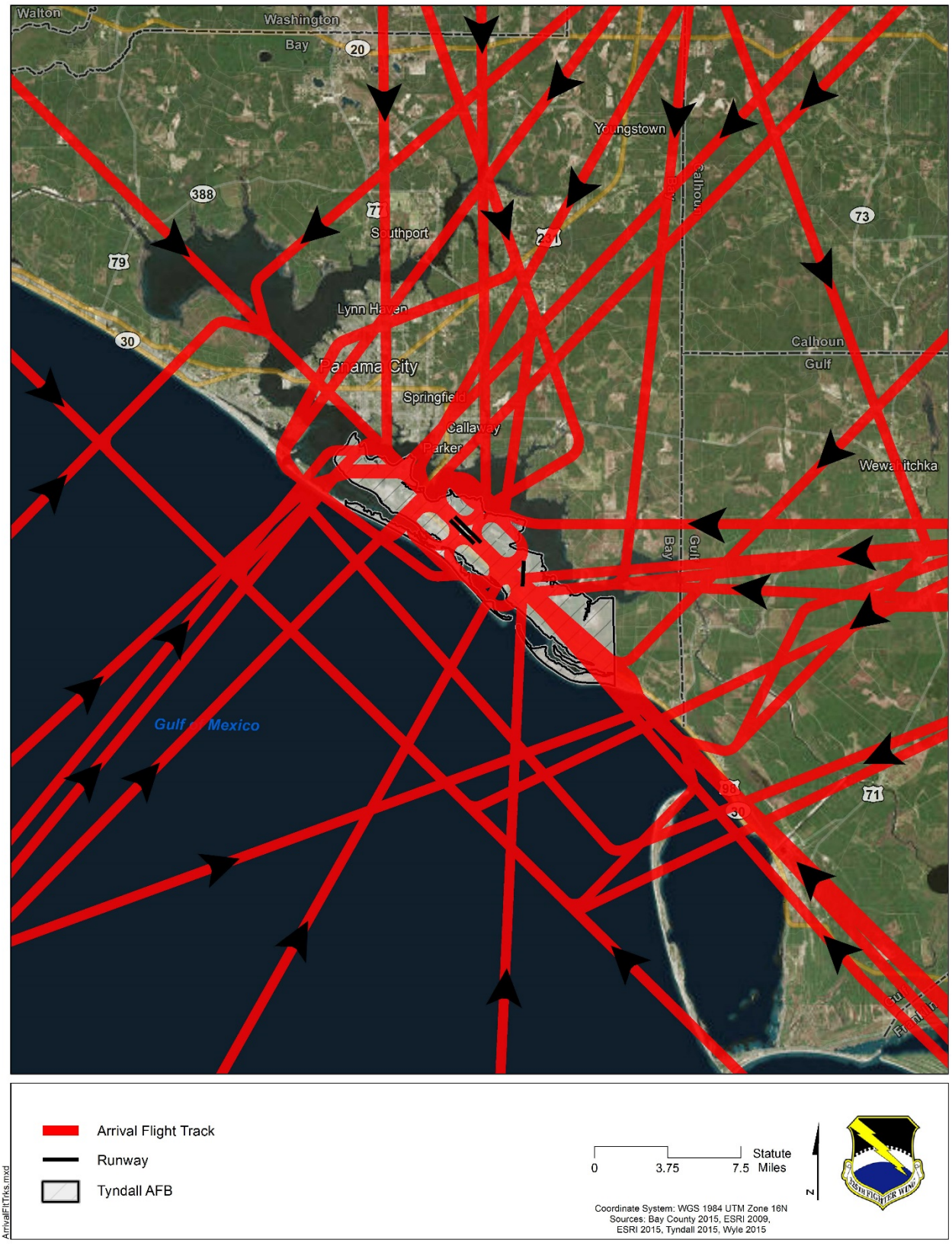


Figure 3-2. Average Daily Arrival Flight Tracks

Figure 3-3. Average Daily Departure Flight Tracks

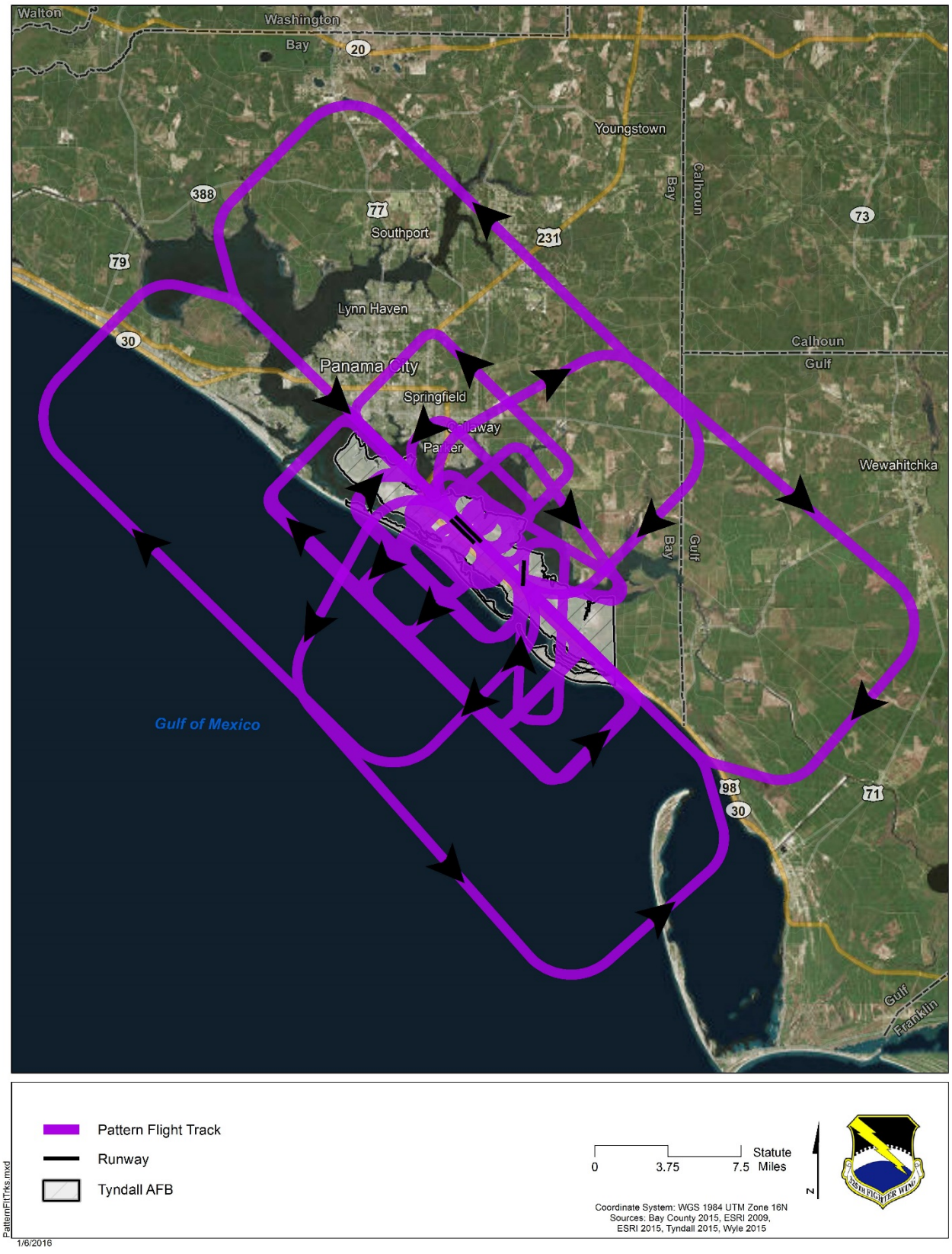


Figure 3-4. Average Daily Pattern Flight Tracks

3.4 Flight Profiles

Along with operations and flight track information presented in the previous sections, the analysis requires development of flight profiles for each of the flight tracks. Certain flight operations (e.g. Touch and Go pattern) require aircraft to travel at published altitudes for safety and noise considerations. The altitudes for aircraft while conducting closed pattern operations along downwind or level altitude portions are:

- Overhead Break – 1,600 feet Above Ground Level (AGL),
- Touch and Go Pattern – 1,600 feet AGL,
- Ground Controlled Approach, Pattern – 2,600 MSL, and
- Radar Pattern – 1,600 feet AGL.

Fixed-wing aircraft may perform brief pre-flight engine run-ups just prior to takeoff. Pre-flight runups are typically conducted near or on the runway[2]. At Tyndall AFB, the F-22 was modeled with a 3 second pre-flight run-up at a power setting of 100 percent Engine Thrust Request (ETR) for all Military power departures on the runway prior to brake release. Other modeled aircraft do not typically perform pre-flight run-ups.

[2] Running up the engine while the aircraft is on the runway just prior to brake release improves the aircraft's rate of acceleration. This often shortens the distance the aircraft must travel on the runway before rotating and lifting off the ground.

4.0 Aircraft Noise

Section 4.1 through 4.5 provides background on the nature of sound or noise itself while Section 4.6 describes noise sources and how they are modeled. Section 4.7 presents the AICUZ Planning Contours. Section 4.8 concludes the chapter with a discussion of noise abatement and complaints at the base.

4.1 What is Sound/Noise?

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Of course, aircraft are not the only sources of noise in an urban or suburban surrounding, where noise from interstate and local roadway traffic, rail, industrial, and neighborhood sources also intrude on the everyday quality of life. Nevertheless, aircraft are readily identifiable to those affected by their noise and are typically singled out for special attention and criticism. Consequently, aircraft noise problems often dominate analyses of environmental impacts.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration.

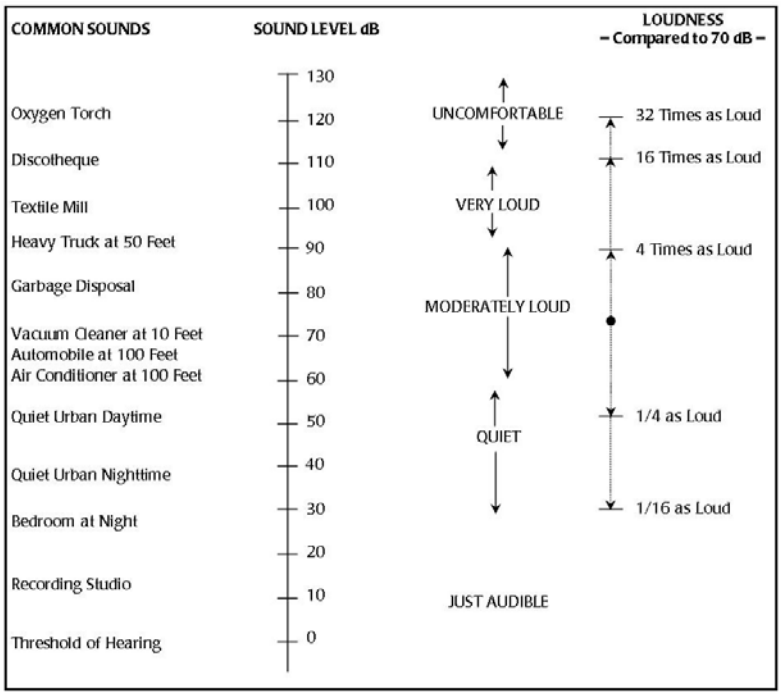
- Intensity is a measure of the acoustic energy of the sound and is related to sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound.
- Frequency determines how the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.
- Duration or the length of time the sound can be detected.

4.2 Sound Levels and Types of Sounds

Most environmental sounds are measured using A-weighting. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting puts emphasis on the 1,000 to 4,000 Hz range which is the range of most human speech. When the use of A-weighting is understood, the term "A-weighted" is often omitted and the unit dB is used. Unless otherwise stated, dB units refer to A-weighted sound levels.

Noise can become an issue when its level exceeds the ambient or background sound level. Ambient noise in urban areas typically varies from 60 to 70 dB, but can be as high as 80 dB in the center of a large city. Quiet suburban neighborhoods experience ambient noise levels around 45-50 dB (U.S. Environmental Protection Agency (USEPA) 1978).

Figure 4-1 is a chart of A-weighted sound levels from common sources. Some sources, like the air conditioner and vacuum cleaner, are continuous sounds whose levels are constant for some time. Some sources, like the automobile and heavy truck, are the maximum sound during an intermittent event like a vehicle pass-by. Some sources like "urban daytime" and "urban nighttime" are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods. These are discussed in detail in Section 4.3.



Sources: Harris 1979; Federal Interagency Committee on Aviation Noise (FICAN) 1997.

Figure 4-1. Typical A-weighted Sound Levels of Common Sounds

4.3 Noise Metrics

Noise metrics quantify sounds so they can be compared with each other, and with their effects, in a standard way. Aircraft noise varies with time. During an aircraft overflight, noise starts at the background level, rises to a maximum level as the aircraft flies close to the observer, then returns to the background as the aircraft recedes into the distance. This is sketched in Figure 4-2, which also indicates two metrics [Maximum Sound Level (L_{max}) and Sound Exposure Level (SEL)] that are described in Sections 4.4.1 and 4.4.3 below.

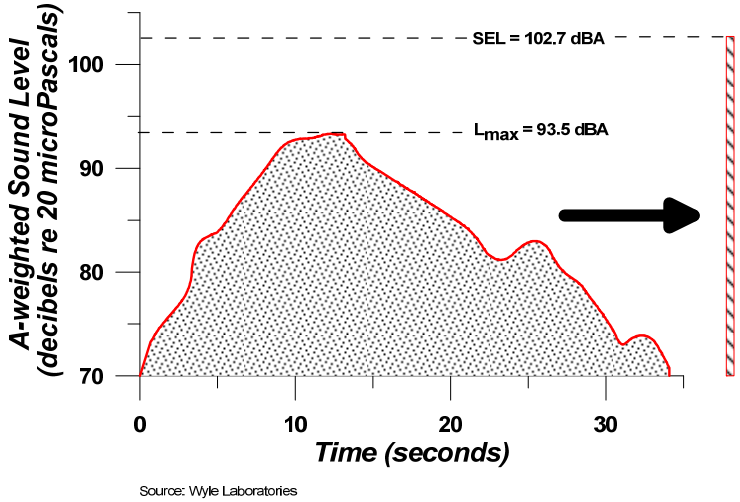


Figure 4-2. Example Time History of Aircraft Noise Flyover

4.4 Single-events

4.4.1 Maximum Sound Level (L_{max})

L_{max} is the instantaneous maximum level that occurs over a fraction of a second. For aircraft noise, the "fraction of a second" is one-eighth of a second, denoted as "fast" response on a sound level measuring meter (ANSI 1988). L_{max} is important in judging if a noise event will interfere with conversation, TV or radio listening, or other common activities. Although it provides some measure of the event, it does not fully describe the noise, because it does not account for how long the sound is heard.

