



AIR INSTALLATIONS COMPATIBLE USE ZONES

AICUZ STUDY

NAVAL AIR STATION WHITING FIELD

AND 12 NAVY OUTLYING LANDING FIELDS

PREPARED BY
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AIR INSTALLATIONS COMPATIBLE USE ZONES STUDY FOR NAVAL AIR STATION WHITING FIELD AND 12 NAVY OUTLYING LANDING FIELDS

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Prepared by

UNITED STATES DEPARTMENT OF THE NAVY
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EXECUTIVE SUMMARY

ES.1 Purpose of AICUZ Study
ES.2 NAS Whiting Field
ES.3 Aircraft Operations
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This Air Installations Compatible Use Zones (AICUZ) Study has been prepared in accordance with federal regulations and United States Department of the Navy (Navy) instructions to protect the public's health, safety, and welfare and to prevent encroachment from degrading the operational capability of Naval Air Station (NAS) Whiting Field and 12 affiliated Navy Outlying Landing Fields (NOLFs) in Florida and Alabama. Analysis and findings presented in this AICUZ Study focus on the noise impact areas generated from aircraft operations and the aircraft safety zones surrounding each airfield's runways. The Navy and NAS Whiting Field strive for compatible development within the noise and safety zones and are committed to working with the surrounding communities to ensure a mutually safe environment to live, work, and continue to meet the mission of the installation.

This Executive Summary provides a preview of the outline of this AICUZ Study and a brief overview of what is discussed and presented in each section.

ES.1 PURPOSE OF AICUZ STUDY

The core of an AICUZ Program is a compatible land use plan developed for the air installation. In the early 1970s, the United States Department of Defense (DOD) established the AICUZ Program to balance the need for military aircraft operations and community concerns over aircraft noise and accident potential. The AICUZ Program was developed in response to growing incompatible urban development (encroachment) around military airfields. Today, the AICUZ Program reaches worldwide and is considered a vital tool used by all branches of the military to communicate with surrounding counties, communities,

The purpose of this AICUZ Study is to achieve land use compatibility between the NAS Whiting Field Complex, including its twelve NOLFs, and neighboring communities in Florida and Alabama.

municipalities, and individuals to educate, inform, and present areas of incompatible land use surrounding military airfields. When implemented, AICUZ studies provide valuable information concerning the safety and well-being of the public while protecting the military's flying mission.

This AICUZ Study provides background information on the NAS Whiting Field Complex, presents noise contours and zones associated with aircraft operations, establishes aircraft accident potential zones (APZs) and locates areas of incompatible land uses within these zones, and recommends actions to encourage compatible land use.

ES.2 NAS WHITING FIELD COMPLEX

NAS Whiting Field Complex

- ☐ Spans five counties in Florida and Alabama.
- ☐ Busiest naval air station in the world.
- ☐ Home to TRAWING FIVE.
- ☐ Leading location for primary pilot training and intermediate rotary-wing pilot training.

NAS Whiting Field is located in Florida's northwest coastal area, approximately 6 miles north of Milton, in Santa Rosa County. NAS Whiting Field has an extensive network of NOLFs that are located in two states (Florida and Alabama) and five counties (Santa Rosa and Escambia in Florida, and Conecuh, Escambia, and Baldwin in Alabama). NAS Whiting Field is the busiest naval air station in the world, responsible for an estimated 60 percent of Chief of Naval Air Training (CNATRA) Command's total flight time. NAS Whiting Field is home to Training Air Wing (TRAWING) FIVE and is the leading location for primary pilot training and intermediate rotary-wing pilot training. There are three fixed-wing squadrons (Training Squadrons Two, Three and Six) as well as three rotary-wing squadrons (Training Squadron Eight, Eighteen and Twenty-Eight).

Collectively termed NAS Whiting Field Complex, the following airfields are discussed in detail in this AICUZ Study:

☐ NAS Whiting Field Main Station, Santa Rosa County, Florida

North and South Airfields

☐ Florida NOLFs

Pace, Santa Rosa County

Spencer, Santa Rosa County

Harold, Santa Rosa County

Santa Rosa, Santa Rosa County

Choctaw, Santa Rosa County

Site 8, Escambia County

☐ Alabama NOLFs

Evergreen (Middleton Airport), Conecuh County

Brewton, Escambia County

Silverhill, Baldwin County

Summerdale, Baldwin County

Barin, Baldwin County

Wolf, Baldwin County

ES.3 AIRCRAFT OPERATIONS

NAS Whiting Field and its NOLFs are primarily utilized by TRAWING FIVE for pilot training for Navy, Marine Corps, Coast Guard, and several allied nations. NOLF Choctaw will be used by Eglin Air Force Base (AFB) for Joint Strike Fighter (JSF) operations, and all airfields are occasionally used by transient aircraft. At NAS Whiting Field, all flight operations are conducted for the purpose of training student pilots and instructor pilots. Each student aviator must complete the required flights; thus, creating a repetitious loop of flight operations as new students join the program and begin the flight curriculum. All basic flight maneuvers as well as a selection of advanced operations are flown at the NAS Whiting Field Complex. Student aviators conduct over 160,000 flight hours per year and an average of 1.3 million flight operations per year.

This AICUZ Study has developed noise contours and APZs based on projected operations for CY2025.

Aircraft operations data have been collected and analyzed as part of this AICUZ Study to develop noise contours and areas of accident potential. One of the primary purposes of an AICUZ Study is to develop a planning document for the installation and, as such, standard practice for AICUZ studies is to include projected operations, typically five to ten years in the future. Therefore, this AICUZ Study has incorporated projected operations for Calendar Year (CY) 2025 and developed noise contours and APZs based on that information.

ES.4 AIRCRAFT NOISE

Air Installation Noise Sources

- ☐ Aircraft Operations
- ☐ Pre-Flight Engine Run-Ups

The main sources of noise at an air installation are aircraft operations and maintenance or pre-flight engine run-ups. This AICUZ Study has incorporated both sources of noise to develop installation specific noise contours for NAS Whiting Field Main Station. The noise exposure from aircraft at NAS Whiting Field, as with other installations, is measured using the day-night average sound level (DNL) noise metric. The DNL is depicted visually as a noise contour that connects equal points of value. The noise contours were developed using the DOD approved noise model, NOISEMAP, used in conjunction with the Rotorcraft Noise Model (RNM), and incorporated data collected from NAS Whiting Field and the Navy.

The AICUZ Program generally divides noise exposure into three categories known as noise zones. Noise zones 1 through 3 are developed based on the DNL and provide land use control recommendations. These noise zones provide the basis for

identifying incompatible land use around an airfield. Noise contours and noise zones have been identified for the NAS Whiting Field Complex, and a parcel-specific land use analysis has been conducted and presented in this AICUZ Study as the 2015 AICUZ noise contours.

ES.5 AIRFIELD SAFETY

The Navy recommends that land uses with a high concentration of people (apartments, churches, schools) be located outside APZs.

While the likelihood of an aircraft mishap occurring is remote, the Navy identifies areas of accident potential to assist in land use planning. The Navy has identified APZs around its runways based on historical data from aircraft mishaps. The Navy recommends certain land uses that concentrate large numbers of people (e.g., apartments, churches and schools) be constructed outside APZs. The components of standard APZs, as applicable for the airfields in the NAS Whiting Field Complex, are Clear Zone, APZ I, and APZ II. An accident is more likely to occur in the Clear Zone than in APZ I or II, and is more likely to occur in APZ I than APZ II.

APZs are developed, in part, on the number of operations conducted on a runway per flight track. AICUZ guidance provides a threshold at which APZs are required. APZs have been identified for the NAS Whiting Field Complex based on the CY2025 projected operations and are presented in this AICUZ Study as the 2015 AICUZ APZs.

ES.6 LAND USE COMPATIBILITY ANALYSIS

The 2015 AICUZ map defines the minimum recommended area needed to protect the health, safety, and welfare of populations near the NAS Whiting Field Complex.

A composite noise contour and APZs map has been developed and overlaid on an aerial photograph to graphically depict the 2015 AICUZ footprint for all airfields in the NAS Whiting Field Complex. The 2015 AICUZ map defines the minimum recommended acceptable area within which land use controls are needed to protect the health, safety, and welfare of those living or working near the NAS Whiting Field Complex and to preserve the defense flying mission.

The Navy has developed land use compatibility recommendations for noise zones and APZs. These recommendations are found in the AICUZ guidance document, Chief of Naval Operations Instruction (OPNAVINST) 11010.36C, and are intended to serve as guidelines for the placement of APZs and noise zones and for the development of land uses around military

installations. Certain land uses are considered incompatible with APZs and high noise zones, while other land uses may be considered compatible or compatible under certain conditions.

This AICUZ Study incorporates city, county, and state land use and zoning regulations and documents as the basis for identifying existing land use and zoning as well as future land use and zoning. Should land use or zoning data not be readily available or not required under the current regulation, site surveys, interviews, and desktop surveys have been conducted to accurately capture local development.

ES.7 LAND USE TOOLS AND RECOMMENDATIONS

Implementation of the AICUZ Study

- ☐ Federal Government
- ☐ State/Regional Governments
- ☐ Local Government
- ☐ Private Citizens
- ☐ Businesses
- ☐ Real Estate Developers
- ☐ Navy

The federal government, state and regional governments, local governments, private citizens, businesses, and real estate developers, along with the Navy, all play an important role in the implementation of this AICUZ Study. The AICUZ footprint should be incorporated into land use and zoning processes for Santa Rosa and Escambia counties in Florida, and Baldwin, Escambia, and Conecuh counties in Alabama, to best guide compatible development around the installation.

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ACRONYMS AND ABBREVIATIONS

AARC	Alabama Association of Regional Councils Alabama
AFB	Air Force Base
AICUZ	Air Installations Compatible Use Zones
AIPD	Airfield Influence Planning District
AOD	Air Operations Department
APZ	Accident Potential Zone
ATC	Air Traffic Control/Controller
ATRC	Alabama-Tombigbee Regional Commission
BASH	Bird/Animal Aircraft Strike Hazard
BCC	Board of County Commissioners
BOCC	Board of County Commissioners (Santa Rosa County)
BRAC	Base Realignment and Closure
CAL	Confined Air Landing
CFA	Controlled Firing Area
CNATRA	Chief of Naval Air Training
CNEL	Community Noise Equivalent Level
CNO	Chief of Naval Operations
CPLO	Community Planning and Liaison Officer
CY	Calendar Year
dB	Decibels
dBA	A-weighted Decibels
DNL	Day-Night Average Sound Level
DOD	United States Department of Defense
du	Dwelling Unit
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FCLP	Field Carrier Landing Practice
FHA	Federal Housing Administration
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise

GIS	Geographic Information System
HITU	Helicopter Instructor Training Unit
HUD	United States Department of Housing and Urban Development
IFR	Instrument Flight Rules
IJTS	Initial Joint Training Site
ITU	Instructor Training Unit
JLUS	Joint Land Use Study
JPATS	Joint Primary Aircraft Training System
JSF	Joint Strike Fighter
MAZ	Military Airport Zone
MLS	Multiple Listing Service
MMRO	Manufacture, Maintenance, Repair, and Overhaul
MOA	Military Operations Area
MSL	Mean Sea Level
MTU	Military Training Unit
MWR	Morale, Welfare, and Recreation
NAAS	Naval Auxiliary Air Station
NAS	Naval Air Station
NATRACOM	Naval Air Training Command
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NM	Nautical Mile
NOLF	Navy Outlying Landing Field
NVG	Night Vision Goggles
OHV	Off-highway Vehicle
OLF	Outlying Landing Field
OPNAVINST	Chief of Naval Operations Instruction
PAZ	Public Airport Zone
Pensacola MSA	Pensacola-Ferry Pass-Brent Metropolitan Statistical Area
POW	Prisoner of War
PPEL	Practice Precautionary Emergency Landing
PV	Photovoltaic
REPI	Readiness and Environmental Protection Integration
RNM	Rotorcraft Noise Model
SARPC	South Alabama Regional Planning Commission
SLUCM	Standard Land Use Coding Manual
SNA	Student Naval Aviator
STEM	Science, Technology, Engineering, and Math
SUA	Special Use Airspace
TDR	Transfer of Development Rights
TIMS	Training Integration Management System
TRAWING	Training Air Wing

TRBO	Tail Rotor/Boost Off
U.S.C.	United States Code
UAV	Unmanned Aerial Vehicle
UFC	Unified Facilities Criteria
USGS	U.S. Geological Survey
VA	U.S. Department of Veterans Affairs
VFR	Visual Flight Rules
WFRPC	West Florida Regional Planning Council
WWII	World War II

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1

1.1 AICUZ Program
1.2 Responsibility for Compatible Land Use
1.3 Previous AICUZ Efforts and Related Studies
1.4 Changes that Necessitate an AICUZ Study Update

INTRODUCTION

Military installations and their host communities often have a history of cooperation and mutual benefit. Installations provide economic benefits through jobs and contracts, while host communities provide housing, services, retail, and schools. The presence of a military base attracts nearby residential and commercial development. New homes are constructed in close proximity to an installation to allow both military and civilian personnel who work at a base to live near their employer. Similarly, businesses are established in proximity to these homes and the military installation to support the installation and its personnel. This development can be complementary in nature and enhance an installation's value and function. Conversely, the surrounding land uses may be located in areas of high noise zones or accident potential, thereby adversely impacting residents or businesses and making this growth incompatible with the sustained long-term mission of the base. In addition, in many locations throughout the United States, the military's presence is expanding in terms of both physical size and mission growth and/or expansion. Neighboring communities to installations are also experiencing population growth and increased development, as is the case with Naval Air Station (NAS) Whiting Field.

Recognizing the need to foster compatible land and air uses, the United States Department of Defense (DOD) initiated the Air Installations Compatible Use Zones (AICUZ) Program in 1973 to help governmental entities and communities anticipate, identify, and promote compatible land use and development near military installations. The goal of the AICUZ Program is to protect the health, safety, and welfare of the public while also protecting the operational capabilities of the military. These goals are accomplished by achieving compatible land use and activities around an air installation.

The goal of the AICUZ Program is to protect the health, safety, and welfare of the public, while also protecting the military operational capabilities.

This goal is accomplished by achieving compatible land use patterns and activities in the vicinity of a military installation.

The AICUZ Program recommends that noise contours, Accident Potential Zones (APZs), height obstruction criteria, and land use recommendations be incorporated into local community plans. Incorporating AICUZ areas into planning processes and local land use controls can reduce the long-term impacts of incompatible development to both the community and the military.

Cooperation between the installation and the community is central to the success of the AICUZ Program. As the communities that surround airfields grow and develop, the United States Department of the Navy (Navy) has the responsibility to communicate and collaborate with local governments on land use planning, zoning, and similar matters that could impact public health, safety, and welfare or which could affect the installation's mission.

NAS WHITING FIELD MAIN STATION, SANTA ROSA COUNTY, FLORIDA
- ☐ North and South Airfields

FLORIDA NOLFs
- ☐ Pace, Santa Rosa County
- ☐ Spencer, Santa Rosa County
- ☐ Harold, Santa Rosa County
- ☐ Santa Rosa, Santa Rosa County
- ☐ Choctaw, Santa Rosa County
- ☐ Site 8, Escambia County

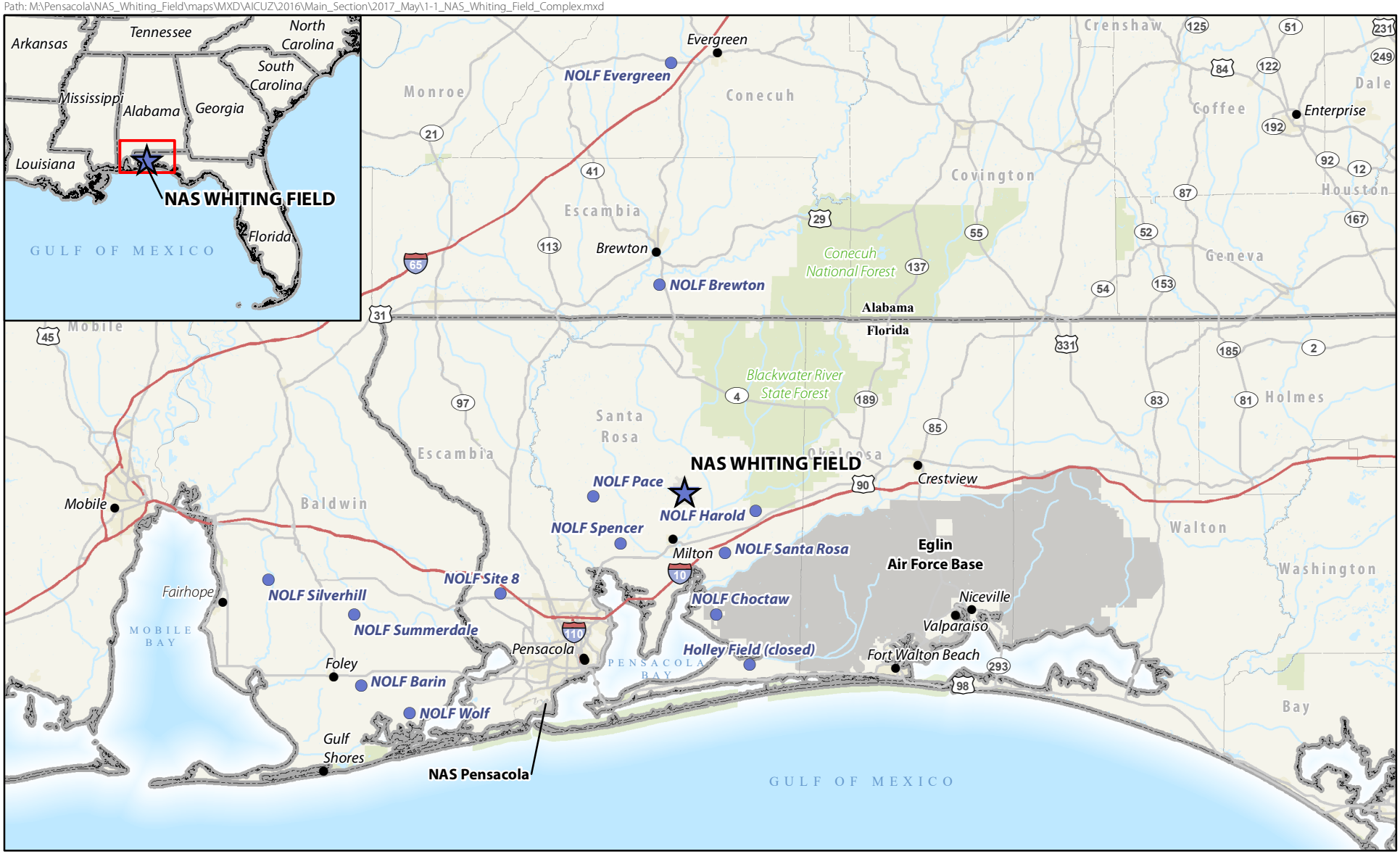
ALABAMA NOLFs
- ☐ Evergreen (Middleton Airport), Conecuh County
- ☐ Brewton, Escambia County
- ☐ Silverhill, Baldwin County
- ☐ Summerdale, Baldwin County
- ☐ Barin, Baldwin County
- ☐ Wolf, Baldwin County

This AICUZ Study has been prepared for NAS Whiting Field, Milton, Florida, and 12 Navy Outlying Landing Fields (NOLFs). NAS Whiting Field is located in northwest Florida and is comprised of two separate airfields, supported by the 12 NOLFs. NAS Whiting Field is the premier naval aviation training facility, graduating over 1,600 student aviators each year. NOLF Holley was closed as an aviation asset in early 2016; therefore, this NOLF (herein referred to as Holley Field) is not included in the AICUZ analysis.

For clarification of reference, the term "NAS Whiting Field Complex" will be used as a general reference to the collective airfields located throughout northwest Florida and southern Alabama. The NAS Whiting Field Complex is depicted on Figure 1-1. The term "NAS Whiting Field" or "Main Station" will be used to specifically address the Naval Air Station and, when necessary, the North and/or South airfields on Main Station will be specified. The 12 NOLFs will be referred to or identified collectively as "the NOLFs," or individually by airfield name with or without the NOLF preface (i.e. "NOLF Evergreen" or "Evergreen"). NOLFs are primarily used by student pilots to conduct a variety of training exercises, as specified in the curriculum.

This AICUZ Study has been prepared in consideration of past and expected changes in mission and aircraft, and projected operational levels through Calendar Year (CY) 2025.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_May\1-1_NAS_Whiting_Field_Complex.mxd



SCALE
0 5 10 Miles

SOURCE: ESRI 2012; BRRC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

- NAS Whiting Field
- NOLF Location
- City
- Interstate
- Major Highway
- State Boundary
- County Boundary
- Military Installation
- Forest Land

Note - Holley Field is closed.

Figure 1-1
NAS Whiting Field Complex, Florida and Alabama
Santa Rosa County, Florida

OPNAVINST 11010.36C is the current Navy guidance document that governs the AICUZ Program.

This 2015 AICUZ Study is an update of the 1990 AICUZ, consolidates all previous noise studies and related documents, and includes projected operations. This Study has been prepared in consideration of both past and anticipated changes in mission, aircraft, and projected operational levels that will occur over the next ten years. Therefore, AICUZ footprints presented in this document reflect projected aircraft operations for CY2025.

1.1 AICUZ PROGRAM

In the early 1970s, the DOD established the AICUZ Program to balance the need for aircraft operations with community concerns over aircraft noise and accident potential. The AICUZ Program was developed in response to growing incompatible urban development around military airfields. The objectives of the AICUZ Program, according to the Chief of Naval Operations Instruction (OPNAVINST 11010.36C), are as follows:

- ☐ To protect the health, safety, and welfare of those persons living or working near military airfields by encouraging land use that is compatible with aircraft operations;
- ☐ To preserve the military's operational capabilities;
- ☐ To reduce, where possible, noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements, both on and in the vicinity of air installations; and
- ☐ To inform the public about the AICUZ Program and seek cooperative efforts to minimize noise and aircraft accident potential impacts by promoting compatible development in the vicinity of military air installations.

Development/Land Uses that could Endanger Aircraft and Pilots

- ☐ Lighting that Impairs Pilot Vision
- ☐ Towers , Tall Structures, and Vegetation that Penetrate Airspace
- ☐ Development that Generates Smoke, Steam, or Dust
- ☐ Uses that Attract Birds
- ☐ EMI Sources

To help meet AICUZ Program objectives, the Federal Aviation Administration (FAA) and DOD have developed specific instructions and guidance to encourage local communities to restrict development or land uses that could endanger pilots operating aircraft in the vicinity of the airfield, including: lighting (direct or reflected) that would impair pilot vision; towers, tall structures, and vegetation that penetrate navigable airspace or are constructed near the airfield; uses that generate smoke, steam, or dust; uses that attract birds, especially waterfowl; and sources of electromagnetic interference (EMI) that may

adversely affect aircraft communication, navigation, or other electrical systems. This is discussed in more detail in Section 5.4, Flight Safety.

To meet the objectives of the AICUZ Program, the Navy recommends that local governments incorporate land use controls in areas surrounding a base, as well as adopt noise zones and APZs. Noise zones and APZs, which are described in detail in Chapters 4 and 5, respectively, are areas of concern for an air installation and its neighboring communities. Since noise zones and APZs often extend beyond the "fence line" of the installation, presenting the most current noise zones and APZs to local governments is essential to fostering mutually beneficial land uses and development. It is a goal of the AICUZ Program to have noise zones and APZs adopted by the local governments in order to incorporate development criteria in areas around the base.

Along the same lines, the Santa Rosa County Joint Land Use Study (JLUS) was prepared for Santa Rosa County, Florida, in 2003. The 2003 Santa Rosa County JLUS worked to address land use issues associated with the operation of NAS Whiting Field and six NOLFs—Pace, Spencer, Harold, Santa Rosa, Choctaw, and Holley. Additionally, the 2003 Escambia County, Florida, JLUS addressed land use issues associated with NOLF Site 8. The analysis for both JLUSs was based on noise contours and APZs completed in 1990 and 2000; thus, any changes in the dimensions of the noise zones or APZs would need to be updated in the JLUSs and may affect planning assumptions outlined in the reports. AICUZ-related tools and recommendations will be discussed further in Chapter 8 of this AICUZ Study.

1.1.1 PURPOSE, SCOPE, AND AUTHORITY

The purpose of the AICUZ Program is to achieve compatibility between air installations and neighboring communities. To satisfy this purpose, the Navy works with the local communities to foster compatible development.

The scope of this AICUZ Study includes an analysis of:

- ☐ Historic, current, and future aircraft operations, including arrivals, departures, and pattern work (e.g., touch-and-go);
- ☐ Noise contours for CY2025 forecasts;

- ☐ Aircraft APZs for CY2025 forecasts;
- ☐ Land use compatibility;
- ☐ Operational alternatives for noise reduction; and
- ☐ Possible solutions to existing and potential incompatible land uses.