4.4.2 Sound Exposure Level (SEL)

Figure 4-2 indicates the SEL for an example event, representing it as if all of the sound energy were contained within 1 second.

Because aircraft noise events last more than a few seconds, the SEL value is larger than L_{max}. It does not directly represent the sound level heard at any given time, but rather the entire event. SEL provides a much better measure of aircraft flyover noise exposure than L_{max} alone.

4.5 Cumulative Events

4.5.1 Day-Night Average Sound Level (DNL)

Day-Night Average Sound Level is a cumulative metric that accounts for all noise events in a 24-hour period. Additionally, DNL contains a nighttime noise penalty of 10 dB to account for our increased sensitivity to noise at night defined as 10:00 p.m. to 7:00 a.m.

A feature of the DNL metric is that a given DNL value could result from a very few noisy events or a large number of quieter events. For example, 1 overflight at 90 dB creates the same DNL as 10 overflights at 80 dB. Scientific studies have found good correlation between the people's annoyance and their noise exposure measured in DNL (Schultz 1978; USEPA 1978). Figure 4-3 depicts typical DNL for common environments. DNL does not represent a level heard at any given time, but represents long term exposure.

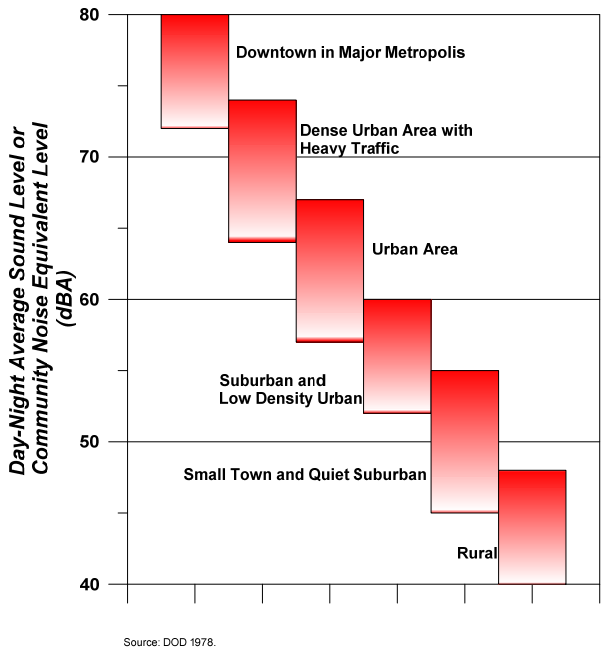


Figure 4-3. Typical DNL Ranges in Various Types of Communities

4.6 Airfield Noise Modeling

A computerized noise exposure model, known as NOISEMAP was used to calculate noise levels associated with forecast military aircraft operations at Tyndall AFB. NOISEMAP is a suite of computer programs and components developed by the DoD to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run- operations. The core program in NOISEMAP is called NMAP. Version 7.2 of NMAP was used for this AICUZ.

Noise modeling is used in preference to actual measurements because the planning contour is based upon a future condition which has not occurred therefore it cannot be measured. Additionally, measurements require extensive monitoring equipment and can be cost prohibitive.

4.7 AICUZ Planning Contours

4.7.1 DNL Contours for 2018 Scenario

Using the data described in Section 3, the NOISEMAP suite was used to compute and plot the 65 dB through 85 dB DNL in 5 dB increments as depicted in Figure 4-4. Most of the 65 dB contour would be contained either within the base boundary or is over ocean. However, it would extend to the City of Parker to the north, Panama City to the northwest, and the Saint Andrews State Park to the west.

City of Parker

The 65 dB DNL contour would extend approximately 3,000 ft onto the peninsula that contains Highway 98 crossing the East Bay. The primary cause would be overhead break operations on Runway 14L by F-22 aircraft, more specifically, the approach portion of the overhead break. During this type of operation, the F-22 aircraft travel to the southeast along the runway heading towards Runway 14L and descend to the break altitude of 1,600 feet AGL just prior to overflight of the runway.

The 70 dB DNL contour would extend approximately 500 ft onto the southernmost tip of the Parker peninsula due to the same F-22 activity.

City of Panama City

The 65 dB DNL contour would extend approximately 1,200 ft onto the southern portion of the peninsula extending from Panama City to the Saint Andrew Bay. The F-22 departures from Runway 32L to the northwest that turn right to the north would be the primary contributor to this contour extent.

Saint Andrews State Park

The 65 dB DNL contour would extend beyond the base boundary on across a portion of the Saint Andrews State Park parallel jetty west of Tyndall AFB. The primary cause of the noise contour extent would be F-22 departures from Runway 32L which takeoff to the northwest and perform a left-hand turn to travel south over the ocean along the coast.

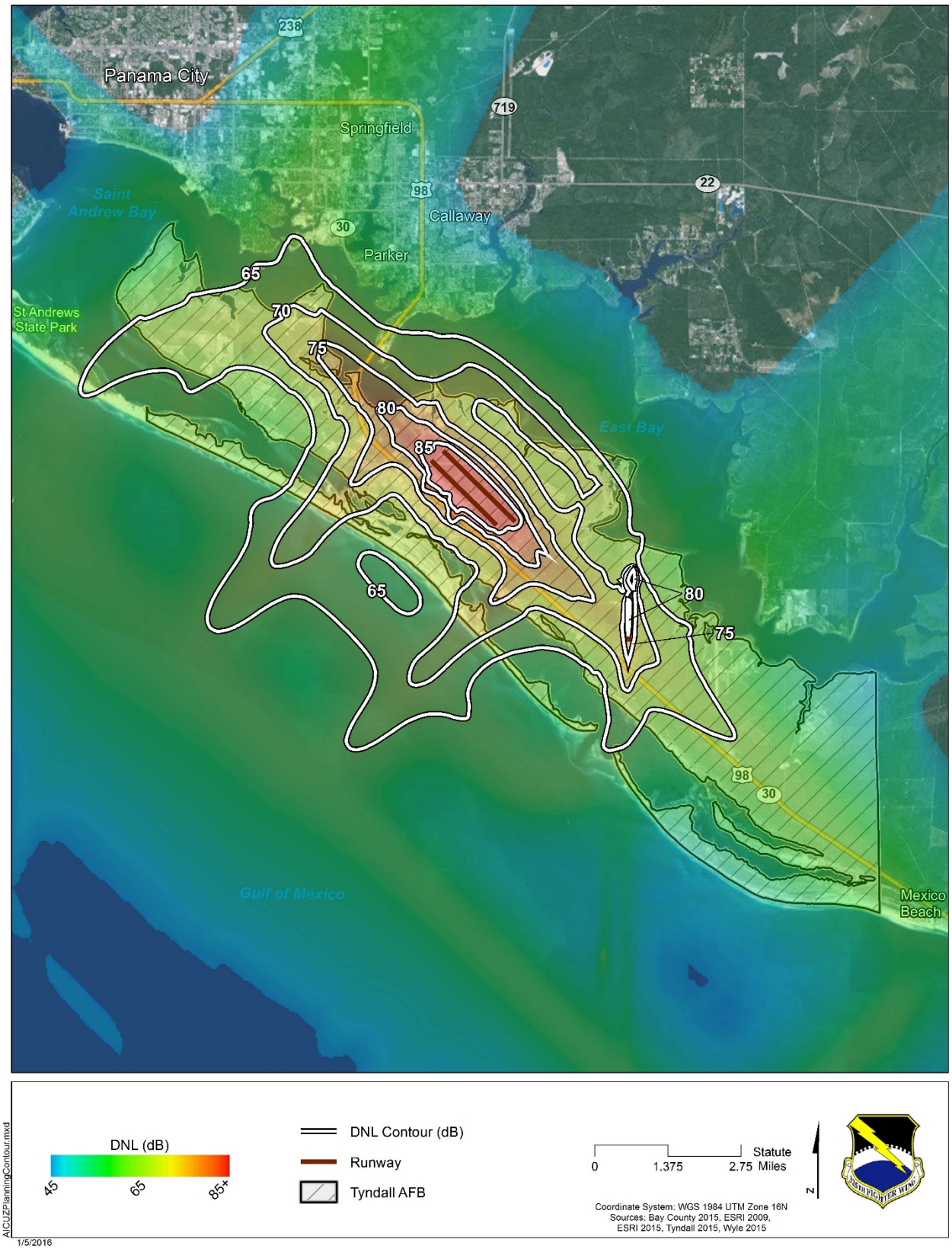


Figure 4-4. 2018 AICUZ Planning Contours and Gradient

Table 4-1 tabulates the off-base land acreage and estimated population within bands of DNL. The population estimates are based on refined 2010 census block data. Using imagery, several of the census blocks were modified to better represent the population distribution. A geometric proportion method was then used to determine the estimated population within the contour bands. A geometric proportion method assigns population based on the portion of a census block that falls within the contour.

The exposure to a minimum of 65 dB DNL would be approximately 171 acres and 219 people, most of which would be exposed to DNL between 65 dB and 70 dB. No off-base acreage or people would be exposed to DNL greater than or equal to 75 dB.

Table 4-1. Off-Base Land Area and Estimated Population within DNL Contour Bands for Planning Scenario

Band of DNL (dB)	Acres	Population
65-70	166.5	192
70-75	4.6	27
75-80	0	0
80-85	0	0
85+	0	0
Total (65+)	171.1	219

4.7.2 Comparison of 2018 and 2008 AICUZ Planning Contours

Figure 4-5 depicts both the 2018 and the 2008 AICUZ 65 dB and 75 dB DNL contours. The 2008 study's contours are up to 3 dB larger than the DNL contours for 2018. In 2008, over 91,000 annual aircraft operations occurred at Tyndall AFB with slightly more than half of those generated by the F-15A. The primary cause of the decrease for 2018 is the nearly 30 percent reduction in aircraft operations.

The only area that would experience an increase relative to the 2008 scenario is the southern portion of the peninsula extending from Panama City to the Saint Andrew Bay. The difference is due to a change in the departure procedures. In 2008, when fighter aircraft destined for a location to the north departed Runways 31L/R (now 32L/R) a left hand turn was initiated to head out over the ocean to the southeast coinciding with the 65 dB hook. After traveling southeast for a few miles the aircraft would turn left to the north and fly over the southeastern portion of East Bay which was the cause of the lobe which crossed East Bay to un-incorporated Bay County. Over time this less efficient path was replaced with a more direct turn to the north shortly after departing Runways 32L/R causing the lobe in the 2018 contours that did not exist in 2008.

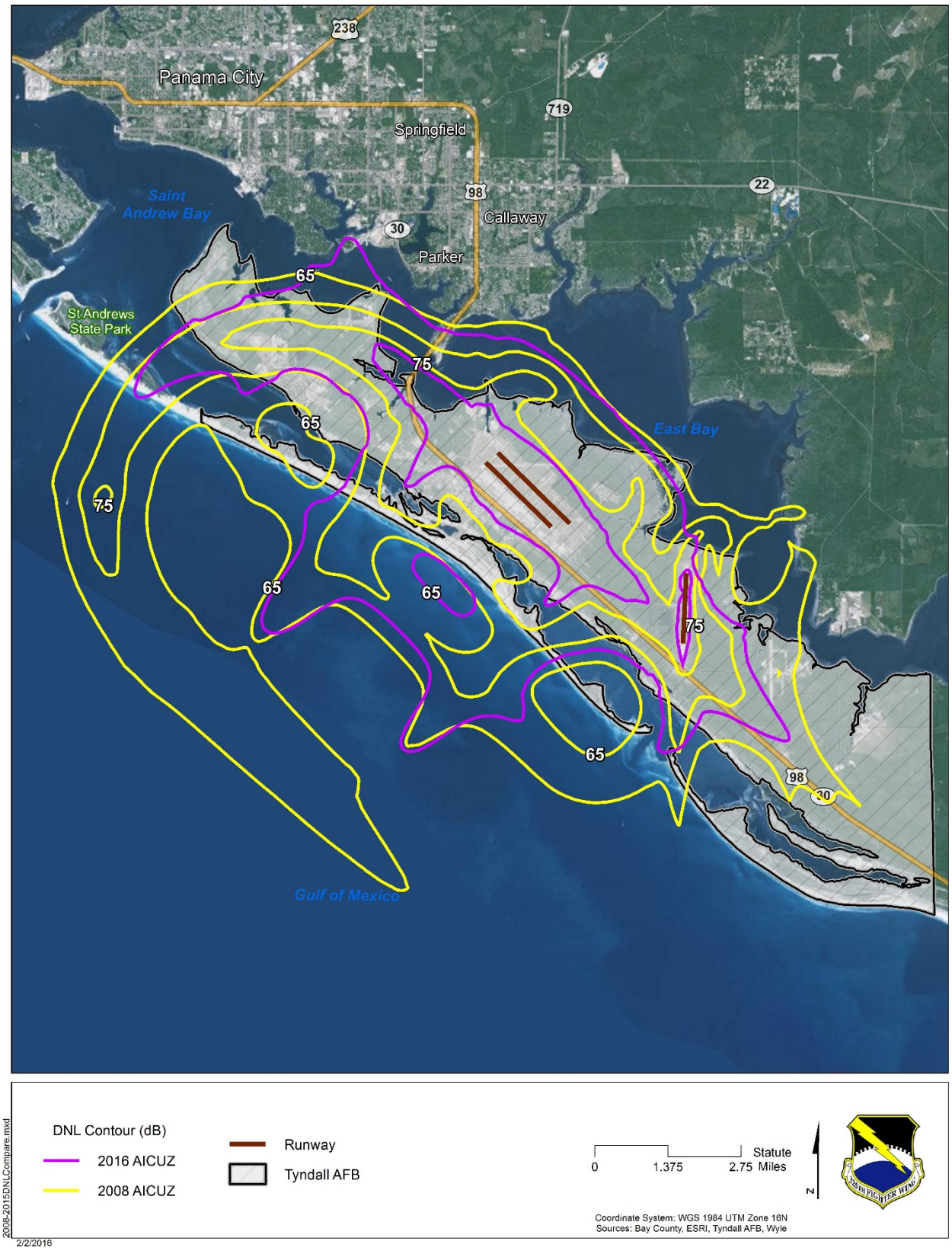


Figure 4-5 Comparison of 2016 and 2008 AICUZ Planning Contours

5.0 Safety

The potential for accidents is the subject of Section 5.1 and Section 5.2 presents the Flight Safety Zones.