An AICUZ Study presents an analysis of community development trends, land use tools, and mission requirements at the airfield to recommend strategies for communities to prevent incompatible land development. Implementation of these strategies requires cooperation between the Installation Commanding Officer, Community Planning and Liaison Officer (CPLO), and the local governments.

Key documents that outline the authority for the establishment and implementation of the AICUZ Program, as well as guidance on facility requirements, are derived from:

- ☐ DOD Instruction 4165.57, "Air Installations Compatible Use Zones," dated May 2, 2011, Incorporating Change 1, Effective March 12, 2015;
- ☐ OPNAVINST 11010.36C, "Air Installations Compatible Use Zones Program," dated October 9, 2008;
- ☐ Unified Facilities Criteria 3-260-01, "Airfield and Heliport Planning and Design," dated November 17, 2008; and
- ☐ United States Department of Transportation, FAA Regulations, Code of Federal Regulations, Title 14, Part 77, "Objects Affecting Navigable Airspace."

The AICUZ Study development and data collection occurred over a four-year period (2010-2014) and was modeled for 2015. To maintain document integrity and clear data sources, operational activities that occurred after this time were not incorporated into the AICUZ Study; therefore, it is referred to as the 2015 AICUZ Study.

1.2 RESPONSIBILITY FOR COMPATIBLE LAND USE

Military installations can make recommendations or advise local governments and agencies on land use near an installation, but it is the local government and agencies that have the planning and zoning authority to preserve land use compatibility near the military installation.

The AICUZ Program promotes compatible land use development around military air installations through mutual cooperation and engagement with the community. Therefore ensuring land use compatibility within the AICUZ is the responsibility of many organizations, including the DOD and Navy, the local naval air installation command, local planning and zoning agencies, real estate agencies, residents, developers, and builders.

State and local governments have the responsibility to protect the health, safety, and welfare of their citizens; similarly, the Navy has the same responsibility, while concurrently preserving the mission and operations of the installation. The Navy actively works with state and local government agencies to engage and inform the local community through the disclosure of noise exposure contours and APZs and compatible land use recommendations designed to minimize noise impacts and accident potential around air installations. While military installations can advise local government agencies on land use near the installation by providing information on aircraft noise and accident potential, it is the state and local government agencies that have the authority to preserve land use compatibility through the adoption and implementation of appropriate control measures recommended in this AICUZ Study, as advised by the military when appropriate.

Cooperative action by all parties is essential to promoting compatible land use and deterring potential hazards. Chapter 8 of this AICUZ Study discusses the Navy's compatible land use tools and recommendations in more detail.

Previous AICUZ Efforts and Related Studies

- 1983 NAS Whiting Field Master Plan
- 1990 AICUZ Update, NAS Whiting Field
- 2000 EA for the Replacement of the T-34C with the JPATS Aircraft at NAS Whiting Field
- 2000 Aircraft Noise and APZ Study for NAS Whiting Field and Seven Related NOLFs
- 2006 Technical Note Aircraft Noise Update for NAS Whiting Field and Five NOLFs
- 2007 Aircraft Noise Update for NAS Whiting Field and Five NOLFS
- 2008 Final USAF ROD and EIS for Proposed Implementation of the BRAC 2005 Decisions and Related Actions at Eglin AFB
- 2011 Final EA for Providing T-6 JPATS Solo Capability at NOLFs, NAS Whiting Field

1.3 PREVIOUS AICUZ EFFORTS AND RELATED STUDIES

The original, complete AICUZ for NAS Whiting Field was prepared and approved in 1990. Since that publication date, several noise studies have been prepared for NAS Whiting Field and affiliated NOLFs. However, there have not been any updates to the original 1990 AICUZ (updates are typically published when there is a significant change in mission). The following list highlights significant AICUZ studies, noise studies, and other environmental documents that present noise contours for NAS Whiting Field and affiliated NOLFs. Many of these studies were prepared to assist with internal planning efforts, and some of the studies included a public outreach component. All are presented here to illustrate the ongoing nature of planning for the airfield environment and areas impacted by aircraft operations.

A timeline is provided below, with a brief summary and relevance of each document.

1983 – NAS WHITING FIELD MASTER PLAN

The 1983 Master Plan included an AICUZ section that presented noise contours and APZs.

1990, FEBRUARY – AICUZ UPDATE, NAS WHITING FIELD

This document was prepared in accordance with Naval Instruction (Naval Facility Command Instruction 11010.63B, FAC 202, dated October 20, 1982), and served as an update of the AICUZ section that was included in the 1983 Master Plan. The noise and APZ data presented in this document were incorporated from the following two documents:

- ☐ 1986, January – "Aircraft Noise Survey, Naval Air Station, Whiting Field, Milton, Florida;" and
- ☐ 1987, October – "Naval Aviation Training System Plan." Permanently stationed aircraft that were included in this study were the T-34C and the TH-57. Airfields evaluated in this study included NAS Whiting Field and NOLFs Barin, Brewton, Evergreen, Holley, Pace, Harold, Santa Rosa, Saufley, Silverhill, Spencer, Site 8, Site 6, Wolf, and Summerdale. NOISEMAP modeling data were derived from controlled condition field measurements taken throughout the 1980s.

2000, JANUARY – AIRCRAFT NOISE AND ACCIDENT POTENTIAL ZONE STUDY FOR NAVAL AIR STATION WHITING FIELD AND SEVEN RELATED NAVAL OUTLYING LANDING FIELDS

This technical note served as an update to the previous 1986 noise study for the airfields. This study was performed under the proposed action of the replacement of the T-34 with the T-6A and presented the proposed CY2009 contours. This study modeled the T-6 aircraft using Shorts 330 standardized noise and aircraft data as surrogates because the T-6 had not yet entered into service and no measured data existed. Aircraft modeled included T-34, T-6, TH-57, and the Blue Angel F/A-18 at Choctaw. Airfields evaluated in this study included NAS Whiting Field and NOLFs Barin, Brewton, Choctaw, Evergreen, Saufley, Silverhill, and Summerdale.

2000, MAY – ENVIRONMENTAL ASSESSMENT FOR THE REPLACEMENT OF THE T-34C TRAINING AIRCRAFT WITH THE JOINT PRIMARY AIRCRAFT TRAINING SYSTEM (JPATS) AIRCRAFT AT NAVAL AIR STATION WHITING FIELD, FLORIDA

This environmental assessment (EA) addressed the primary environmental issues involved with the replacement of T-34C aircraft with T-6A aircraft and associated equipment and facilities, which are components of the Joint Primary Aircraft Training System (JPATS). T-6A flight training operations were evaluated at NAS Whiting Field and NOLFs Barin, Brewton, Evergreen, Saufley, and Choctaw. The EA considered the T-6A; however, the T-34C was ultimately replaced by the T-6B.

2006, SEPTEMBER – TECHNICAL NOTE: AIRCRAFT NOISE UPDATE FOR NAVAL AIR STATION WHITING FIELD AND FIVE NAVAL OUTLYING LANDING FIELDS

This technical note updated the CY2009 proposed action scenario noise contours that were presented in the January 2000 Wyle TN 99-32 report. The purpose of this study update was to incorporate T-6 measured noise source data and actual T-6 profiles to the proposed action operations contained in the original report. Airfields evaluated in this study included NAS Whiting Field and NOLFs Barin, Brewton, Choctaw, Evergreen, and Saufley.

2007, JANUARY – AIRCRAFT NOISE UPDATE FOR NAVAL AIR STATION WHITING FIELD AND FIVE NAVAL OUTLYING LANDING FIELDS

This report was conducted as an update to the September 2006 Wyle Technical Update TN 06-05 and represents the proposed CY2010 conditions at NAS Whiting Field and NOLFs Barin, Brewton, Choctaw, Evergreen, and Saufley. The analysis utilized measured T-6 data and actual T-6 profiles.

2009, FEBRUARY – FINAL U.S. AIR FORCE RECORD OF DECISION AND ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED IMPLEMENTATION OF THE BASE REALIGNMENT AND CLOSURE 2005 DECISIONS AND RELATED ACTIONS AT EGLIN AFB, FLORIDA

Commonly known as the Joint Strike Fighter (JSF) Final Environmental Impact Statement (EIS), a major portion of this document's purpose was to implement the Base Realignment and Closure (BRAC) 2005 decisions, as required by law, concerning the establishment of the JSF Initial Joint Training Site (IJTS) at Eglin Air Force Base (AFB). This document contains recently modeled noise contours for the JSF at NOLF Choctaw and, thus, is pertinent to NAS Whiting Field and this 2015 AICUZ Study. A Supplemental EIS (Draft published in September 2014 and Final published in June 2014) was developed to analyze the beddown, location, operational alternatives, and possible mitigation measures for the F-35s that were authorized for delivery by the February 2009 Record of Decision.

2011, JANUARY – FINAL ENVIRONMENTAL ASSESSMENT FOR PROVIDING T-6 JPATS SOLO CAPABILITY AT NAVY OUTLYING LANDING FIELDS, NAVAL AIR STATION WHITING FIELD, FLORIDA

The purpose of this EA was to evaluate the proposed action of expanding two NOLF runways to support training with the T-6. Airfields that were reviewed in this analysis (including updated noise contours) were NOLFs Silverhill, Summerdale, Barin, and Wolf. The noise study used in development of the EA was from the Noise Study for Providing T-6 JPATS Solo Capability at Navy Outlying Fields, Naval Air Station Whiting Field, Florida: Amended Modeling Results, January 2010.

Other planning documents, such as the 2015 Airfield Obstructions and Controls Report, provide additional context related to the development and management of the existing AICUZ Program as well as the current analysis. The Airfield Obstructions and Controls Report, conducted in 2015, assisted the Base Operations units in creating and maintaining standardized geographic information system (GIS) data layers. These layers help support the tracking of airfield operations concerns, such as airfield lighting and airfield obstructions, while utilizing Federal Aviation Regulations (FAR) Part 77, "Objects Affecting Navigable Airspace," Unified Facilities Criteria (UFC) 3-260-01, "Airfield and Heliport Planning and Design," applicable DOD instruction and OPNAVINST, and other UFCs.

Airfield obstructions data collected from existing studies and relevant GIS data for NAS Whiting Field included noise contours, APZs, Clear Zones, and imaginary surface layers. The main objective of the airfield obstructions study was to identify the heights, locations, and types of obstructions at NAS Whiting Field to ensure the highest possible level of safety in the unlikely event of an aircraft mishap.

This AICUZ Study has incorporated data from previous noise-related documents and, as applicable, adopted existing noise contours and APZs, presenting them as the 2015 AICUZ Study noise contours and APZs. The original 1990 AICUZ and 2003 Santa Rosa County JLUS are used for the baseline conditions for comparison purposes. NOLF Choctaw is the only airfield that was not included in the 1990 AICUZ; therefore, baseline conditions are not included in this analysis. Source data, as incorporated into the document, will be referenced where necessary.

AICUZ studies should be updated when an installation has:

- ☐ Significant changes in aircraft operations.
- ☐ Changes in the type of aircraft stationed or operating at the installation.
- ☐ Changes in flight paths or procedures.

1.4 CHANGES THAT NECESSITATE AN AICUZ STUDY UPDATE

AICUZ updates follow DOD and Navy Instruction. The updates are determined to be necessary based on a variety of factors, primarily when an air installation has a significant change in aircraft operations, a significant increase in nighttime flying activities, a change in the type of aircraft based and operating at the installation, or changes in flight paths or runway utilization. Another critical determining factor is an installation's acquisition or discontinuation of a mission that affects aircraft operations. Other factors that are considered when determining the need for an AICUZ Study update include the year of the

previous AICUZ Study, updates to the DOD or Navy Instruction, updates to noise modeling methods, and local community land use changes and developments.

This 2015 AICUZ Study has been developed in accordance with OPNAVINST 11010.36C and is a formal update to the 1990 AICUZ Study Update. The AICUZ Study development and data collection occurred over a four-year period (2010-2014) and was modeled for 2015. To maintain document integrity and clear data sources, operational activities that occurred after this time were not incorporated into the AICUZ Study; therefore, it is referred to as the 2015 AICUZ Study. This 2015 AICUZ Study provides NAS Whiting Field's projected aircraft operations outlook for CY2025. The justifications for this 2015 AICUZ Study are provided below:

- ☐ Current AICUZ Study is 25 years old.
- ☐ AICUZ Program guidance and instructions have been updated since publication of the current AICUZ Study:
  - DOD Instruction was updated in 2011; and
  - OPNAVINST was updated in 2008.
- ☐ Advancements in the DOD NOISEMAP suite of computer-based noise modeling tools:
  - Updated aircraft acoustical data;
  - Addition of terrain into noise modeling;
  - Conducted using the "Average Annual Day" methodology; and
  - Improved geographical technology.
- ☐ Significant changes in aircraft since the 1990 AICUZ Study:
  - Replacement of the T-34C with the T-6B; and

- Addition of the F-35 as a transient aircraft at NOLF Choctaw.