5.1 Accident Potential

5.1.1 Mishaps

Areas around airports are exposed to the possibility of aircraft accidents in spite of well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and many hours of training, past history makes it clear that accidents may occur. Recorded mishaps include:

- F-22 crash at the end of the Runway 19/01, Nov 2012,
- Subscale remotely-piloted aircraft crash along Highway 98, Feb 2004, and
- Full-Scale remotely-piloted aircraft (QF-4) crash along Highway 98, opposite to Runway 19/01, 2001.

5.1.2 Clear Zones and Accident Potential Zones

5.1.2.1 Basis for Clear Zones and Accident Potential Zones

The risk of people on the ground being killed or injured by aircraft accidents is small. However, an aircraft accident is a high-consequence event and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead, it approaches this safety issue from a land use planning perspective. Designation of safety zones around the airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards. As shown in Figure 5-1, the AICUZ program includes three safety zones: CZ, APZ I, and APZ II.

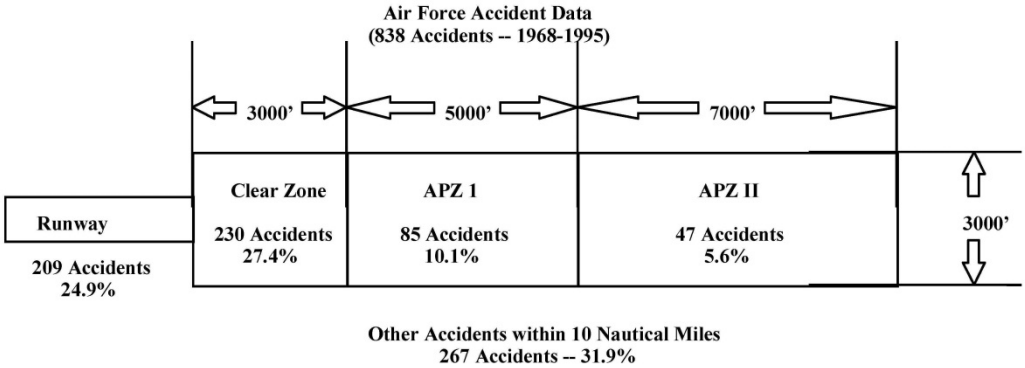


Figure 5-1. Air Force Accident Data (1968-1995)

5.1.2.2 Clear Zones and Accident Potential Zones at Tyndall AFB

Figure 5-2 depicts the CZs and APZs for Runways 14L/32R, 14R/32L, and 01/19. APZ I is less critical than the CZ, but still possesses a significant risk factor. This 3,000 foot by 5,000 foot area has land use compatibility guidelines that are sufficiently flexible to allow reasonable economic use of the land, such as industrial/manufacturing, transportation, communication/utilities, wholesale trade, open

space, recreation, and agriculture. However, uses that concentrate people in such areas are incompatible with airfield operations.

APZ II is less critical than APZ I, but still possesses potential for accidents. APZ II, also 3,000 feet wide, is 7,000 feet long extending to 15,000 feet from the runway threshold. Acceptable uses include those of APZ I, as well as low density single family residential and those personal and business services and commercial/retail trade uses of low intensity or scale of operation. High population density functions such as multi-story buildings, places of assembly (*e.g.*, theaters, churches, schools, restaurants, *etc.*), and high density office uses are not recommended.

All land areas associated with Tyndall's CZs and APZs lie within the boundaries of TAFB.

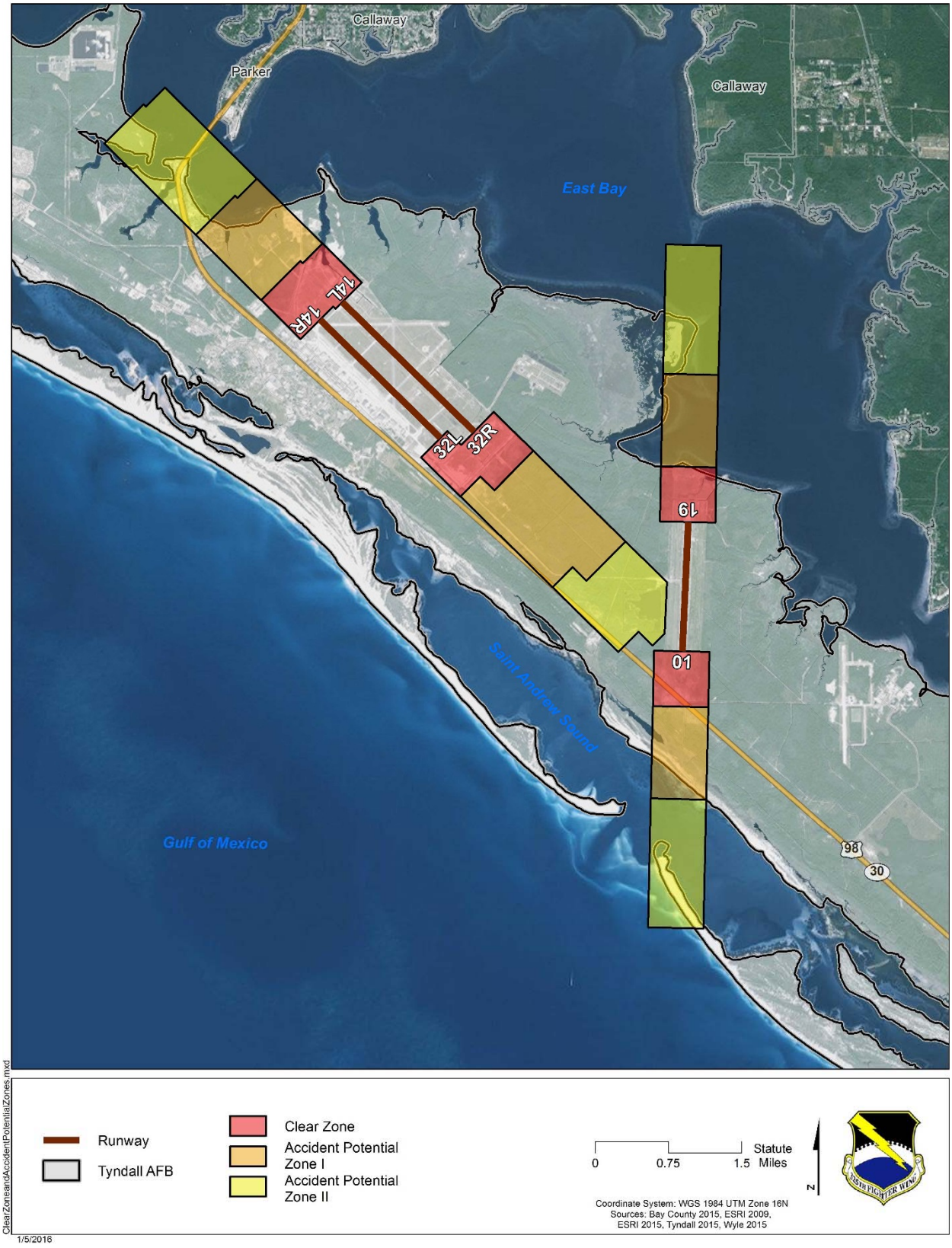


Figure 5-2. 2018 AICUZ Clear Zones and Accident Potential Zones For Tyndall AFB

5.2 Flight Safety Zones

5.2.1 Height Obstructions

The purpose of this section is to describe the imaginary surfaces associated with obstructions to air navigation, and noise exposure.

5.2.1.1 Airspace Control Surface Plan

Obstructions to air navigation are considered to be:

- Natural objects or artificial structures that protrude above the planes or imaginary surfaces and/or
- Artificial objects that extend more than 500 feet AGL at the site of the structure.

The following elevation, runway length, and dimensional criteria apply:

- Controlling Elevation: Whenever surfaces or planes within the obstruction criteria overlap, the controlling (or governing) elevation becomes that of the lowest surface or plane.
- Runway Length: Per Table 3-6, Tyndall AFB has three runways. Runways 14L/32R, 14R/32L, and 01/19 are 10,000, 9,135, and 7,000 feet long, respectively. All three runways are Class B runways that are designed and built for sustained aircraft landings and take-offs.
- Established Airfield Elevation: the established elevation for the airfield is 17 feet above MSL.
- Dimensions: All dimensions are measured horizontally unless otherwise noted.

5.2.1.2 Runway Airspace Imaginary Surfaces

Runway Airspace Imaginary Surfaces are areas in space around airfield's runways. The surfaces are designed to define the areas that must remain obstacle-free for safe aircraft operation. Table 5-1 and Figure 5-3 contains definitions of the runway airspace imaginary surfaces for Air Force Class B runways. Refer to Unified Facilities Criteria (UFC) 3-260-01, Airfield and Heliport Planning and Design, for a more detailed description. Figure 5-4 and Figure 5-5 depict the runway airspace imaginary surfaces specific to Tyndall AFB.

Table 5-1. Description of Imaginary Surfaces

Primary Surface	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.
Clear Zone Surface	Clear Zone Surface—An obstruction-free surface (except for features essential for aircraft operations) on the ground symmetrically centered on the extended runway centerline beginning at the end of the runway and extending outward 3,000 feet. The CZ width is 3,000 feet (1,500 feet to either side of runway centerline).
Accident Potential Zone Surfaces	Accident Potential Zone Surfaces—APZ I begins at the outer end of the CZ and is 5,000 feet long and 3,000 feet wide. APZ II begins at the outer end of APZ I and is 7,000 feet long and 3,000 feet wide.
Approach-Departure Clearance Surface	Approach-Departure Clearance Surface—This imaginary surface is symmetrically centered on the extended runway centerline, beginning as an inclined plane (glide angle) 200 feet beyond each end of the primary surface, 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	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 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
Conical Surface	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.