☐ Incorporation of projected aircraft and operations for AICUZ Study CY2025:

- Addition of civilian aircraft and operations associated with the Airpark;
- Increased F-35 activity and operations at NOLF Choctaw; and
- Increased annual operations over the average of the past five years at most NOLFs.

☐ Adjustments made for flight tracks and flight track utilization.

☐ Local planning and governmental settings for the local communities and the recommendations and strategies for land use compatibility require updates.

These factors all have differing effects on the noise contours and APZs, commonly called the "AICUZ footprint." These effects, as well as the extent of changes from the 1990 AICUZ Study, are discussed in further detail in the remainder of this AICUZ Study.

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2

2.1 Location and History
2.2 Mission
2.3 Installation Activities
2.4 Airspace
2.5 Operational Areas
2.6 Local Economic Impacts and Population Growth

NAS WHITING FIELD COMPLEX


Inspection, Whiting Field, July 1944

2.1 LOCATION AND HISTORY

NAS Whiting Field is located in Florida's northwest coastal area, approximately 6 miles north of Milton, in Santa Rosa County. At approximately 4,000 acres, the station is located near the Blackwater River and north of Blackwater Bay. Northwest Florida is bordered by Alabama to the north and west, and the installation's 12 NOLFs are located in both states. The northwest Florida region, in addition to NAS Whiting Field, is home to one naval base and five other aviation-related military installations including: Naval Support Activity Panama City, NAS Pensacola, Eglin Air Force Base, Duke Field, Hurlburt Field, and Tyndall Air Force Base (Figure 2-1).


Instructor and Flight Student

The Navy first commissioned NAS Whiting Field in 1943 as a Naval Auxiliary Air Station (NAAS). Throughout the course of World War II (WWII), Whiting Field's mission was to train aviators for the fleet. In 1945, a prisoner-of-war (POW) camp for German soldiers was established in cooperation with NAS Pensacola and Camp Rucker. After the end of WWII, Whiting Field was converted to a naval air station and, by 1949, NAS Whiting Field was known throughout Naval Air Basic Training Command as the backbone of the Navy's flight program. During its 73 years of continuous operation, NAS Whiting Field served as the home of the famed Blue Angels Flight Demonstration Squadron and the Navy's first jet training unit, all while maintaining its basic pilot training program.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_Jan\2_1_Regional_Location_NAS_Whiting_Complex.mxd



SCALE

0 5 10 Miles

Legend

- NAS Whiting Field
- City
- Interstate
- Major Highway
- County Boundary
- Military Installation
- Park

SOURCE: ESRI 2012; Ecology and Environment, Inc. 2015
ESRI 2007; EIMS (COP Downloaded August 11, 2014)

Figure 2-1
Regional Location Map
NAS Whiting Field Complex
Santa Rosa County, Florida

Starting in 1955, NAS Whiting Field adopted the new T-34B Mentor aircraft as its premier trainer; the next year, the instruments tactics phase of basic flight training was moved from NAAS Saufley Field to Whiting. Three primary training Squadrons (VT-2, VT-3, and VT-6) were established in 1960, followed by two helicopter Training Squadrons (HT-8 and HT-18) in 1972 and HT-28 in 2007. Starting in 1973, helicopter training began and, since then, all graduates of Navy helicopter training have received their Wings of Gold at NAS Whiting Field.



NAS Whiting Field (Mid-1960s and Present Day)

Today, NAS Whiting Field is the busiest naval air station in the world, responsible for an estimated 60 percent of the Chief of Naval Air Training (CNATRA) Command's total flight time. Headquartered on board NAS Corpus Christi, Texas, CNATRA leads the Naval Air Training Command (NATRACOM) and is comprised of five Training Air Wings (TRAWINGs) located on naval air stations in Florida, Mississippi, and Texas. The TRAWINGs are home to 17 Training Squadrons. NAS Whiting Field is home to TRAWING FIVE and is the leading location for primary pilot training and intermediate rotary-wing pilot training.

2.2 MISSION

NAS Whiting Field Mission

"To effectively support the mission accomplishment of multiple commands tenant commands' training of U.S. Navy, Marine Corps, Air Force, Coast Guard, and international students, by efficiently providing high-quality installation facilities and operational services at 2 primary airfields and 12 Navy Outlying Landing Fields."

NAS Whiting Field, named in honor of Captain Kenneth E. Whiting, a distinguished pioneer in both submarine operations and naval aviation, upholds his reputation by distinguishing itself as a premier pilot training facility to the finest aviation professionals in the world. The installation is responsible for providing basic facility services, business and support functions, housing and accommodations, and quality of life services, all in support of the installation's mission. NATRACOM, in concert with the installation's mission, is focused on the student aviators.

NAS Whiting Field's mission extends off station and into the surrounding communities. Student aviators, civil servants, and DOD contractors are all integral parts of the Milton community. Community outreach opportunities include several programs encompassing a footprint that spans across the entire northwest Florida panhandle and Alabama. Examples of these outreach opportunities include Starbase Atlantis, a program designed to increase interest in and knowledge of science, technology, engineering, and math (STEM) in local youth, Adopt-A-Highway program, Adopt-A-School program, numerous veteran support programs, and countless other community outreach programs.

2.3 INSTALLATION ACTIVITIES

NATRACOM Mission

"The Mission of NATRACOM is to train the world's finest combat quality aviation professionals, delivering them at the right time, in the right numbers, and at the right cost to the Joint Forces for tasking in the Global War on Terrorism."

The largest tenant at NAS Whiting Field is TRAWING FIVE. Other major tenants include a Naval Training Meteorology and Oceanography Detachment and an Aviation Technical Training Detachment. NAS Whiting Field also hosts installation-level support, such as Air Operations, Command, and Staff services. A brief description of each is provided below.

2.3.1 TRAINING AIR WING FIVE

TRAWING FIVE's primary mission is to administer and coordinate training for SNAs and allied nation flight students. The Wing also provides liaison between their assigned squadrons and CNATRA.

NAS Whiting Field is home to TRAWING FIVE and is the premier location for primary/intermediate pilot training and intermediate/advanced rotary-wing pilot training. TRAWING FIVE is comprised of three primary fixed-wing and three advanced helicopter squadrons training Navy, Marine Corps, Coast Guard, and allied nation aviators. TRAWING FIVE's primary mission is to administer and coordinate training for Student Naval Aviators (SNAs) and allied nation flight students. TRAWING FIVE also provides liaison between their assigned squadrons and CNATRA.

Primary SNA training is conducted at NAS Whiting Field and NAS Corpus Christi. Following primary training, SNAs attend intermediate training. Intermediate training locations are dependent upon the type of aircraft frame a SNA has been selected to fly: Maritime (multi-engine prop), E-2/C-2, Rotary (helicopters), Strike (jets), and the E-6 TACAMO. Intermediate training locations include NAS Corpus Christi, Vance AFB, NAS Kingsville (Texas), NAS Meridian (Mississippi), and NAS Whiting Field. Upon completion of intermediate training, SNAs are awarded their *Wings Of Gold* and become Naval Aviators. This training pipeline is depicted in Figure 2-2.

Primary flight instruction provides a combination of actual and simulated flight experiences. With the exception of solo flights, all actual flights of the T-6B are conducted under the experienced eye of an instructor pilot, a designated military aviator. The TRAWING FIVE staff is primarily responsible for implementing the CNATRA-approved flight and academic syllabus and monitoring aircraft maintenance activities. The Academic Training Department of TRAWING FIVE provides the foundation of knowledge upon which all simulator and aircraft instruction is based. The integrated syllabus consists of cockpit procedure training and various flight support courses that include course rules, aircrew coordination, emergency procedures, safety, bailout, preflight inspection, safe for solo, formation, basic instruments, radio instruments, night familiarization, wheels watch, and precision landing and aerobatics.

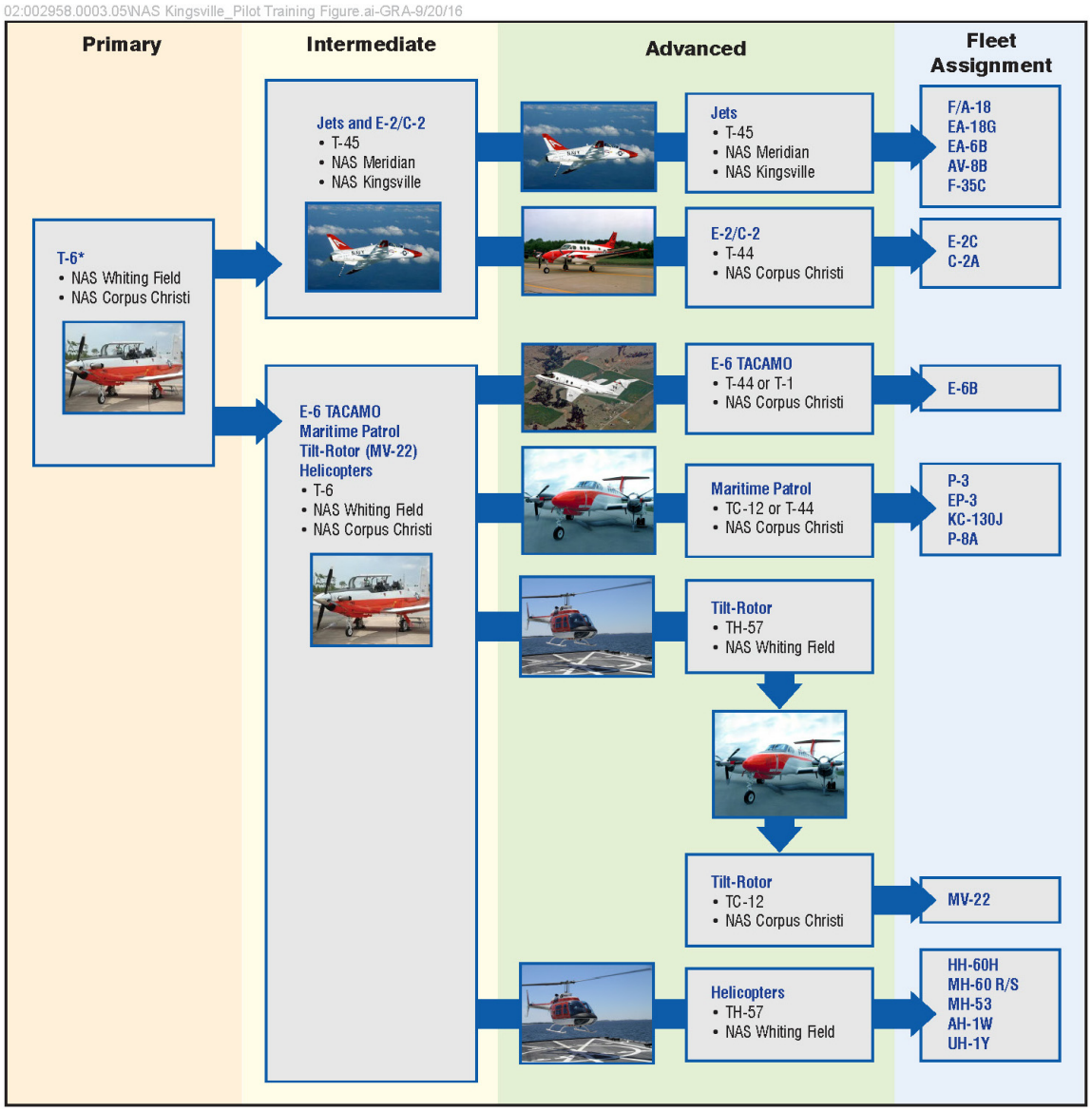


Figure 2-2 Student Naval Aviators Training Pipeline







Within TRAWING FIVE there are three fixed-wing training squadrons, three rotary-wing training squadrons, two instructor training units (ITUs), and one reserve unit, as described below.

FIXED-WING TRAINING SQUADRONS (VTS)

- ☐ **Training Squadron Two (VT-2) "DOERBIRDS."** Training Squadron Two (VT-2) is the Navy's oldest primary training squadron and has trained more than 19,000 students since it was commissioned in 1960. VT-2's mission is to provide primary and intermediate stage flight training to selected student aviators of the Navy, Marine Corps, Coast Guard, and several allied nations.

- ☐ **Training Squadron Three (VT-3) "RED KNIGHTS."** The Red Knights provide training to student aviators from the Navy, Marine Corps, Coast Guard, and several allied nations with emphasis on day and night piloting familiarization, precision aerobatics, instruments, and formation flying. The Red Knights were the Navy's first joint primary flight training squadron, both for instructors and students. VT-3, a Navy squadron, alternates between Navy and Air Force commanding officers.