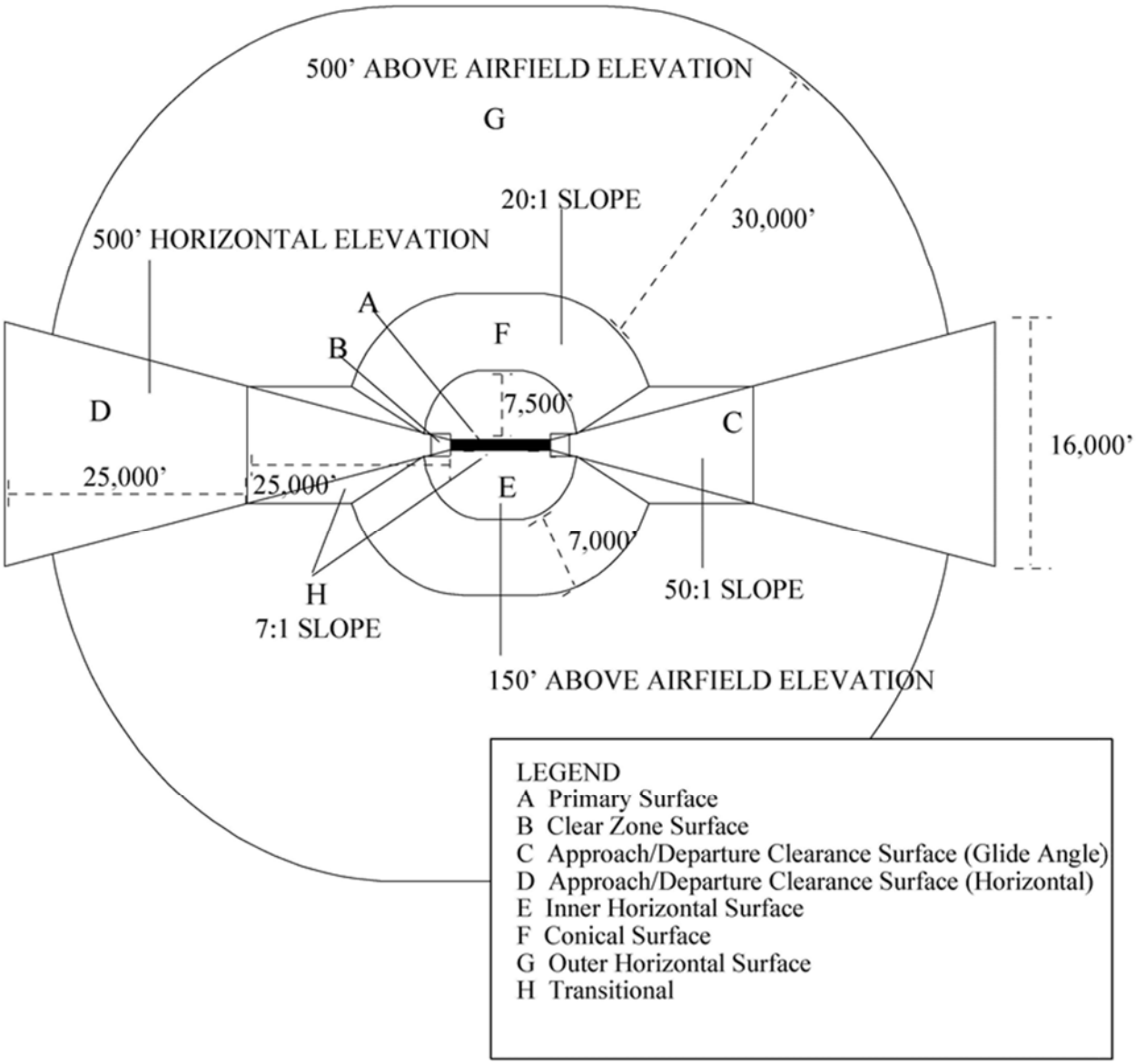


Figure 5-3. Imaginary Surfaces and Transition Planes

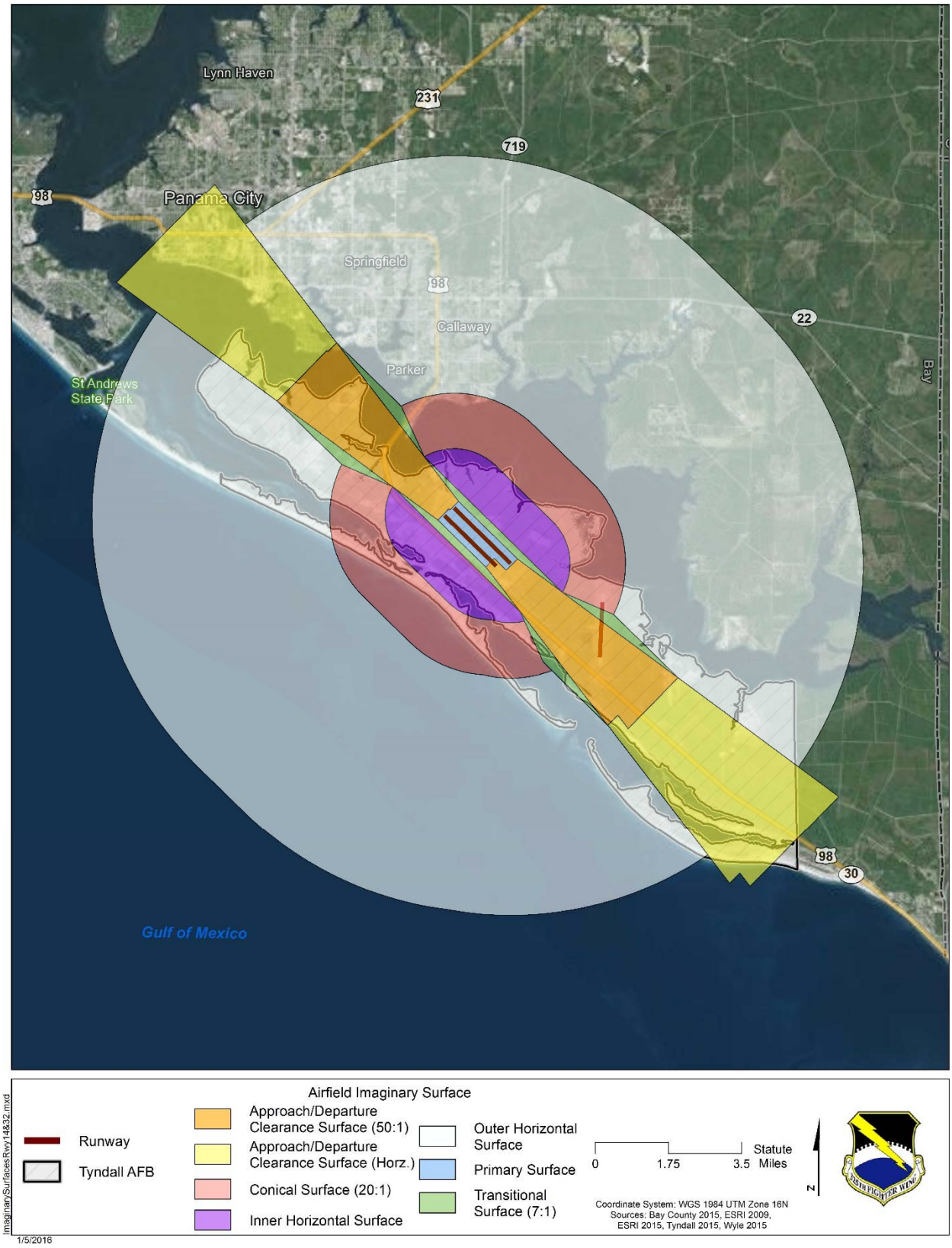


Figure 5-4. Imaginary Surfaces and Transition Planes Specific To Runways 14 and 32 at Tyndall AFB

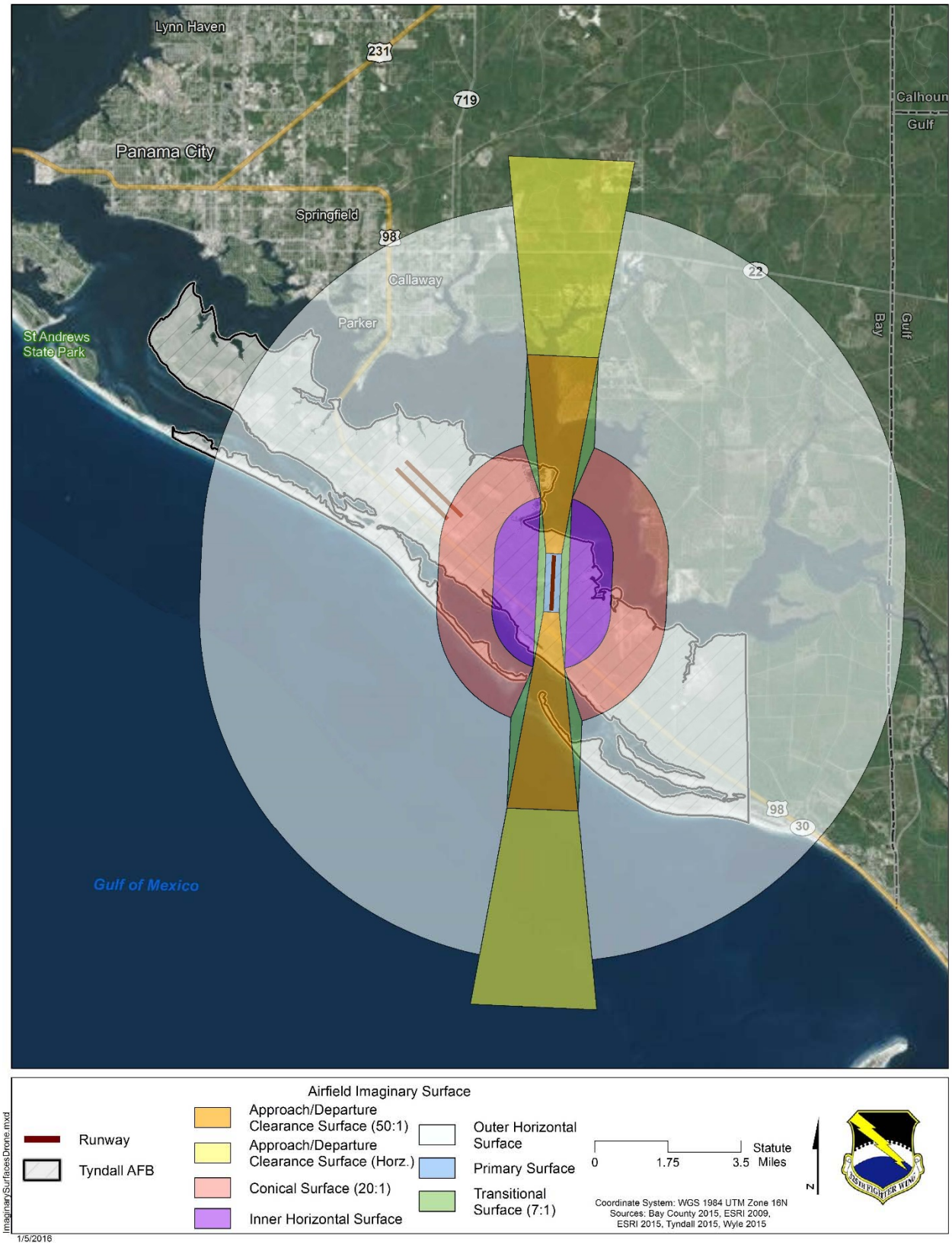


Figure 5-5. Imaginary Surfaces and Transition Planes Specific To Runway 01 and 19 at Tyndall AFB

5.2.2 Other Criteria

Hazards to flight safety should be avoided in the airfield vicinity.

These hazards include activities and land uses that obstruct or interfere with aircraft arrivals and departures, pilot vision, communications, or aircraft electronics.

Bird/Animal Strike Hazard

Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to the open, grassy areas and warm pavement of the airfield.

Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft. Most collisions occur when the aircraft is at an elevation of less than 1,000 feet. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force.

To reduce bird and animal strike hazards (BASH), the FAA and the military recommend that land uses that attract birds be located at least 10,000 feet from the airfield. These land uses include:

- ▪ Waste disposal operations,
- ▪ Wastewater treatment facilities,
- ▪ Landfills,
- ▪ Golf courses,
- ▪ Wetlands,
- ▪ Dredge disposal sites,
- ▪ Seafood processing plants, and
- ▪ Storm water ponds.

Design modifications also can be used to reduce the attractiveness of these types of land uses to birds and other wildlife

Electromagnetic Interference

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. EMI can be induced intentionally, as in forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, such as high-tension line leakage.

Additionally, EMI may be caused by atmospheric phenomena such as lightning and precipitation static and by non-telecommunication equipment such as vehicles and industry machinery. Cellular towers are not a significant source of EMI.

Lighting

Bright lights, either direct or indirect, 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 ability to adapt to darkness. Partial recovery is usually achieved in minutes, but full recovery typically requires 40 to 45 minutes. Lasers that emit in the visible spectrum can be potential harmful to pilot's vision during both day and night.

Smoke, Dust, and Steam

Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity could obstruct the pilot's vision during takeoff, landing, or other periods of low-altitude flight.

6.0 Land Use Analysis

Land use planning and control is a dynamic process that is driven by the changing conditions of the economic, social, and physical environment of a community and by changing public concerns. This section includes a summary of land use compatibility guidelines (section 6.1), a description of the area's local planning authorities (section 6.2), and a land use compatibility analysis for existing and future land uses in the vicinity of Tyndall AFB (sections 6.3 and 6.4).

The planning area for this study includes the communities of Panama City, Parker, Callaway, Mexico Beach, and unincorporated areas of Bay County.

6.1 Land Use Compatibility Guidelines and Classifications

In an effort to establish long-term land use compatibility for lands within the vicinity of military air installations, the DoD has created AICUZ land use compatibility recommendations based on the Federal Highway Administration's Standard Land Use Coding Manual (SLUCM). These guidelines may be found in AFI 32-7063 (US Air Force 2015a). They are intended to be used by DoD personnel for both on-base planning and for engaging with the local community to foster compatible land use development. Suggested land use compatibility guidelines within the APZs and CZs are shown in Table 6-1. Table 6-2 provides land use compatibility recommendations within bands of DNL.

Land use describes how land is modified and managed, and is characterized by the dominant function occurring within an area. To compare land use consistently across jurisdictions, this analysis employs generalized land use classifications illustrating land use compatibility across common types of land use. These generalized land use categories do not exactly represent the local community's land use designations, but combine similar uses into the one of the following seven categories:

- **Residential:** This category includes all types of residential activity, such as single and multi-family residences and mobile homes, at a density greater than one dwelling unit per acre.
- **Commercial:** This category includes offices, retails, restaurants and other types of commercial establishments.
- **Industrial:** This category includes manufacturing, warehouses and other similar uses.
- **Public/Quasi-Public**: This category includes publicly owned lands and/or land to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
- **Recreational:** This category includes land areas designated for recreational activity, such as parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.
- **Open/Agriculture/Low Density**: This category includes undeveloped land areas, agricultural areas, grazing lands and areas with residential activity at densities less than or equal to one dwelling unit per acre.
- **Undesignated**: This category was applied for parcels that had no value or were listed as 'undesignated' in the original datasets.

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs

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

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (*continued)*

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
20	Manufacturing3 (continued)				
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	Manufacturing[3] (continued)				
31	Rubber and miscellaneous plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
34	Fabricated metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	Transportation, communication, and utilities[3, 4]				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
42	Motor vehicle transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
43	Aircraft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
44	Marine craft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
45	Highway and street right-of-way	Y[5]	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (*continued)*

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
40	Transportation, communication, and utilities (continued)[3, 4]				
46	Automobile parking	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
47	Communication	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48	Utilities[7]	N	Y[6]	Y[6]	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48.5	Solid waste disposal (landfills, incinerators, etc.)	N	N	N	
49	Other transportation, communication, and utilities	N	Y[6]	Y	See Note 6 below
50	Trade				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I & .56 in APZ II
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	See Note 8 below
53	Retail trade – including, discount clubs, home improvement stores, electronics superstores, etc.	N	N	Y	Maximum FAR of 0.16 in APZ II
53	Shopping centers-Neighborhood, Community, Regional, Super-regional[9]	N	N	N	
54	Retail trade – food	N	N	Y	Maximum FAR of 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR of 0.28 in APZ II
57	Retail trade – furniture, home, furnishings and equipment	N	N	Y	Maximum FAR of 0.28 in APZ II
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR of 0.16 in APZ II

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (concluded)

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

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (*continued)*

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

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (*continued)*

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

NOTES:

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

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

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

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

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

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

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

Table 6-1. Air Force Land Use Compatibility Recommendations in APZs and CZs (concluded)

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

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

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

11. 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, large classes, etc., are not recommended.

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

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

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

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

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

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

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

Table 6-2. Air Force Land Use Compatibility Recommendations in Bands of DNL

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+
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

Table 6-2. Air Force Land Use Compatibility Recommendations in Bands of DNL (*continued*)

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)					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	Transportation, communication and utilities					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y [3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	25[5]	30[5]	N	N
50	Trade					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N

Table 6-2. Air Force Land Use Compatibility Recommendations in Bands of DNL (*continued*)

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+
50	Trade (continued)					
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	Services					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
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

Table 6-2. Air Force Land Use Compatibility Recommendations in Bands of DNL (*continued*)

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+
70	Cultural, entertainment and recreational (continued)					
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	Resource production and extraction					
81	Agriculture (except live-stock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

KEY:

SLUCM – Standard Land Use Coding Manual, U.S. Department of Transportation

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.