- ☐ **Training Squadron Six (VT-6) "SHOOTERS."** VT-6, commissioned in 1960, was the Navy's third primary training squadron and, today, provides primary and intermediate flight training to student aviators of the Navy, Marine Corps, Coast Guard, and several allied nations. Similar to VT-3's rotating leadership schedule, VT-6 alternates between Navy and Marine Corps commanding officers.

HELICOPTER TRAINING SQUADRONS (HTS)







Student pilots selected for helicopter training report to NAS Whiting Field and complete advanced training in the TH-57 "Sea Ranger." Helicopter students learn the unique characteristics and tactics of rotary-wing aviation. The Navy also trains helicopter pilots for the Coast Guard and several allied nations.

- ☐ Helicopter Training Squadron Eight (HT-8) "EIGHT BALLERS." HT-8, the Navy's oldest helicopter squadron, was established in 1950 and provides primary and advanced helicopter flight instruction to all Navy, Marine Corps, and Coast Guard helicopter flight students as well as students from several allied nations. Students who successfully complete the program earn their *Wings of Gold*. In 1972, the squadron split to form HT-18.

- ☐ Helicopter Training Squadron Eighteen (HT-18) "VIGILANT EAGLES." HT-18's primary mission is to transition student aviators through basic and advanced rotary-wing pilot training. The squadron provides training for Navy, Marine Corps, Coast Guard student aviators, as well as students from several allied nations. In addition, HT-18 provides refresher and transition training to fleet aviators, and indoctrination flights for mid-shipmen and flight surgeons.

- ☐ Helicopter Training Squadron Twenty Eight (HT-28) "HELLIONS." HT-28 was established in 2007, and its primary mission is to transition student aviators through basic and advanced rotary-wing pilot training. HT-18 provides instruction to Navy, Marine Corps, and Coast Guard helicopter flight students as well as students from several allied nations. Students who successfully complete the program earn their *Wings of Gold*.

OTHER ELEMENTS OF TRAWING FIVE

- ☐ Instructor Training Units (ITUs). The primary mission of ITUs is to train top-quality instructor pilots for the squadrons. There are two ITUs on station: one helicopter ITU (HITU), and one fixed-wing ITU (FITU).

- ☐ Reserve Unit. One Reserve Unit augments TRAWING FIVE's squadrons.

2.3.2 MAJOR TENANT

NAS Whiting Field hosts several other training programs, including the Center for Aviation Technical Training Detachment

CENTER FOR AVIATION TECHNICAL TRAINING DETACHMENT

This detachment is comprised of three Military Training Units (MTUs) encompassing eight courses ranging from 3 to 20 weeks in length. These MTUs are specifically designed training courses for both Navy and Marine Corps personnel and provide students with the tools, experience, and knowledge to effectively perform their duties as military technicians and officers. These MTUs include:

- ☐ MTU-6001: Unmanned Aerial Vehicle (UAV) mechanical and technical courses;
- ☐ MTU-6005: Ordnance University; and
- ☐ MTU-6010: Naval Aviation Maintenance Program Indoctrination and Management courses.

2.3.3 OTHER ACTIVITIES

Air Ops is an integral component to operations at the NAS Whiting Field Complex and this AICUZ Study because historic knowledge, current operations and statistics, and future projections all fall under the responsibility of this department.

NAS Whiting Field operates much like a small town and provides a variety of services required to operate and maintain a military installation. Support services include housing, dining facilities, a commissary and Navy exchange, a gas station, a credit union, postal services, and religious programs, as well as countless morale, welfare, and recreation (MWR) services.

In addition, Command and Staff Services addresses business-related matters for military personnel, civilian employees, and tenants, while Air Operations is the hub of activity for NAS Whiting Field.

The Air Operations Department (AOD) provides air traffic control (ATC) personnel, ground electronics personnel, and Fire Department personnel for the NAS Whiting Field Complex. Commonly called "Air Ops," this department responsible for the daily coordination and safety of all aircraft and operations onboard NAS Whiting Field and at the affiliated NOLFs. Air Ops is

the overarching term to describe aircraft operations, the coordination of flights, the availability of airspace and airfields, the maintenance of airport facilities and services, safety of aviators and the public, and the liaison between the installation and the surrounding community. A majority of historic knowledge, current operations, statistics, and future projections are the responsibility of Air Ops and, as such, this department is an integral component to operations at the NAS Whiting Field Complex.

2.4 AIRSPACE

Airspace Classifications

Class C	NAS Whiting Field Airfields (North and South)
Class D	NOLF Choctaw
Class E	All other NOLFs within the NAS Whiting Field Complex

The use of airspace over NAS Whiting Field is dictated by the FAA National Airspace System. This system is designed to ensure the safe, orderly, and efficient flow of commercial, private, and military aircraft. NAS Whiting Field is located in the airspace assigned to FAA's Jacksonville Center. Aircraft using this airspace operate under either Visual Flight Rules (VFR) (i.e., operating an aircraft when the weather is clear and landmarks on the ground may be used to assist with navigation) or Instrument Flight Rules (IFR) (operating when an aircraft must rely on instrumentation to ensure safety of flight either due to weather conditions, nearby operations, or training parameters). Aircraft operating under VFR must contact Pensacola Approach prior to entering the Class C or Class D airspace for radar services and sequencing over the appropriate VFR entry points. All VFR departures must have clearance to depart.

There are four basic types of airspace that are used within the NAS Whiting Field Complex:

- Controlled airspace, designated Class A through Class E, is a generic term that covers the different classifications of airspace and defined dimensions within which ATC service is provided in accordance with the airspace classification. NAS Whiting Field North and South airfields are considered Class C airspace. NOLF Choctaw is considered Class D airspace, and the remaining NOLFs are considered Class E airspace. General descriptions of these airspace classifications are shown in Figure 2-3, with local details shown in Figure 2-4 (both provided at the conclusion of Section 2.4). Text descriptions are provided in Sections 2.4.1 through 2.4.3.

- **Uncontrolled airspace** is the portion of the airspace not designated as Class A through Class E, and where ATC has no authority or responsibility to control air traffic (FAA 2008).

- **Special use airspace** (SUA) is the designation of airspace in which certain activities must be confined, or where limitations may be imposed on aircraft operations that are not part of those activities. Certain SUA areas can create limitations on the mixed used of airspace. Additional detail is provided below in Section 2.4.4.

- "**Other airspace areas**" is a general term referring to the majority of remaining airspace and includes local airport advisories, military training routes, temporary flight restrictions, parachute jump aircraft operations, published VFR routes, terminal radar service areas, and national security areas (FAA 2008).

2.4.1 CLASS C AIRSPACE

Class C airspace is generally airspace from the surface to 4,000 feet above the airport elevation (charted in mean sea level [MSL]) and surrounds those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a surface area with a 5-nautical-mile (NM) radius, an outer circle with a 10-NM radius that extends from 1,200 to 4,000 feet above the airport elevation, and an outer area. Each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and, thereafter, maintain those communications while within the airspace. Class C airspace surrounds NAS Whiting Field and other nearby airfields (i.e., NAS Pensacola) as a complex.



2.4.2 CLASS D AIRSPACE

Class D airspace is generally airspace from the surface to 2,500 feet above the airport elevation surrounding those airports that have an operations tower. Unless otherwise authorized, each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and, thereafter, maintain those communications while within the airspace. Class D airspace surrounds NOLF Choctaw.

2.4.3 CLASS E AIRSPACE

Class E airspace is the controlled airspace that is not classified as A through D, and extends upward from either the surface or a designated altitude to the overlying or adjacent airspace. Class E airspace surrounds NOLF Brewton as part of the Brewton Municipal Airport in Brewton, Alabama, and NOLF Evergreen as part of Middleton Field in Conecuh County, Alabama.

2.4.4 SPECIAL USE AIRSPACE

The term "special use airspace" (or SUA) is used to describe airspace where unique, special, or protected activities take place where pilots must exercise caution or avoid completely. SUA includes:

- ☐ Prohibited Areas: Airspace of defined dimensions within which the flight of aircraft is prohibited.
- ☐ Restricted Areas: Areas where operations are hazardous to nonparticipating aircraft and contain airspace within which flight, while not wholly prohibited, is subject to restrictions.
- ☐ Warning Areas: Airspace of defined dimensions, extending from 12 NM outward from the coast of the United States, containing activity that may be hazardous to nonparticipating aircraft. These areas may contain a wide variety of aircraft and on-aircraft activities, such as aerial gunnery, bombing, aircraft carrier operations, surface and subsurface operations, naval gunfire, and missile shoots.

- ☐ Military Operations Areas (MOAs): Airspace with defined vertical and lateral limits established for separating certain military training activities from IFR traffic.
- ☐ Alert Areas: Areas that may contain a high volume of pilot training or an unusual type of aerial activity.
- ☐ Controlled Firing Areas (CFAs): Areas that contain activities, which, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft.

The NAS Whiting Field Complex has limited airspace to fulfill its mission. NAS Whiting Field's operational areas include both controlled airspace and SUA. NAS Whiting Field North and South Field and NOLF Choctaw are tower controlled fields. The remaining airfields included in the NAS Whiting Field Complex fall within SUA. SUA in the region includes Alert Areas, MOAs, Restricted Areas, and Warning Areas (Figure 2-5). NAS Whiting Field's SUAs provide flexibility for operations and include the following:

- ☐ Alert Area A-292: Located north and west of NAS Whiting Field.
- ☐ Pensacola North and South MOA: Located over NAS Pensacola and north of NAS Whiting Field.