DNL – Day-Night Average Sound Level.

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

Ldn – Mathematical symbol for DNL.

Table 6-2. Air Force Land Use Compatibility Recommendations in Bands of DNL (*concluded*)

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, non-conforming 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.

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.

6.2 Planning Authorities

This section presents the State of Florida, Bay County, and the municipalities that have land use jurisdiction near Tyndall AFB, including descriptions of existing and future land uses. Bay County exercises control over unincorporated lands across East Bay to the east. Panama City exercises land use control across Saint Andrew Bay, to the north of the base, the cities of Parker and Callaway exercise land use control north of East Bay, and Mexico Beach is located near the southwest perimeter of the base.

6.2.1 Florida Statutes

The State of Florida requires local governments (cities and counties) to regulate land use and development. Section 163.3167(1) states that the several incorporated municipalities and counties shall have power and responsibility to:

- To plan for their future development and growth.
- To adopt and amend comprehensive plans, or elements or portions thereof, to guide their future development and growth.
- To implement adopted or amended comprehensive plans by the adoption of appropriate land development regulations or elements thereof.
- To establish, support, and maintain administrative instruments and procedures to carry out the provisions and purposes of this act (Florida Land Development Regulations 2015).

Section 163.3177 requires affected local governments to amend their comprehensive plans to include criteria addressing compatibility by December 31, 2013. As of July 1, 2014, all affected local governments have adopted the required comprehensive plan amendments (FDEO 2015).

Section 163.3175(2) identifies the major military installations that, due to their mission and activities, have a greater potential for experiencing compatibility and coordination issues than others, and identifies the local governments proximate to these installations that are required to address compatibility of land development with military installations in their comprehensive plans. The statute specifically mentions Tyndall AFB as a major military installation.

Section 163.3177(6)(a) requires that the future land use element in the local government's comprehensive plan include criteria to be used to achieve the compatibility of lands adjacent or closely proximate to military installations.

Section 163.3175(4) requires that the Bay County and the City of Parker to send copies of comprehensive plan amendments, land development regulation changes, and, if requested, development orders varying requirements related to height, lighting, or noise attenuation to the commanding officers of the identified military installations. The local governments must provide copies of comments on comprehensive plan amendments to the state land planning agency.

6.2.2 Comprehensive Plans

Comprehensive plans typically contain chapters known as "elements" which address future land use, transportation, infrastructure, housing, coastal management, conservation, recreation and open space, intergovernmental coordination, and capital improvements. The following comprehensive plans guide development adjacent to Tyndall AFB.

6.2.2.1 Bay County

The Bay County Comprehensive Plan, updated in 2009, includes a Future Land Use Map (FLUM) that assigns land use designations (e.g., "Residential", "Commercial", etc.) to all parcels of land in unincorporated Bay County. A series of maps also identifies Service Areas, Special Treatment Zones, Military Influence Areas, and the West Bay Detailed Specific Area Plan. Objective 3.4 of the plan identifies and designates overlays on the FLUM to be used as Special Treatment Zones for purposes of dealing with unique or desirable circumstances. Policy 3.41 specifically addresses the 2008 Tyndall AFB AICUZ Study areas to prohibit "development that would threaten the integrity and mission of Tyndall AFB" (Bay County 2009).

6.2.2.2 Panama City

The city's Comprehensive Plan identifies its long-range intentions regarding the nature and direction of future development and contains elements on land use, transportation, community facilities, urban design and housing. Typically, the document is prepared every 5 to 10 years by the planning department and is adopted by the City Commission. The most recent document of record is the 2013 Panama City Comprehensive Plan (Panama City 2015).

6.2.2.3 City of Parker

The City of Parker 2025 Comprehensive Plan was prepared in 2010. The Land Use Element of the comprehensive plan designates future land use patterns as reflected in other aspects of the plan. Land use is regulated through the designation of land use districts on the FLUM. Districts include, Low-Density Residential, Mixed Use, Commercial, Public/Institutional, and Conservation. The plan is enacted through land development regulations (City of Parker 2012).

As noted above, the City of Parker maintains policies within its comprehensive plan to limit incompatible development within the Tyndall AFB airport influence area. These policies address sound attenuations cited in 14 CFR Part 150, *Airport Noise Compatibility Planning*. Noise disclosure must be made in areas exposed to DNL greater than or equal to 65 dB, as depicted on the adopted AICUZ overlay, and official notification to the city must occur if structures are proposed that meet and/or exceed the federal notification criteria pursuant to 14 CFR Part 77.13. The applicant must provide a written copy of an FAA aeronautical study that has determined that the proposed structure is not a hazard to air navigation before obtaining any development permit or such requirement shall become a condition to the development permit (City of Parker 2010).

6.2.2.4 City of Callaway

The City of Callaway Comprehensive Plan 2025 was adopted in 2009 to encourage a strong economic base; preserve Callaway's natural, cultural, and historic assets; promote sustainable development; and provide a strong, safe, and healthy environment for its residents. As with other cities, the Land Use Element designates future land use patterns on the FLUM. The City of Callaway is considering a large-scale comprehensive plan map amendment to change a total of 134 acres from Commercial, High Density Residential, Low Density Residential, and Public Facilities land use categories to the Mixed Use category on the FLUM. The amendment area is located in the Community Redevelopment Area (City of Callaway 2009).

6.2.2.5 City of Mexico Beach

The City of Mexico Beach adopted its original Comprehensive Plan in 1991. The plan was amended in 2007 to both accommodate infrastructure improvements and the growth resulting from these

improvements. The Land Use Element maintains a FLUM that designates future land use districts, including Residential, Tourist-Residential, Commercial, Recreation, Conservation, and Public/Institutional (City of Mexico Beach 2012).

6.3 Land Use and Proposed Development

6.3.1 Existing Land Use

As mentioned in earlier sections, Tyndall AFB is located on a peninsula, surrounded to the south by the Gulf of Mexico and to the north by Saint Andrew Bay and East Bay. Nearest the base, across the bay, land uses include commercial, industrial, residential, and open/agricultural/low density. Figure 6-1 presents the existing land uses for the area that surrounds Tyndall AFB and those exposed to DNL greater than or equal to 65 dB due to aircraft operations at the installation. Existing land use was determined by using the Department of Revenue Property Classification codes found in the parcel dataset, provided by the Bay County GIS Division Manager, as a proxy for Existing Land Use. For AICUZ planning purposes, similar land uses were consolidated into the seven categories as discussed in Section 6.1).

Figure 6-2 presents the CZs and APZs associated with the Tyndall AFB runways. No lands exist within Tyndall's CZs or APZs that have future land use designation.

The shoreline areas, along the east side of the East Bay segment of Saint Andrew Bay, primarily consist of undeveloped lands and are managed for conservation and recreation, with residential development located along Cook, California, and Richard Bayous. Industrial uses occur near Murray Bayou. The waterfront areas of Panama City, Parker, and Callaway, north of Saint Andrew Bay, are used for industrial, commercial and residential activities. Tourist-based commercial and residential uses occur in the vicinity of Mexico Beach, south of the base. St. Andrews State Park is located on the barrier island southwest of Tyndall AFB, in the Gulf of Mexico.

United States (U.S.) Route 98 is an east-west highway and is the primary transportation corridor that runs through Panama City, crosses Saint Andrew Bay via the DuPont Bridge, continues through Tyndall AFB, and on to the City of Mexico Beach. U.S. 98 links to regional primary and secondary transportation routes with access to Panama City and Bay County. These routes contain the majority of commercial and public properties. Residential units are located along the secondary and tertiary routes throughout the region.

Some areas along U.S. 98 that are currently vacant or used for residential activities are actually zoned for commercial/mixed use development. This means these areas could be developed with higher density residential and commercial uses without requiring any changes to the current zoning. This is also the case in Mexico Beach, where areas that are currently open space / agricultural / low density use are actually zoned for commercial use.

6.3.2 Current Zoning

Zoning is the legal regulation of property use to protect the health, safety, and welfare of citizens; protect property rights; conserve resources; and avoid incompatible uses. In Florida, counties and cities enact zoning ordinances to implement respective comprehensive plan objectives. As described in Section 6.3.1, Existing Land Use, zoning classifications are generalized to illustrate compatibility across common land use and zoning types. Figure 6-3 shows current zoning and AICUZ planning contours in the areas surrounding Tyndall AFB (Bay County 2015). The analysis also includes zoning within Tyndall AFB's Clear Zones and APZ I and II (see Figure 6-4). No lands exist within Tyndall's CZs or APZs that have future land use designation.