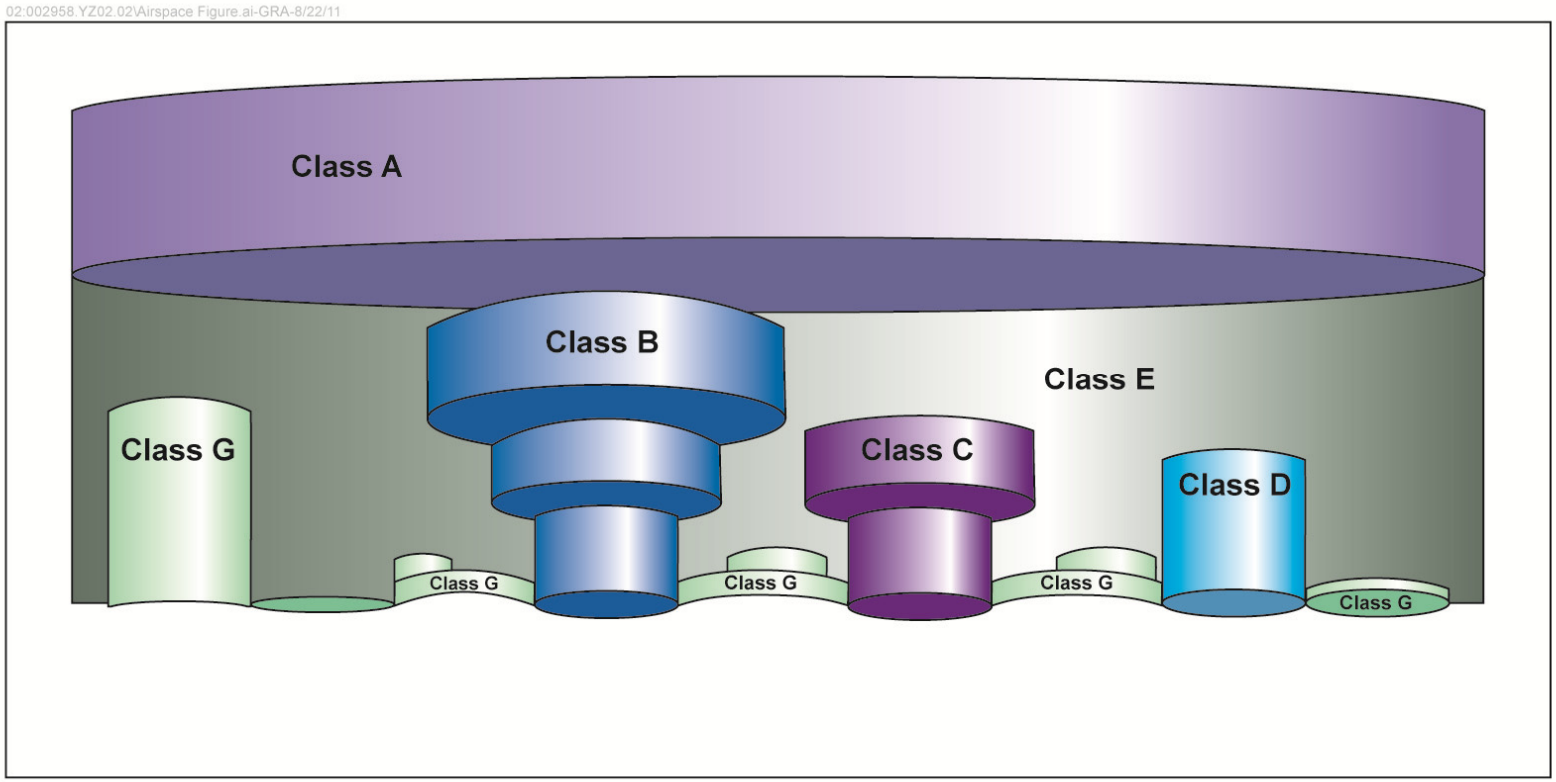
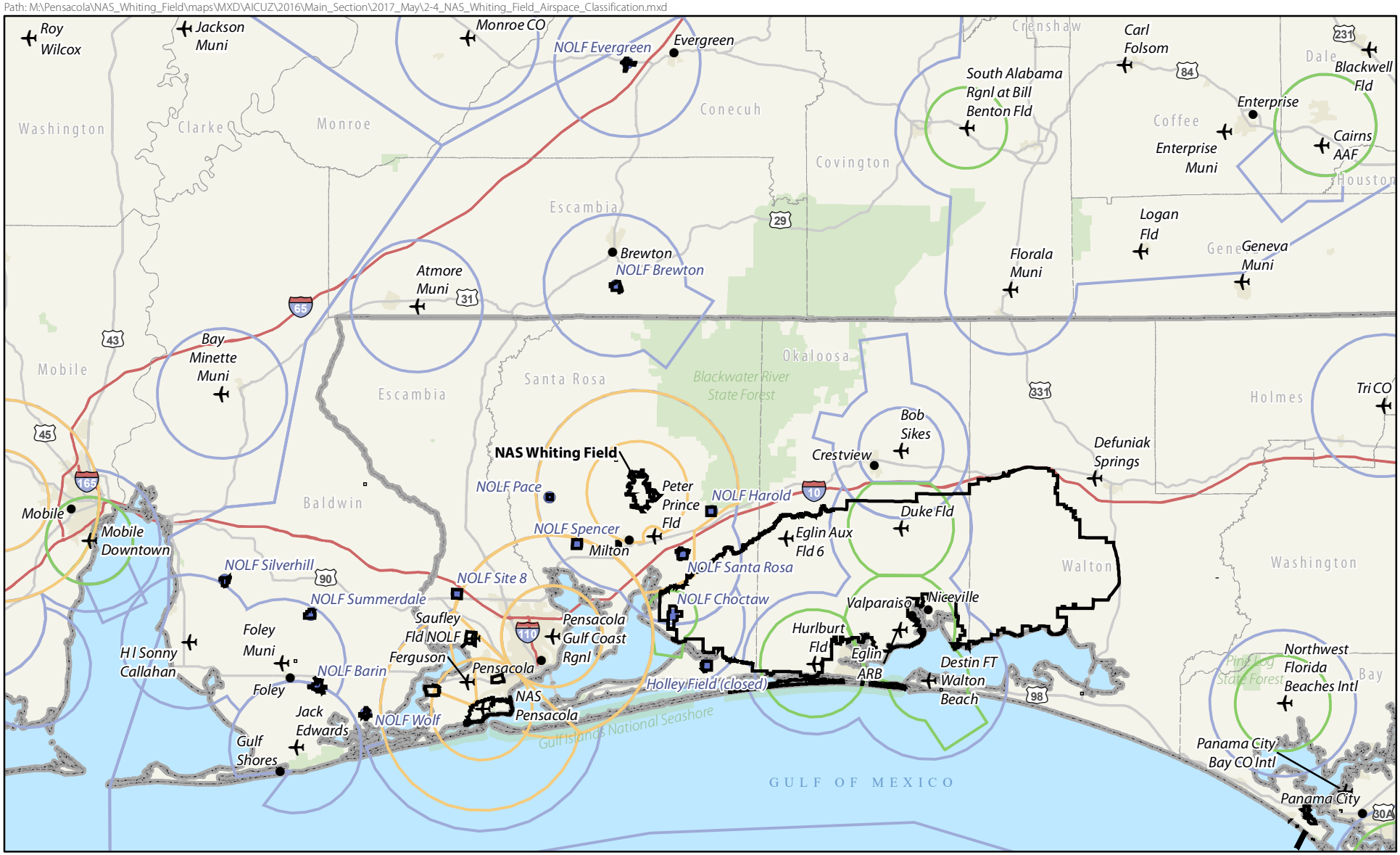


Figure 2-3 Airspace Classifications, General

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_May\2-4_NAS_Whiting_Field_Airspace_Classification.mxd



SCALE

0 5 10 Miles

SOURCE: ESRI 2007, 2012; Ecology and Environment, Inc. 2015; NAVFAC 2015.

Legend

- NOLF Location
- City
- Interstate
- U.S. Highway
- Airport/Airfield
- County Boundary
- State Boundary
- Military Installation
- Park
- Urban Area
- Class C Airspace
- Class D Airspace
- Class E Airspace

Note - Holley Field is closed.

Figure 2-4
Airspace Classification,
NAS Whiting Field Complex
Santa Rosa County, Florida

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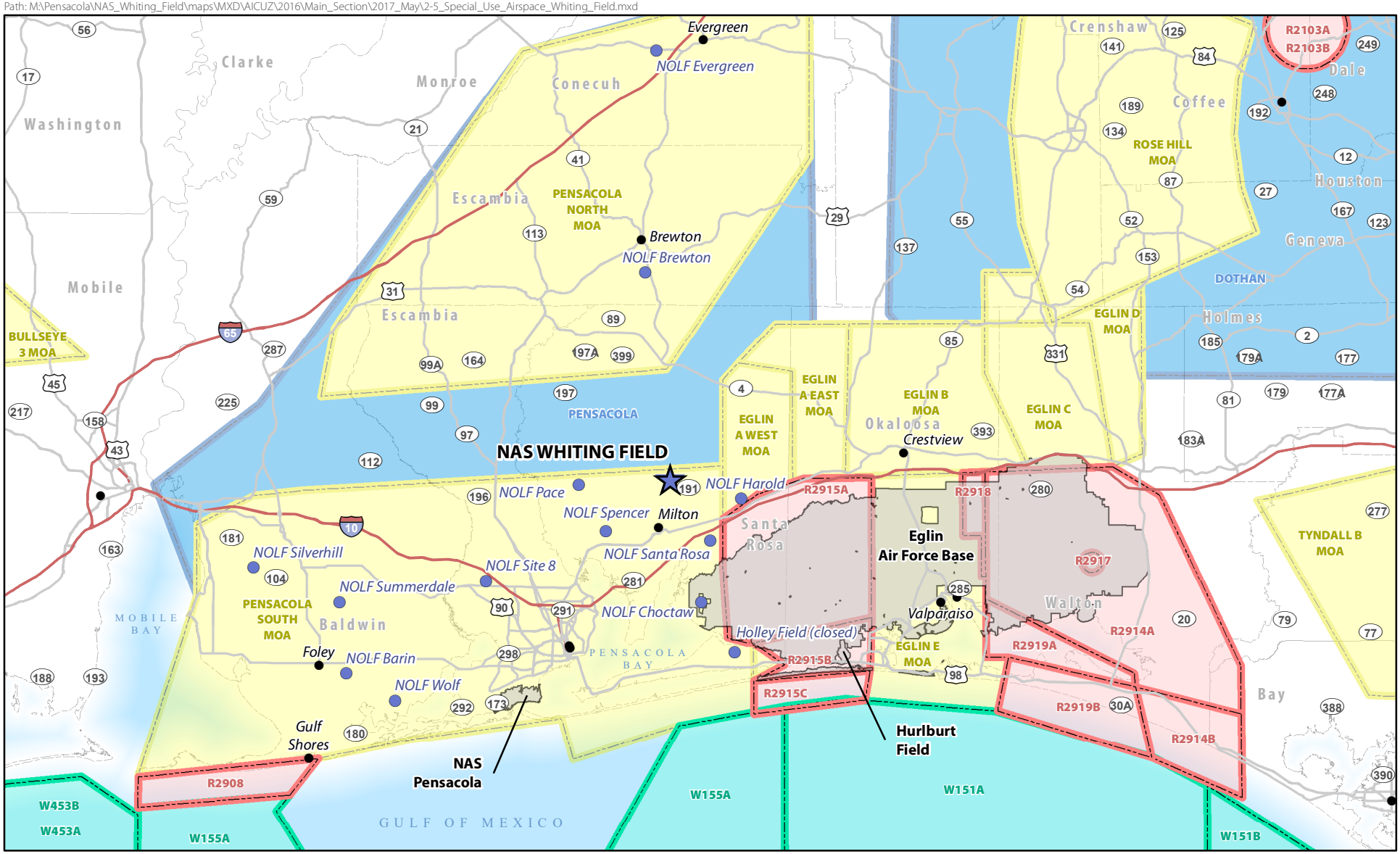

SCALE

0 5 10 Miles

Legend

- City
- NAS Whiting Field
- NOLF Location
- County Boundary
- Military Installation

Special Use Airspace

- Alert Area
- MOA
- Restricted Area
- Warning Area

Note - Holley Field is closed.

SOURCE: ESRI 2007, 2012; Ecology and Environment, Inc. 2015; EIMS (COP Downloaded August 11, 2014).

Figure 2-5
Special Use Airspace
NAS Whiting Field
Santa Rosa County, Florida

2.5 OPERATIONAL AREAS

The station has been a naval aviation training facility since it was commissioned in July 1943. NAS Whiting Field comprises two separate airfields—North Field and South Field. Primary and intermediate fixed-wing flight training is conducted at North Field, and helicopter and fixed-wing instrument flight training is conducted at South Field.

DOD fixed-wing runways are separated into two classes (Class A and Class B) for the purpose of AICUZ analysis and accident potential areas. Class A runways are primarily used by light aircraft and do not have the potential for intensive use by heavy or high-performance aircraft. Class B runways are primarily intended for high-performance and large, heavy aircraft. In addition, runways are classified according to the type of aircraft that operate from the runway.

Runway Classifications

Class A	NAS Whiting Field Airfields (North and South) All NOLFs within the NAS Whiting Field Complex, except NOLF Choctaw
Class B	NOLF Choctaw

Airfields at NAS Whiting Field are categorized as Class A runways. All fixed-wing NOLFs are classified as Class A runways, except for NOLF Choctaw, which is classified as a Class B runway.

Rotary-wing landing pads, also known as "helipads," do not fall into the runway classification system. Rotary-wing aircraft, however, can conduct operations on fixed-wing runways, as allowed and applicable. However, fixed-wing aircraft cannot perform operations on helipads due to airfield configurations. NAS Whiting Field rotary-wing NOLFs utilize a combination of helicopter runways, helipads, and training aids (e.g., gravel lines for line-up).

The following sections present general airfield operations area specifics, including location, runway configurations, and dimensions for each airfield evaluated in this AICUZ Study.

2.5.1 NAS WHITING FIELD MAIN STATION

NAS Whiting Field is made up of two distinct airfields, designated "North Field" and "South Field," each containing two intersecting runways (Figure 2-6). The North Field is comprised of Runways 05/23 and 14/32 and is utilized by fixed-wing aircraft. The South Field is also comprised of Runways 05/23 and 14/32 and is primarily used by rotary-wing aircraft. Six helipads are available for use at the South Field. Runways are numbered according to their magnetic heading for aircraft on approach or departure. For example, on Runway 05/23, the numbers 05 and 23 signify that this runway is most closely aligned with a compass heading of 50 and 230 degrees, respectively. All runways at NAS Whiting Field are 6,000 feet long and 200 feet wide. The NAS Whiting Field airfield elevations are 199 feet above MSL. At the Main Station, operations are conducted during acoustic daytime (7:00 a.m. to 10:00 p.m.) and acoustic nighttime hours (10:00 p.m. to 7:00 a.m.). Aircraft operating at an NOLF depart and return to the Main Station within the established operating hours of the Main Station.

Table 2-1 provides detailed information for each runway, including the normal operating hours of the airfields.