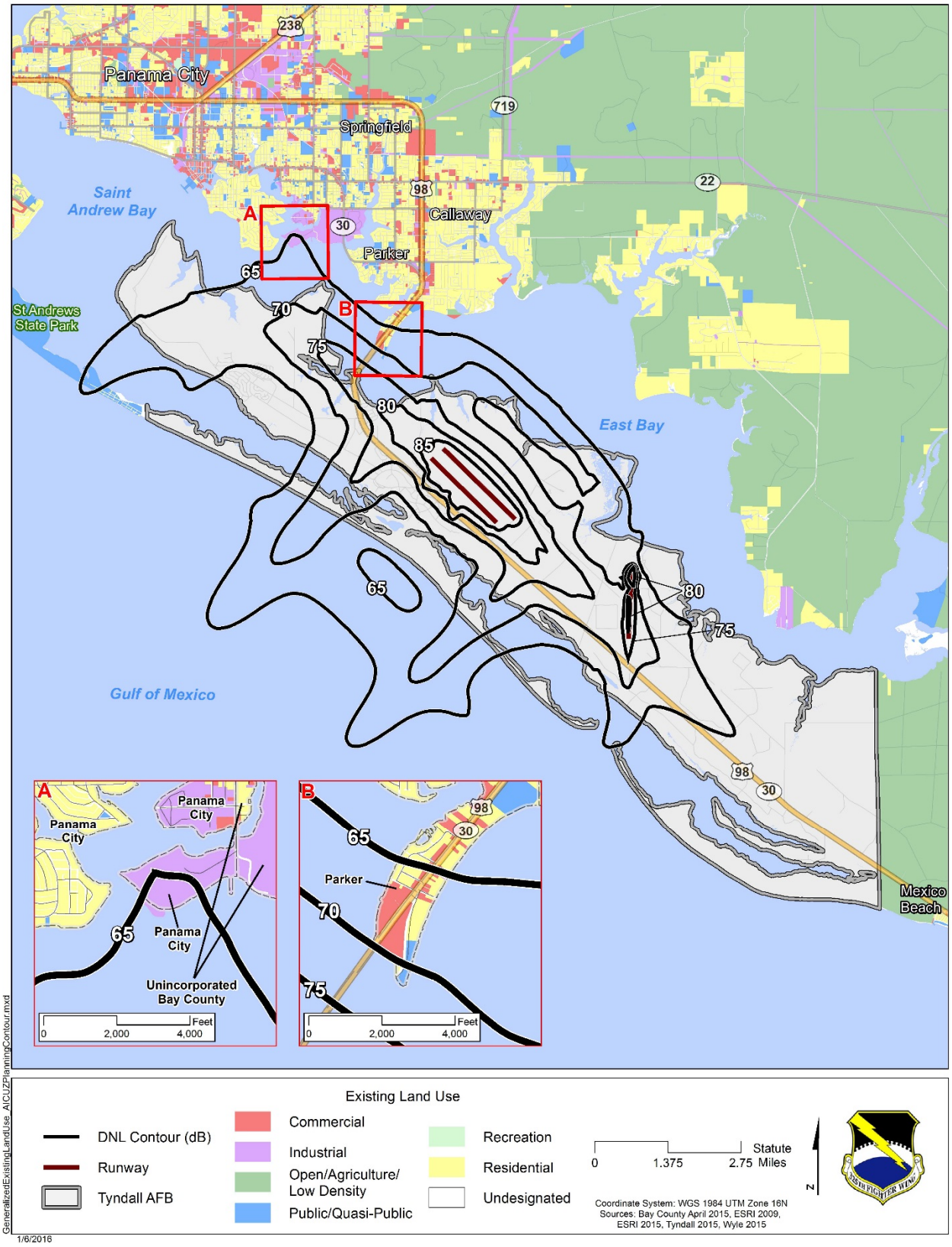


Figure 6-1. Generalized Existing Land Use and AICUZ Planning Contours

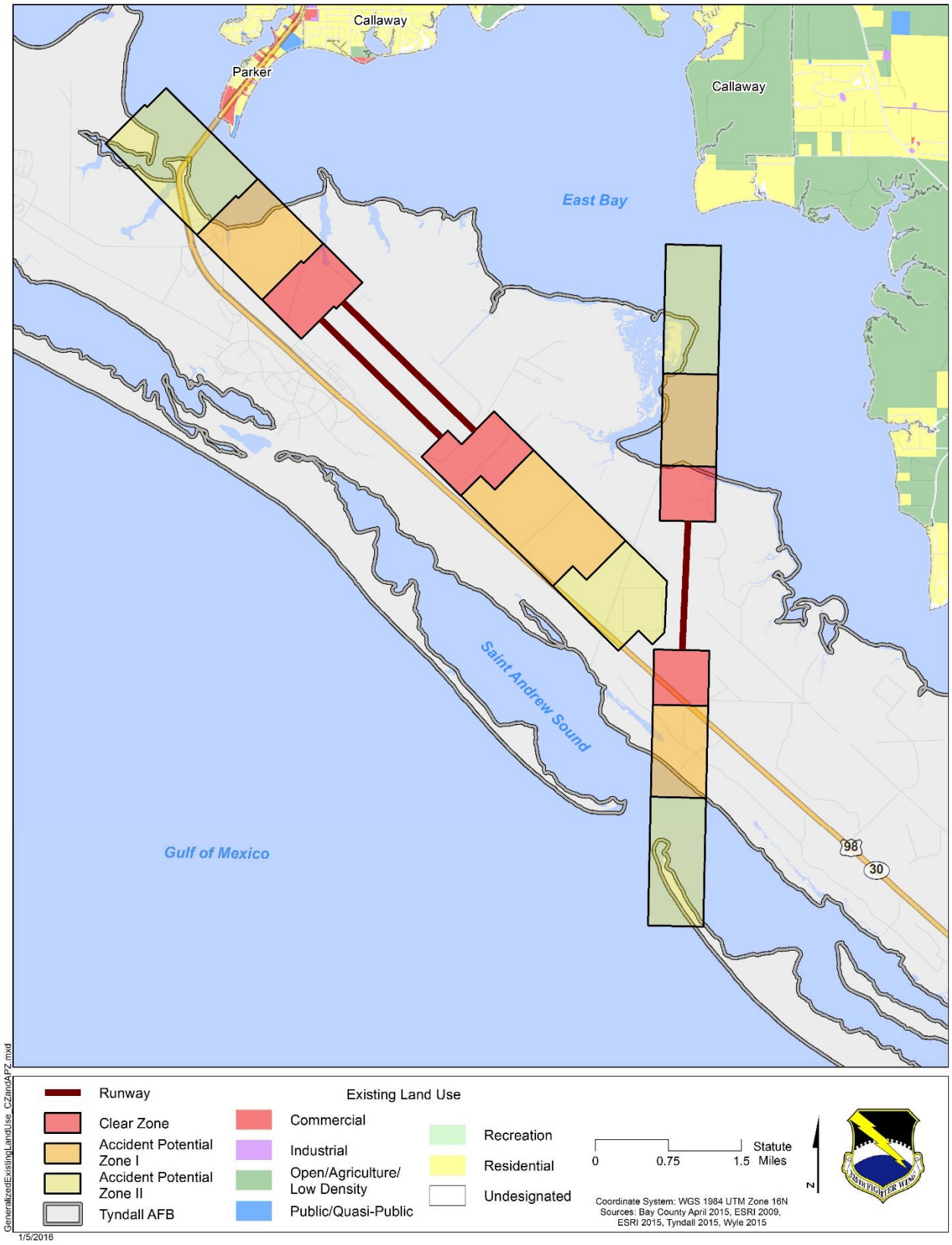


Figure 6-2. Generalized Existing Land Use and Accident Potential/Clear Zones

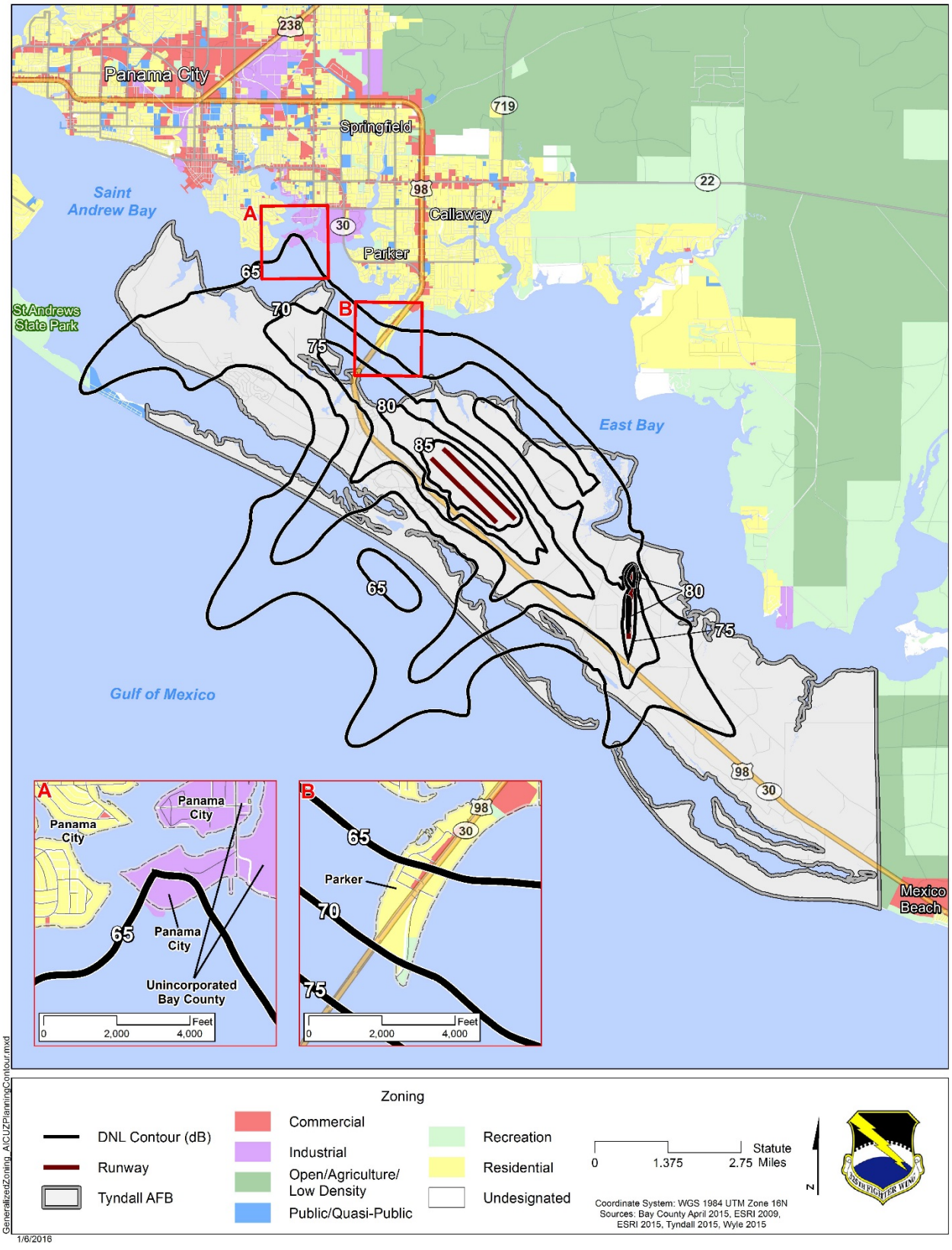


Figure 6-3. Generalized Existing Zoning and AICUZ Planning Contours

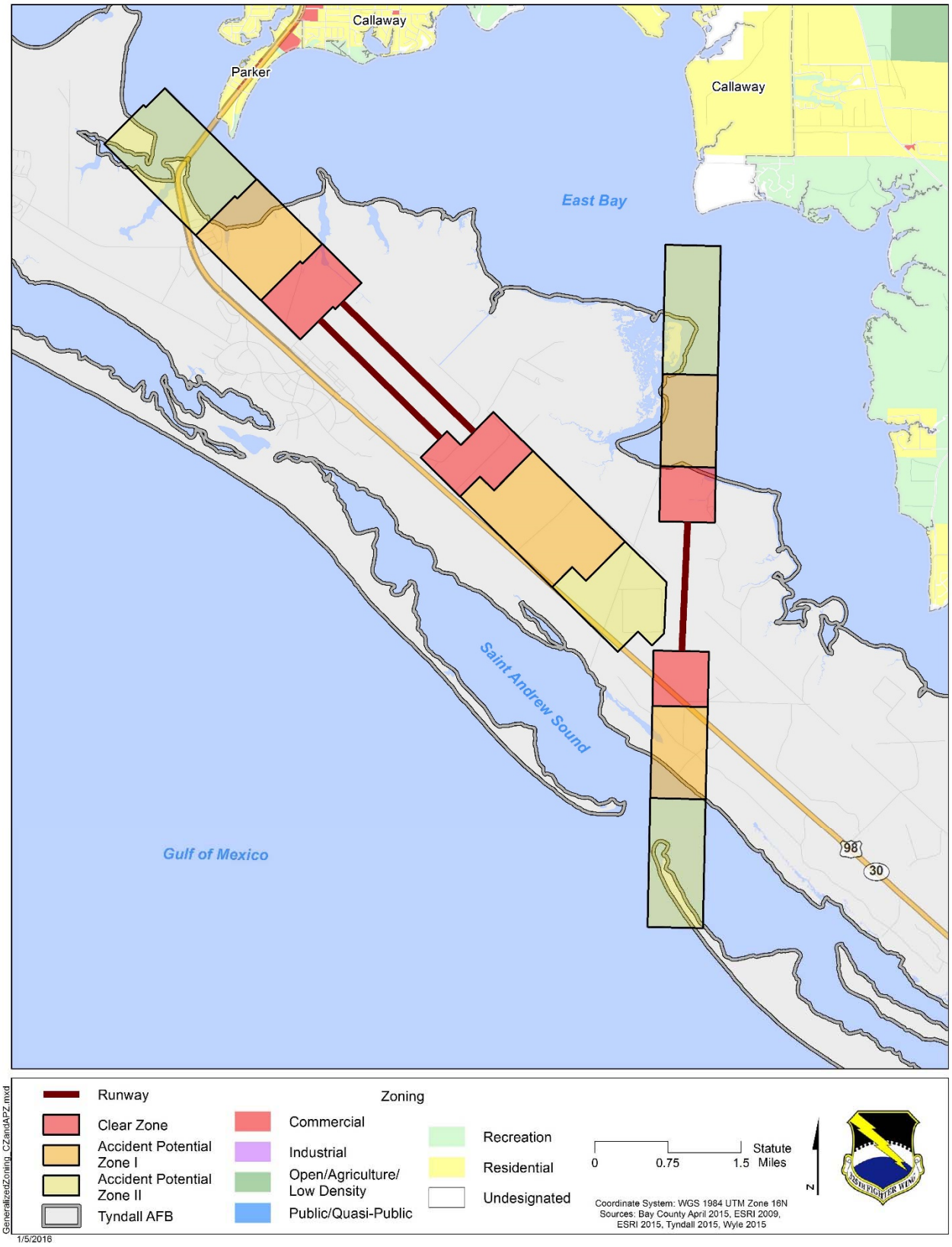


Figure 6-4. Generalized Existing Zoning and Accident Potential/Clear Zones

Areas along the eastern shore of the East Bay segment are zoned primarily for open/agricultural/low density uses, and areas zoned for residential uses surround the mouth of the Laird and Piclalene Bayous. Within unincorporated Bay County, Shell Island, situated on a barrier island to the southwest of the base, is designated as public/quasi-public use.

Zoning within the waterfront areas north of Saint Andrew Bay in Panama City, Parker, and Callaway are similar to existing land use areas. These areas are zoned primarily for industrial, commercial, and residential activities. Some differences between the zoning map and existing land use occur in the City of Parker. Areas along U.S. 98 that are currently vacant or used for residential activities are zoned for commercial/mixed use development, which could have the potential for higher density residential and commercial use than present conditions. Differences occur also in Mexico Beach, where areas that are currently open space/agricultural/low density use are zoned for commercial use.

6.3.3 Future Land Use

The U.S. Census Bureau population estimates indicate that Bay County, namely the Panama City metropolitan (metro) area, was the 19th-fastest growing metro area in the U.S. between 2013 and 2014. Within that timeframe, the metro area grew nearly 2.2 percent (U.S. Census Bureau 2015). As with existing land use and zoning, future land use has been generalized for comparison.

Objective 3.2 of the Bay County Comprehensive Plan is to maintain an accurate and reliable FLUM that shows the proposed distribution, location, and extent of the various categories of land use in order to preserve existing advantages and guide future growth (Bay County 2015). According to the Comprehensive Plan, the designation of FLUM categories are to be coordinated with appropriate site conditions, the availability of facilities and services, protection of natural or historic resources, and policy criteria.

Since the Zoning Categories described above are enacted to be consistent with the FLUM, the Current Zoning Map and the FLUM are nearly identical. Figure 6-5 shows the future land use for areas potentially affected by aircraft-generated noise associated with Tyndall AFB. The APZs and CZs along with future land use are shown in Figure 6-6. These figures are discussed in section 6.4.