TABLE 2-1 NAS WHITING FIELD MAIN STATION AIRFIELDS

AIRFIELD	RUNWAY	LENGTH (FEET)	WIDTH (FEET)	USE	OPERATING HOURS	LOCATION	OWNERSHIP
North Field	05/23 & 14/32	6,000	200	T-6B	M-TH: 6:30 a.m. - 11:00 p.m. Fri: 7:00 a.m. - 10:00 p.m. Sat-Sun: Closed	Milton, Santa Rosa County, FL	Navy
South Field	05/23 & 14/32	6,000	200	TH-57	M-TH: 7:00 a.m. - 11:00 p.m. Fri: 7:00 a.m. - 10:00 p.m. Sat: Closed Sun: 4:00 p.m. - 8:00 p.m. (Operating hours vary in the summer months)	Milton, Santa Rosa County, FL	Navy

Note:
NAS Whiting Field is closed on federal holidays.

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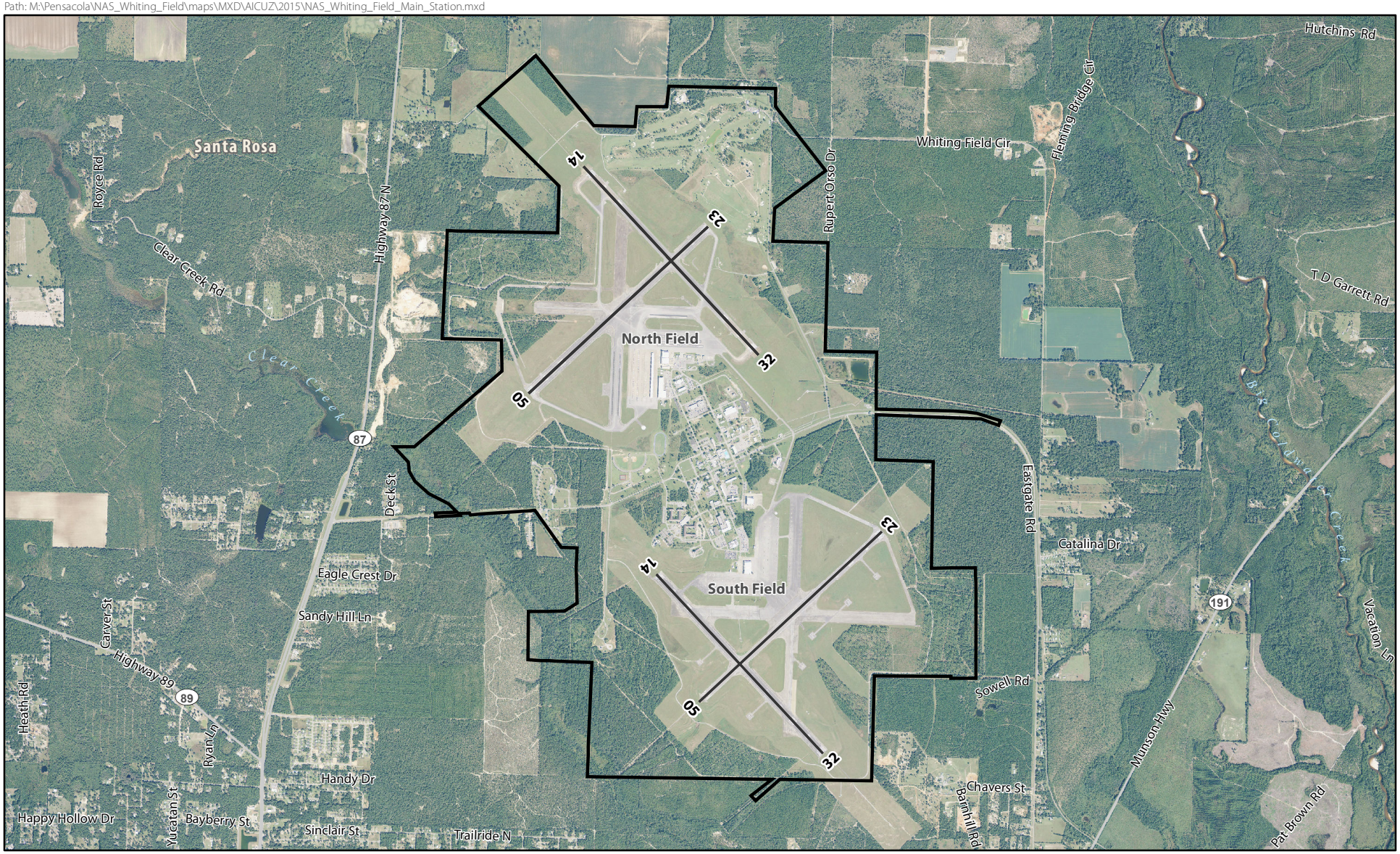
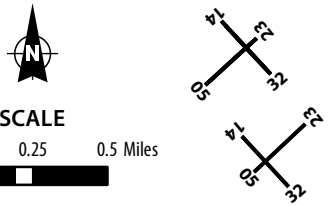




Legend

- Other Major Road
- Runway
- NAS Whiting Field Boundary

Figure 2-6
NAS Whiting Field
Main Station
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

2.5.2 NAVY OUTLYING LANDING FIELDS

NOLFs are properties that are airfields, runways, or landing areas located within the region of an affiliated active naval air station. The NAS Whiting Field Complex includes 12 NOLFs located in Santa Rosa and Escambia counties in Florida and Baldwin, Conecuh, and Escambia counties in Alabama. Ten of the NOLFs affiliated with NAS Whiting Field are owned by the Navy, and two are owned by municipalities. These NOLFs are used for fixed-wing and rotary-wing pilot training. NOLF Holley (referred to as Holley Field) was closed as an aviation asset in early 2016 and, therefore, is not analyzed in this AICUZ Study.

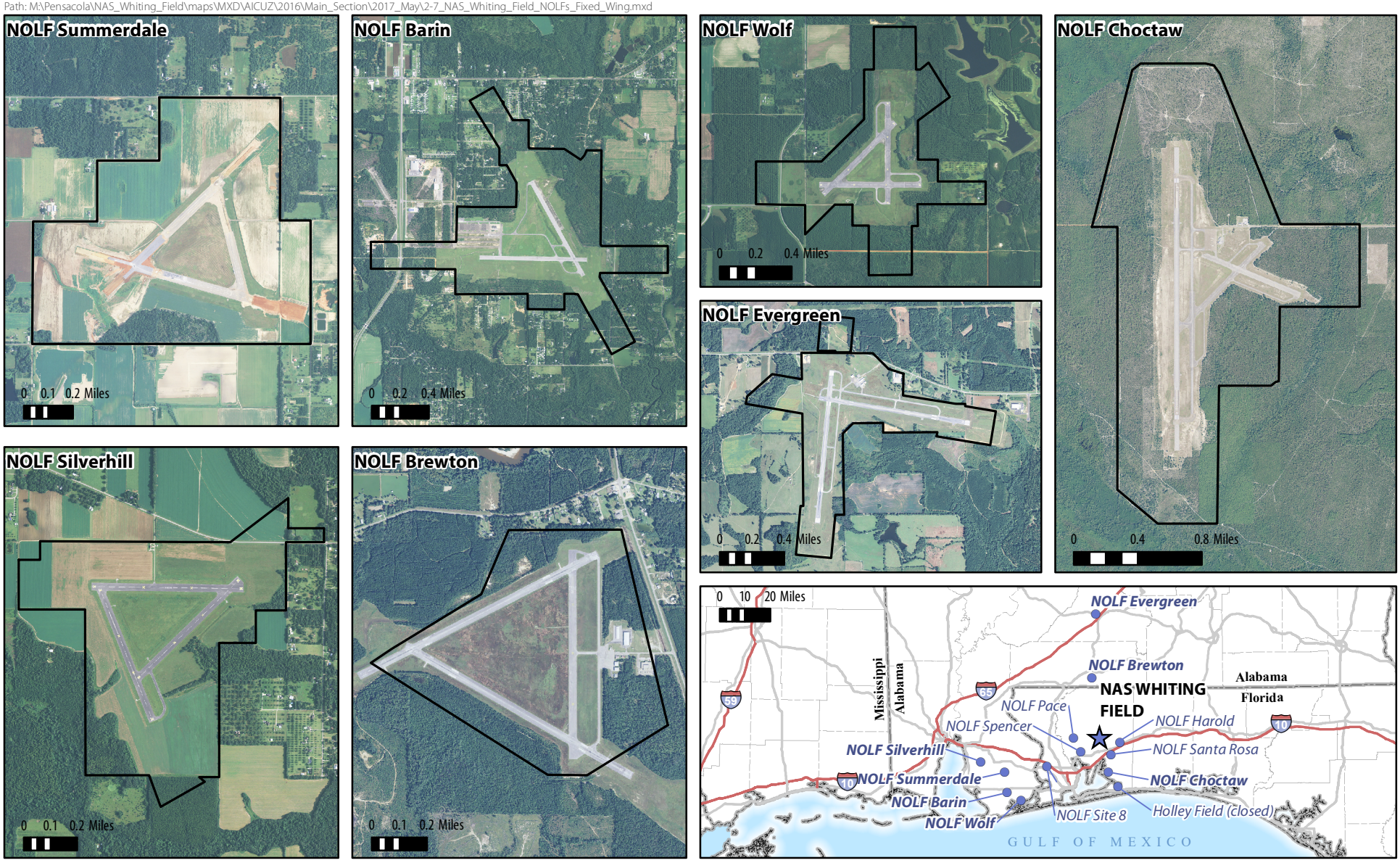
NOLFs are typically used for training, practice, or other routine operations. Aircraft are not stationed, parked overnight, or maintained at NOLFs.

NOLFs are typically used for training, practice, or other routine operations where aircraft will perform touch-and-go's, low approaches, or other operations that require the aircraft to remain in the area for a short period of time. Aircraft are not stationed or parked overnight at an NOLF, nor are routine maintenance activities conducted at an NOLF. The NOLFs used by NAS Whiting Field each serve a specific training purpose for either fixed-wing or rotary-wing aircraft. The fixed-wing NOLFs are primarily used by T-6s and can occasionally be used by the TH-57s; however, the rotary-wing NOLFs are only used by the TH-57s due to airfield configuration. The fixed-wing training conducted at NAS Whiting Field Main Station and associated NOLFs includes both solo and dual flights. The T-6 requires a minimum safe runway length of 4,000 feet for dual operations (in which an instructor pilot is onboard the aircraft with the student pilot) and 5,000 feet in solo operations (when a student pilot flies alone) (Navy 2011).

NAS Whiting Field is responsible for providing crash and rescue services, referred to as Military Crash Crews, or more commonly as Crash Crews, at the Main Station and affiliated NOLFs. The Gulf Coast Regional Fire Department is located onboard NAS Whiting Field, and Military Crash Crews are deployed for support of the NAS Whiting Field Complex. NAS Pensacola provides Military Crash Crew services for NOLF Choctaw.

Locations for fixed-wing NOLFs are shown on Figure 2-7 and locations for rotary-wing NOLFs are shown on Figure 2-8. The NOLFs are summarized in Table 2-2 and discussed in greater detail in the subsections below.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_May\2-7_NAS_Whiting_Field_NOLFs_Fixed_Wing.mxd