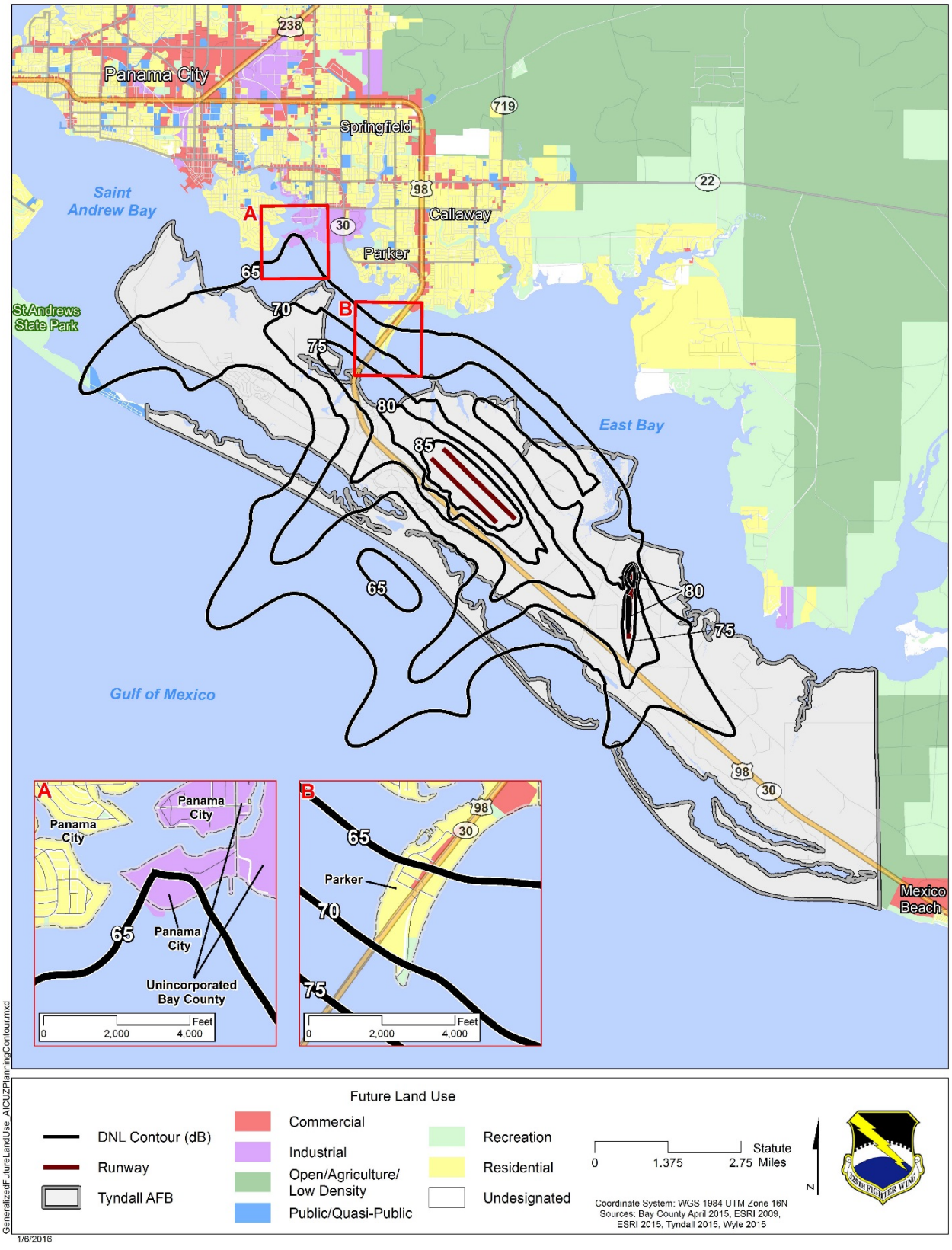


Figure 6-5. Generalized Future Land Use and AICUZ Planning Contours

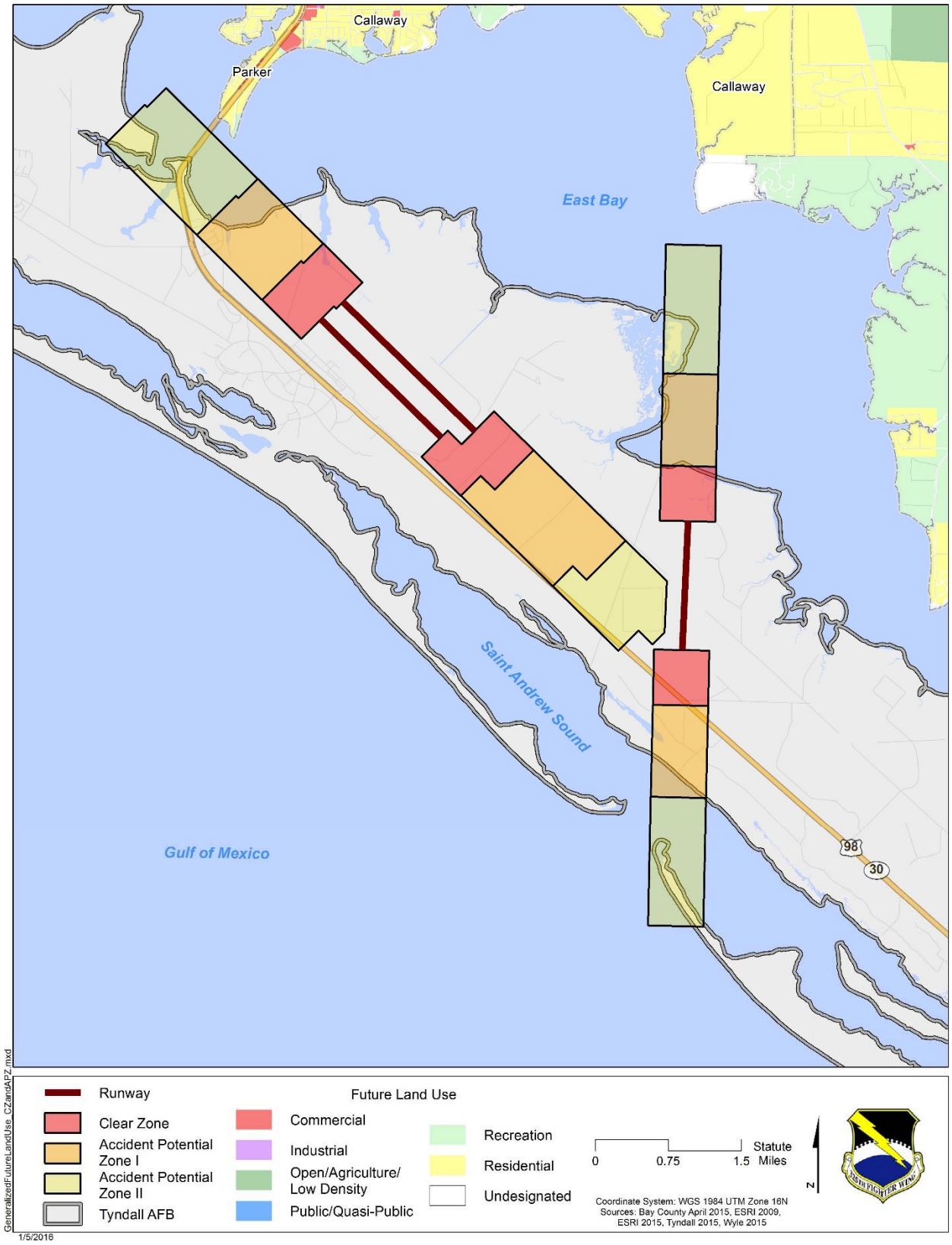


Figure 6-6. Generalized Future Existing Land Use and Accident Potential/Clear Zones

6.4 Compatibility Concerns

6.4.1 Land Use Analysis

For the purpose of this analysis, the DoD AICUZ compatibility guidelines (Tables 6-1 and 6-2) have been consolidated into the seven generalized land use classifications described in section 6.1. The generalized compatibility guidelines are shown in Table 6-3.

Land use compatibility falls into one of four categories: (1) Compatible, (2) Compatible with Restrictions, (3) Not Compatible, and (4) Not Compatible with Exceptions. The conditionally compatible land use, i.e., categories 2 and 4, may require incorporation of noise attenuation measures into the design and construction of the structures and further evaluation to be considered "compatible" or density limitations for land in APZs.

Table 6-3. Generalized Land Use Categories and Noise/Safety Compatibility

Land Use Category	Band of DNL (dB)					CZ	APZ I	APZ II
	65-70	70-75	75-80	80-85	85+			
Residential	No[1]	No[1]	No	No	No	No	No	No
Commercial	Yes	Yes[2]	Yes[2]	No	No	No	Yes[2]	Yes[2]
Industrial	Yes	Yes	Yes	Yes[2]	No	No	Yes[2]	Yes[2]
Public/Quasi-Public	Yes[2]	Yes[2]	Yes[2]	No	No	No	No	Yes[2]
Recreation	Yes[2]	Yes[2]	No	No	No	No	Yes[2]	Yes[2]
Open/Agriculture/Low Density	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Undesignated	No	No	No	No	No	No	No	No

[1] *Incompatible with exceptions - See Table 6-2*

[2] *Compatible with restrictions - See Table 6-2*

6.4.2 Existing Land Use Compatibility Concerns

Existing land use compatibility for areas exposed to DNL greater than or equal to 65 dB for Tyndall AFB is provided in Table 6-4. No land uses would be affected by Tyndall AFB APZs or CZs. For a land use to be considered compatible, it must meet the criteria listed in Table 6-2. The consolidated version of these compatibility guidelines, Table 6-3, was compared to existing land use plans to determine what type of compatibility was associated with aircraft-generated DNL from Tyndall AFB.

Table 6-4. Off-Base Existing Land Use Acreage within the AICUZ Planning Contours

Land Use Category		Band of DNL (dB)					Total
		65-70	70-75	75-80	80-85	85+	
Residential	Compatible	n/a	n/a	n/a	n/a	n/a	**n/a**
	Incompatible	23.6[1]	1.2[1]	0	0	0	**24.8**
Commercial	Compatible	34.6	0	0	n/a	n/a	**34.6**
	Incompatible	n/a	n/a	n/a	0	0	**0**
Industrial	Compatible	32.3	0	0	0	n/a	**32.3**
	Incompatible	n/a	n/a	n/a	n/a	0	**0**
Public/Quasi-Public	Compatible	69.6[2]	2.8[2]	0	n/a	n/a	**72.4**
	Incompatible	n/a	n/a	n/a	0	0	**0**
Recreation	Compatible	0	0	n/a	n/a	n/a	**0**
	Incompatible	n/a	n/a	0	0	0	**0**
Open/Agriculture /Low Density	Compatible	1.7[2]	0	0	0	0	**1.7**
	Incompatible	n/a	n/a	n/a	n/a	n/a	**n/a**
Undesignated	Compatible	n/a	n/a	n/a	n/a	n/a	**n/a**
	Incompatible	0	0	0	0	0	**0**
Total	**Compatible**	**138.2**	**2.8**	**0**	**0**	**0**	**141.0**
	Incompatible	**23.6**	**1.2**	**0**	**0**	**0**	**24.8**

Note: All contour areas on-base, over water, and over roadways are excluded from the counts

[1] Incompatible with exceptions - See Table 6-2

[2] Compatible with restrictions - See Table 6-2

6.4.2.1 Unincorporated Bay County

In Bay County, the 65-75 dB DNL contour band extends to the west (61 acres), over a portion of Shell Island designated as public/quasi-public use (see Figure 6-2). According to the recommendations in the Air Force AICUZ Noise Compatibility categories (Table 6-2), these uses are likely compatible.

6.4.2.2 Panama City

The 65-70 dB DNL contour band extends over a 32-acre area of industrial use located in the Panama City (see inset A in Figure 6-2). This land use is considered compatible under Air Force AICUZ Noise Compatibility categories.

6.4.2.3 City of Parker

There are 82 acres exposed to a minimum of 65 dB DNL in the City of Parker (see inset B in Figure 6-2). Twenty-five acres consist of residential land use and are considered incompatible. The majority of the remaining area exposed to a minimum of 65 dB DNL is designated as commercial but is compatible under the Air Force's guidelines.

Because all CZs and APZs associated with Runways 32L/14R at Tyndall AFB are located within the installation boundaries or over the open waterways of East Bay and St. Andrew Bay, there are currently no potential incompatible developments anticipated. However, there are portions of the CZ and APZs that continue to extend over U.S. 98. If there were an aircraft mishap, severe transportation impacts along this main east-to-west highway could result.

6.4.2.4 *City of Callaway*

In Callaway, no compatibility concerns are found.

6.4.2.5 *City of Mexico Beach*

In Mexico Beach, no compatibility concerns are found.

6.4.3 *Future Land Use Compatibility Concerns*

Any land that lies outside of Tyndall AFB boundaries, exposed to DNL greater than or equal to 65 dB and within the APZs was evaluated to determine the land use compatibility as shown in Figure 6-7.

Future land use compatibility acreages are provided in Table 6-5. For a land use to be considered compatible within the noise contours, it must meet the criteria listed in Table 6-2. The consolidated version of these compatibility guidelines, Table 6-3, was compared to future land use plans to determine what type of compatibility was associated with aircraft-generated noise from Tyndall AFB. No future land uses would be affected by Tyndall AFB APZs or CZs.

Table 6-5. Off-Base Future Land Use Acreage within the AICUZ Planning Contours

Land Use Category		Band of DNL (dB)					Total
		65-70	70-75	75-80	80-85	85+	
Residential	Compatible	n/a	n/a	n/a	n/a	n/a	**n/a**
	Incompatible	57.0[1]	1.2[1]	0	0	0	**58.2**
Commercial	Compatible	1.6	0	0	n/a	n/a	**1.6**
	Incompatible	n/a	n/a	n/a	0	0	**0**
Industrial	Compatible	31.2	0	0	0	n/a	**31.2**
	Incompatible	n/a	n/a	n/a	n/a	0	**0**
Public/Quasi-Public	Compatible	45.1[2]	0	0	n/a	n/a	**45.1**
	Incompatible	n/a	n/a	n/a	0	0	**0**
Recreation	Compatible	26.9[2]	2.8[2]	n/a	n/a	n/a	**29.7**
	Incompatible	n/a	n/a	0	0	0	**0**
Open/Agriculture /Low Density	Compatible	0	0	0	0	0	**0**
	Incompatible	n/a	n/a	n/a	n/a	n/a	**n/a**
Undesignated	Compatible	n/a	n/a	n/a	n/a	n/a	**n/a**
	Incompatible	0	0	0	0	0	**0**
Total	**Compatible**	**104.8**	**2.8**	**0**	**0**	**0**	**107.6**
	Incompatible	**57.0**	**1.2**	**0**	**0**	**0**	**58.2**

Note: All contour areas on-base, over water, and over roadways are excluded from the counts

[1] Incompatible with exceptions - See Table 6-2

[2] Compatible with restrictions - See Table 6-2

6.4.3.1 *Unincorporated Bay County*

In Bay County, the 65-70 dB DNL contour band would extend 61 acres to the west, over a portion of Shell Island designated as both recreation and public/quasi-public use (see Figure 6-6). According to the recommendations in the Air Force AICUZ Noise Compatibility Chart (Table 6-2), these uses would likely be compatible.

6.4.3.2 Panama City

The 65-70 dB DNL contour band would encompass an approximate 31-acre area designated as industrial use located in the Panama City (see Figure 6-6). This land use would be considered compatible under the Air Force AICUZ planning contours.

6.4.3.3 City of Parker

There would be 82 acres exposed to a minimum of 65 dB DNL in the City of Parker (see inset in Figure 6-6). The City of Parker has designated land uses along U.S. 98 as a Mixed Use District for residential and commercial. In the city's Future Land Use Element of the Comprehensive Plan, this area is zoned to accommodate medium- to high-density residential development and low-intensity commercial development. According to the future land use data, approximately 58 acres exposed to a minimum of 65 dB DNL would have the potential to be developed for residential use. This use would be considered incompatible under the Air Force AICUZ planning contours. Additionally, 7 acres of recreational area, on the southern tip of the city, would be exposed to a minimum of 65 dB DNL, with a low potential for incompatible use.

6.4.3.4 City of Callaway

In Callaway, no future land use compatibility concerns are identified.

6.4.3.5 City of Mexico Beach

In Mexico Beach, no future land use compatibility concerns are identified.

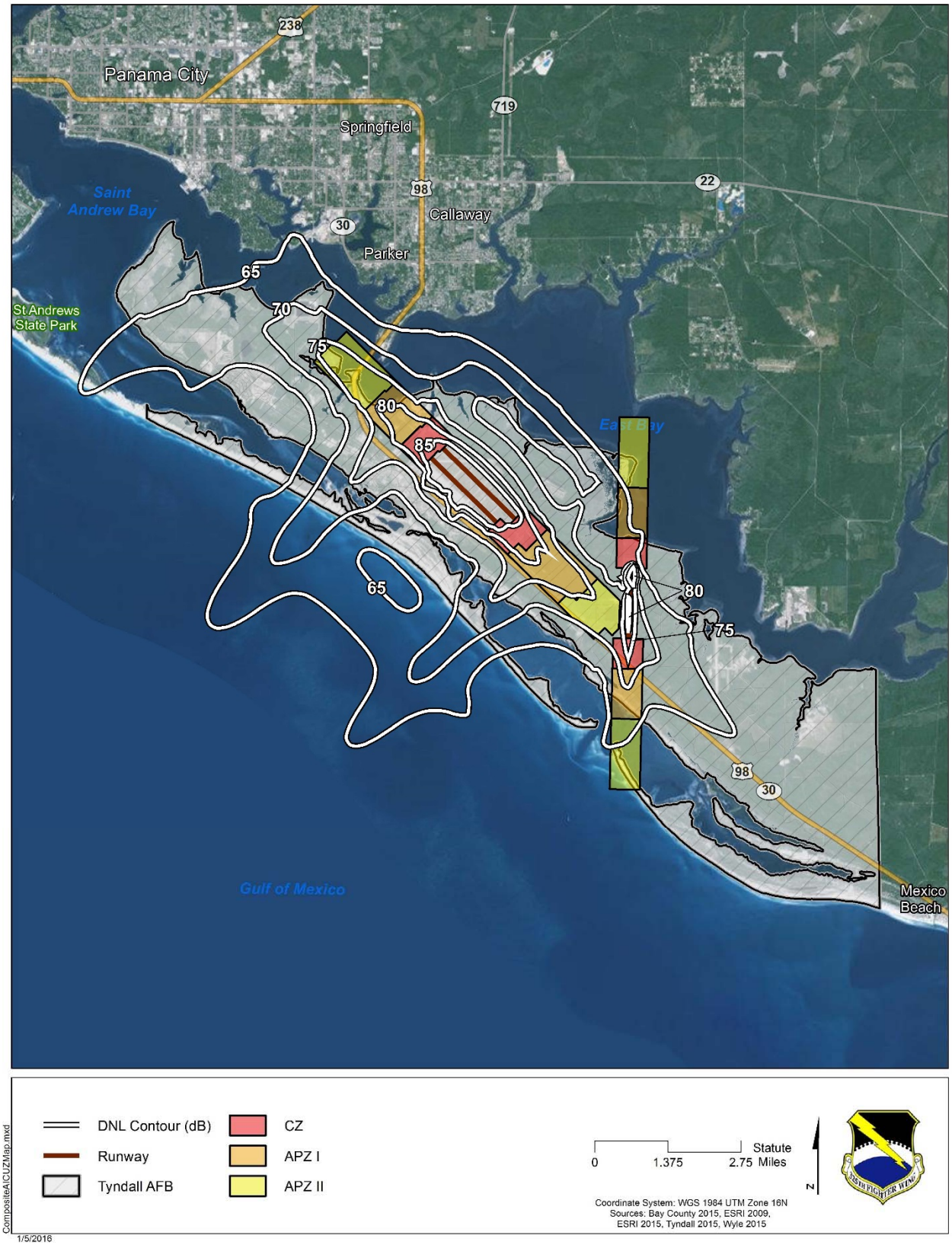


Figure 6-7. AICUZ Planning Contours and Accident Potential/Clear Zones Associated with Tyndall AFB

7.0 Implementation

Implementation of the AICUZ Study must be a joint effort between Tyndall AFB and adjacent communities. This AICUZ Study provides the best source of information to ensure land use planning decisions made by the local municipalities are compatible with a future installation presence. The role of Tyndall AFB (Section 7.1) is to minimize noise impact on the surrounding local communities by operational activities on the base. The role of the communities, encompassed in Sections 7.2 through 7.4, is to ensure that development in the surrounding area is compatible with accepted planning, zoning, and development principles and practices to protect the base's mission.

7.1 Air Force Role

The role of Tyndall AFB is to minimize the noise impact on the surrounding communities and to advise these communities on potential impacts from base operations on the safety, welfare, and quality of life of their citizens.

In general, Tyndall AFB perceives its AICUZ responsibilities as encompassing the areas of flying safety, noise abatement, and participation in the land use planning process. Well-maintained aircraft and well-trained aircrews do a great deal to ensure that aircraft accidents are avoided. Despite the best aircrew training and aircraft maintenance intentions, however, history clearly shows that accidents do occur. It is imperative that flights be routed over sparsely populated areas as regularly as possible to reduce the exposure of lives and property to a potential accident.

Through Air Force regulations, Commanders are required by Air Force policy to periodically review existing traffic patterns, instrument approaches, weather minima, and operating practices and evaluate these factors in relationship to populated areas and other local situations. This requirement is a direct result and expression of Air Force policy that all AICUZ plans must include an analysis of flying and flying-related activities designed to reduce and control the effects of such operations on surrounding land areas. Noise is generated from aircraft both in the air and on the ground.

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

It is also recognized that the AICUZ program is an ongoing activity even after compatible development plans are adopted and implemented. The local communities are encouraged to use this report to update their land use plans. Tyndall AFB personnel are prepared to participate in the continuing discussion of zoning and other land use matters as they may affect, or may be affected by, the base. Tyndall AFB Public Affairs 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..

Participation in land use planning can take many forms. The simplest of these forms is straightforward, consistent two-way discussion and information sharing with both professionals and neighbors. Copies of the AICUZ Study, including maps, will be provided to local communities and counties and regional planning departments and zoning administrators. Through this communication process, Tyndall AFB reviews applications for development or changed use of properties within the noise impact and safety areas, as well as other nearby parcels. Tyndall AFB uses aviation easements, which are tools used to minimize adverse actions. Tyndall AFB coordinates closely with surrounding communities and counties on zoning and land use issues.

7.2 State / Regional Roles

The State of Florida statute 163.3175, enacted in 2004 states, *"…it [is] desirable for the local governments in the state to cooperate with military installations to encourage compatible land use, help prevent incompatible encroachment, and facilitate the continued presence of major military installations in this state.*"

In accordance with that statute, the State of Florida has identified that the entire City of Parker is located within Zone 2 of Tyndall AFB's Airport Influence Area which is an imaginary surface created by the inner and outer horizontal surfaces and conical surfaces associated with the two active runways on Tyndall AFB (see Section 5.2). These three surfaces combined create a horizontal surface distance of 50,000 feet or 9.5 miles from the end of the runways, as defined in Federal Aviation Regulation 77.28. Communities located within the airport influence area are: Parker; Callaway; Springfield; Panama City; Cedar Grove; Lynn Haven; and unincorporated Bay County. Communities and governing bodies within the Airport Influence Area are required to communicate proposed planning document changes to Tyndall AFB.

In 2011 the State of Florida enacted statute 288.987, creating the Florida Defense Support Task Force with the mission to "*...make recommendations to preserve and protect military installations to support the state's position in research and development related to or arising out of military missions and contracting, and to improve the state's military-friendly environment for service members, military dependents, military retirees, and businesses that bring military and base-related jobs to the state."*

The statute provides grant initiatives to local communities supporting military installations. A recent grant of $500,000 was provided to the Economic Development Alliance of Bay County for construction of a high capacity data link, called the LambdaRail, to connect to the nearby Naval Support Activity Panama City.

7.3 Local Government Role

The role of the communities is to ensure that development in the surrounding area is compatible with accepted planning, zoning, and development principles and practices to protect the base's mission. The residents of local municipalities and Bay County have a long history of working with personnel from Tyndall AFB. Adoption of the following recommendations during the revision of relevant land use planning or zoning regulations will strengthen this relationship, increase the health and safety of the public, and help protect the integrity of the installation's flying mission:

- Recommend local government planners consider AICUZ policies and guidelines when developing or revising city comprehensive plans and use AICUZ overlay maps and Air Force Land Use Compatibility Guidelines 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 report.
- Recommend local government and county planners establish procedures to consult on land use matters within overlapping extra-territorial jurisdictions near Tyndall AFB.
- Recommend local government, county, and state expenditure plans/programs be reviewed to ensure they do not encourage incompatible land use patterns near Tyndall AFB, with particular emphasis on utility extension and transportation planning.
- Recommend local governments implement height and obstruction ordinances that reflect current Air Force and Title 14 of the Code of Federal Regulations 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 Tyndall AFB.
- Recommend real estate disclosures be provided to individuals purchasing property within noise contours.
- Encourage building/residential codes be enacted or modified to ensure that any new construction in the vicinity of Tyndall AFB has the recommended noise-level reduction measures incorporated into the design and construction of structures.
- Recommend proposals for tall structures such as wind turbines and communication towers be monitored to ensure that new construction does not pose a hazard to navigable airspace around Tyndall AFB.
- Recommend AICUZ land use recommendations for development density in APZs be reflected in local government plans and ordinances.
- Encourage local governments to consult with Tyndall AFB on planning and zoning actions that have the potential to affect base operations.
- Encourage the development of a working group of city, county, and Tyndall AFB representatives to discuss land use concerns and major development proposals that could affect aircraft operations.

7.4 Private Citizens / Real Estate Professionals / Businesses Roles

Residents in the area surrounding Tyndall AFB and base personnel have a long history of working together for mutual benefit of the area around the airfields and installation. Local jurisdictions should take a proactive approach in incorporating land use regulations into local plans and ordinances, which take Tyndall AFB operations into account when considering development proposals. Adoption of the following recommendations will strengthen this relationship, protect the health and ensure the safety of the public, and help protect the integrity of the installation‘s flying mission:

- Incorporate AICUZ policies and guidelines into the comprehensive plans of Bay County and local communities. Use overlay maps of the AICUZ noise contours and land use compatibility guidelines to evaluate existing and future land use proposals.
- Incorporate noise level maps into the comprehensive plans of Bay County and local communities for informational purposes during land use planning.
- Make recommendations regarding existing zoning ordinances and subdivision regulations to support the compatible land uses outlined in this study through implementation of a zoning overlay district based on noise contours and Accident Potential Zones.
- Require sellers of real estate to disclose noise impact to all prospective buyers of properties within 2 miles of airfield.
- Implement height and obstruction ordinances to reflect current Air Force and Federal Aviation Regulation Part 77 requirements.
- Make recommendations regarding building codes to ensure that new construction within the AICUZ area of influence has the recommended noise level reductions incorporated into design and construction codes.

- Encourage local citizenry support the existing Bay County Joint Land Use Study (JLUS) to promote compatible development. The JLUS objective is to avoid land use conflicts and to plan in a manner that supports both the military mission and the needs of the civilian population.
- Continue to inform Tyndall AFB 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.

8.0 References

AFD 140717-046. 2013. Economic Impact Analysis, Tyndall Air Force Base, Florida.

AFH. 1999. Air Force Handbook 32-7084, AICUZ Program Manager's Guide. March 1999.

ANSI. 1988. Quantities and Procedures for Description and Measurement of Environmental Sound: Part 1, ANSI S12.9-1988.

ANSI. 1996. Quantities and Procedures for Description and Measurement of Environmental Sound: Part 4, ANSI S12.9-1996.

Bay County 2009. Bay County Comprehensive Plan, Charting Our Course to 2020. Policy 3.4.1. Bay County Planning and Zoning. Panama City, FL. October.

Berglund, B., and T. Lindvall, eds. 1995. Community Noise, Jannes Snabbtryck, Stockholm, Sweden.

Czech, Joseph J. and Plotkin, Kenneth J., 1998. Wyle Research Report WR 98-13, NMAP 7.0 User's Manual, Wyle Laboratories, Inc., November.

City of Callaway 2009. City of Callaway Comprehensive Plan 2025. City of Callaway Planning Department. Callaway, FL.

City of Mexico Beach 2007. Comprehensive Plan. Mexico Beach Planning and Zoning Board. Mexico Beach, FL. August.

City of Parker 2010. City of Parker 2025 Comprehensive Plan. City of Parker. Parker, FL. August.

FDEO 2015. Florida Department of Economic Opportunity. Website. Retrieved from www.floridajobs.org/community-planning-and-development

Florida Senate 2015. Florida State Statute, Title XI, Chapter 163, Section 3177: Required and optional elements of comprehensive plan; studies and surveys.

FICAN 1997. "Effects of Aviation Noise on Awakenings from Sleep," June.

Harris, C.M. 1979. Handbook of Noise Control, McGraw-Hill Book Co.

Panama City 2013. City of Panama City 2035, Future Land Use Element. Planning and Land use Department. Panama City, FL. September.

Schultz, T.J. 1978. "Synthesis of social surveys on noise annoyance," *J. Acoust. Soc. Am.*, Vol. 64, No. 2, pp. 377-405, August.

Tyndall 2015. Tyndall Air Force Base. homepage. Retrieved from www.tyndall.af.mil on 2015.

US Air Force 1994 Tyndall Airforce Base. Air Installation Compatible Use Zone Study. Florida.

_____. 2008. Tyndall Airforce Base. Air Installation Compatible Use Zone Study. Florida. January.

_____. 2015a. Air Force Instruction AFI 32-7063, Air Installations Compatible Use Zones Program, 19 December 2015.

_____. 2015b. The official homepage of the *U.S. Air Force*. Retrieved from www.af.mil on 2015.

U.S. Census Bureau 2015. Seeking the Sunshine. Accessed at: www.census.gov/content/dam/Census/newsroom/releases/2015/cb15-56_graphic.pdf in December 2015.

USEPA 1978. "Protective Noise Levels," Office of Noise Abatement and Control, Washington, D.C. U.S. Environmental Protection Agency Report 550/9-79-100, November.