Legend

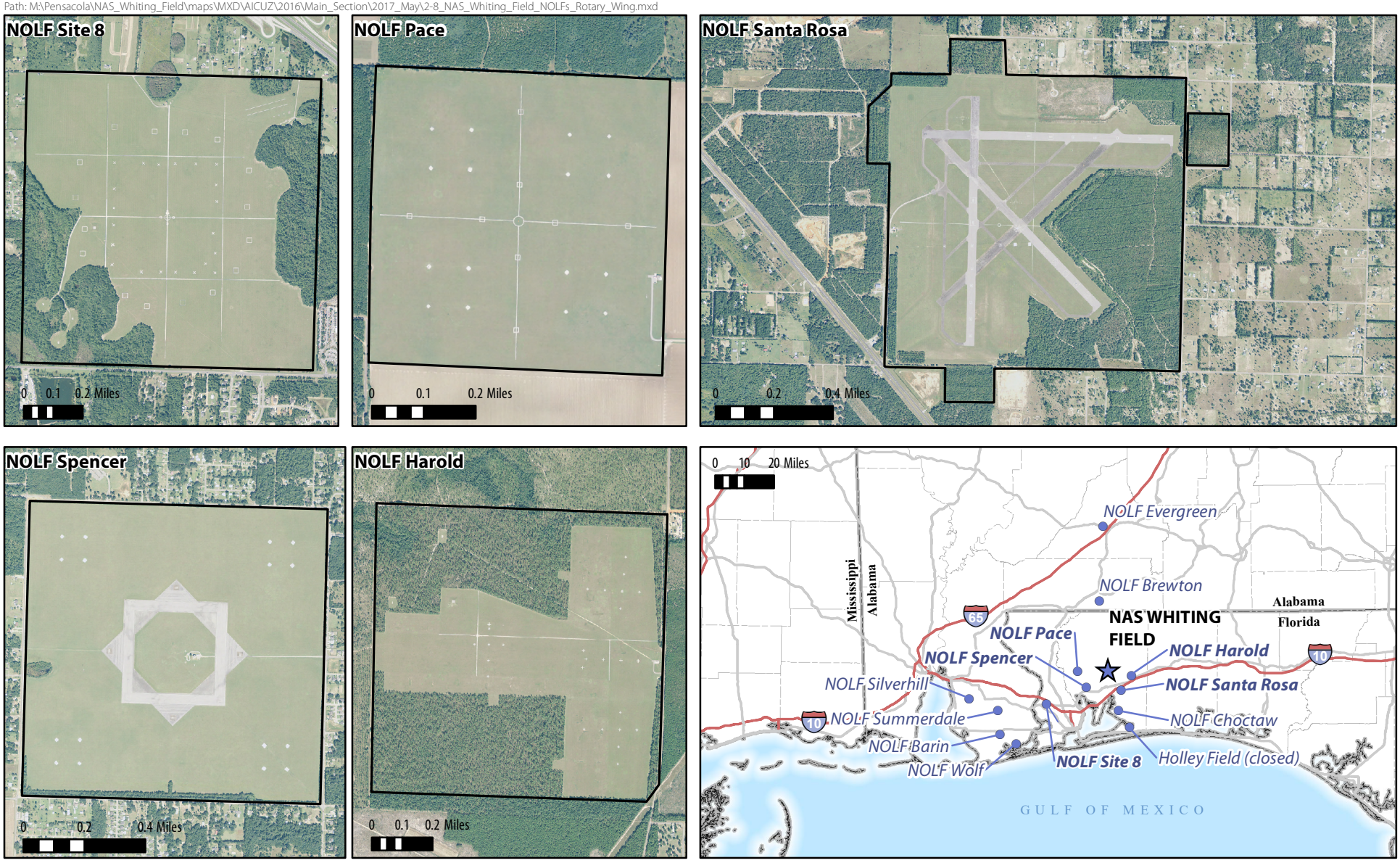
- NAS Whiting Field
- NOLF Location
- Interstate Highway
- US Highway
- State Boundary
- County Boundary
- OLF Boundary

Note - Holley Field is closed.

SOURCE: ESRI 2007, 2012; Ecology and Environment, Inc. 2015; NAIP 2013.

Figure 2-7
NAS Whiting Field
Fixed-Wing NOLFs
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_May\2-8_NAS_Whiting_Field_NOLFs_Rotary_Wing.mxd



Legend

- NAS Whiting Field
- NOLF Location
- Interstate Highway
- US Highway
- State Boundary
- County Boundary
- OLF Boundary

Note - Holley Field is closed.

SOURCE: ESRI 2007, 2012; Ecology and Environment, Inc. 2015; NAIP 2013.

Figure 2-8
NAS Whiting Field
Rotary-Wing NOLFs
Santa Rosa County, Florida

TABLE 2-2 NAS WHITING FIELD NOLF AIRFIELDS

NOLF	RUNWAY/ TRAINING AIDS	LENGTH (FEET)	WIDTH (FEET)	PROPOSED USE	DISTANCE FROM NAS WF	LOCATION (COUNTY)	OWNERSHIP
Fixed-Wing NOLFs							
Evergreen	01/19, 10/28	5,000 and 5,000	150	T-6, solo	42 mi North	Conecuh, AL	City of Evergreen
Brewton	06/24, 12/30	5,000 and 5,135	150	T-6, solo	20 mi North	Escambia, AL	City of Brewton
Silverhill	05/23, 09/27, 16/34 (closed)	2,851, 3,115, 2,799	150	T-6, low approaches only	42 mi West-Southwest	Baldwin, AL	Navy
Summerdale	05/23, 11/29	4,000	150	T-6, dual	35 mi Southwest	Baldwin, AL	Navy
Barin	09/27, 15/33	5,000	150	T-6, solo	37 mi Southwest	Baldwin, AL	Navy
Wolf	04/22, 09/27, 18/36	3,000	150	T-6, low approaches only	40 mi Southwest	Baldwin, AL	Navy
Choctaw	18/36	8,000	150	F-35, T-6 & TH-57	14 mi Southeast	Santa Rosa, FL on Eglin AFB	Navy
Rotary-Wing NOLFs							
Site 8	Training Aids	n/a	n/a	TH-57	22 mi Southwest	Escambia, FL	Navy
Pace	Training Aids	n/a	n/a	TH-57	9 mi West	Santa Rosa, FL	Navy
Spencer	Training Aids	n/a	n/a	TH-57	9 mi Southwest	Santa Rosa, FL	Navy
Harold	Training Aids	n/a	n/a	TH-57	9 mi East	Santa Rosa, FL	Navy
Santa Rosa	Training Aids	n/a	n/a	TH-57	7 mi Southeast	Santa Rosa, FL	Navy

Note: Airfield descriptions represent projected CY2025 conditions.

ALABAMA NAVY OUTLYING LANDING FIELDS

The NAS Whiting Field Complex includes six fixed-wing NOLFs in the state of Alabama in Conecuh, Escambia, and Baldwin counties. Two NOLFs are located north of NAS Whiting Field and the remaining NOLFs are located in south Baldwin County. The NOLFs located in Baldwin County have been recently evaluated for runway extensions to accommodate T-6 operational requirements. For the purposes of this AICUZ Study, the preferred alternatives stated in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011) are assumed to be the future operational areas used by NAS Whiting Field.



NOLF EVERGREEN (CONECUH COUNTY)

Located in Conecuh County and approximately 42 miles north of NAS Whiting Field, NOLF Evergreen is also known as Middleton Field of Evergreen, Alabama. Middleton Field is a general aviation airport and is owned by the City of Evergreen, Alabama, with an airfield elevation of 258 feet MSL. NOLF Evergreen is a fixed-wing training airfield and both runways (01/19 and 10/28) were extended to 5,000 feet and can now accommodate T-6 solo operations.



NOLF BREWTON (ESCAMBIA COUNTY)

Located in Escambia County and approximately 20 miles north of NAS Whiting Field, NOLF Brewton is a primary fixed-wing training airfield. NOLF Brewton is owned by the City of Brewton and serves as the municipal airport for city, with naval flight operations conducted under a lease agreement. Airport facilities are shared by the City of Brewton and NAS Whiting Field personnel, including Crash Crews. Only two of the three runways are operational for Navy use, and both meet the operational requirements to accommodate T-6 solo operations.

NOLF SILVERHILL (BALDWIN COUNTY)



Located in Baldwin County and approximately 42 miles west-southwest of NAS Whiting Field, NOLF Silverhill is currently inactive. The airfield, previously used for fixed-wing pilot training, is owned and operated by the Navy. This 400-acre airfield has an elevation of 129 feet MSL. Existing runways (which are no longer in use) were adequate to accommodate T-34 training operations; however, these runways do not meet the operational requirements of the T-6 aircraft. NOLF Silverhill, along with the other three Baldwin County NOLFs, was evaluated in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011). NOLF Silverhill was determined to be one of two airfields that could be modified to accommodate T-6 operations. However, this NOLF was not selected as the preferred alternative for runway extension, as NAS Whiting Field determined that the runways are not expandable for T-6 operations.

NOLF SUMMERDALE (BALDWIN COUNTY)



Located in Baldwin County and approximately 35 miles southwest of NAS Whiting Field, NOLF Summerdale is used for fixed-wing pilot training. The airfield is owned by the Navy and is 565-acres in size, with an elevation of 149 feet MSL. There were three runways at NOLF Summerdale, none of which were long enough to accommodate T-6 operations. NOLF Summerdale was one of the preferred alternatives in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011), and was evaluated for runway expansion. This airfield was selected as the preferred alternative for runway extension. Runways 05/23 and 11/29 were extended to 4,000 feet each to accommodate T-6 dual operations. NOLF Summerdale's runways were renumbered from 04/22 and 10/28 to 05/23 and 11/29, respectively, after a recent magnetic calibration evaluation. The magnetic calibration evaluation occurred after data gathering and map preparation for this AICUZ Study; therefore, NOLF Summerdale's runway numbering in the figures presented in this AICUZ Study align with pre-evaluation numbering.

NOLF BARIN (BALDWIN COUNTY)



Located in Baldwin County and approximately 37 miles south of NAS Whiting Field, NOLF Barin is used for fixed-wing pilot training. The airfield is owned by the Navy, is 810-acres in size, and has an elevation of 54 feet MSL. There are two 4,000-foot runways at NOLF Barin, both of which are long enough to accommodate T-6 dual operations. In addition, the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011) evaluated NOLF Barin as one of the preferred alternatives for runway expansion. Runway 15/33 and Runway 09/27 at NOLF Barin have been extended to 5,000 feet to accommodate T-6 solo operations.

NOLF WOLF (BALDWIN COUNTY)



Located in Baldwin County and approximately 40 miles south of NAS Whiting Field, NOLF Wolf is currently inactive. The airfield is owned by the Navy, is 422-acres in size, and has an elevation of 61 feet MSL. There are two 3,000-foot runways at NOLF Wolf, neither of which are long enough to accommodate T-6 operations. NOLF Wolf was not selected as a preferred alternative for runway extension in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January (Navy 2011).

FLORIDA NAVY OUTLYING LANDING FIELDS

Six NOLFs affiliated with the NAS Whiting Field Complex are located in northwest Florida, spanning from the western state line to the western boundary of Eglin AFB. All are within Santa Rosa or Escambia County. Five NOLFs are helicopter-only, one will be primarily used by the JSFs from Eglin AFB.

NOLF CHOCTAW (SANTA ROSA COUNTY)



Located in Santa Rosa County and within the boundary of Eglin AFB, NOLF Choctaw is located approximately 14 miles southeast of NAS Whiting Field at an elevation of 111 feet MSL. NOLF Choctaw is used for both fixed-wing and rotary-wing/helicopter training operations and authorized for night operations. NOLF Choctaw is a tower-controlled airfield that is operated and maintained by the Navy. NOLF Choctaw has a control tower and facilities to house Crash Crews and Airfield Services personnel. The airfield is used by the Navy, Air Force, Special Operations, Alabama National Guard, and others for pilot training and ground maneuvers. The Integrated Training Center at Eglin AFB is home to pilot and maintainer training for all three variants of the F-35 Lightning II. This NOLF is expected to serve as a primary outlying landing field (OLF) for use by Eglin AFB's F-35 squadrons (USAF 2008) during daytime and acoustic nighttime hours (10:00 p.m. to 7:00 a.m.).

NOLF SITE 8 (ESCAMBIA COUNTY)

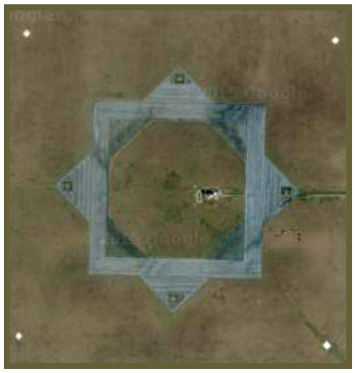


Located in Escambia County, approximately 22 miles southwest of NAS Whiting Field and just south of Interstate 10, NOLF Site 8 is a rotary-wing/helicopter training NOLF. Located on 640-acres at an elevation of 159 feet MSL, NOLF Site 8 is owned and operated by the Navy. NOLF Site 8 is predominantly grass and has limited facilities that house Crash Crews and refueling operations. This NOLF serves a refueling location for the western training area of the NAS Whiting Field Complex. While the majority of operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.), there are some NVG operations conducted during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.).



NOLF PACE (SANTA ROSA COUNTY)

Located in Santa Rosa County and approximately 9 miles west of NAS Whiting Field, NOLF Pace is a primary rotary-wing/helicopter training NOLF. The airfield is owned and operated by the Navy and is 207 acres in size. The entire NOLF is grass with no paved helipads or runways. The elevation at NOLF Pace is 204 feet MSL. The airfield is divided by a gravel centerline into two identical sides where a maximum of eight aircraft can operate at one time. There is one small structure located at the airfield that is used by the Crash Crew and for crew change.



NOLF SPENCER (SANTA ROSA COUNTY)

Located in Santa Rosa County and approximately 9 miles southwest of NAS Whiting Field, NOLF Spencer is a primary rotary-wing/helicopter training NOLF and the busiest airfield in the NAS Whiting Field Complex. The airfield is owned and operated by the Navy and is 640 acres in size. The airfield elevation is 151 feet MSL. The NOLF is predominantly grass with a diamond shaped paved training aid the in the center of the airfield. The interior of the training aid is called the "infield." Located in the infield are two refueling pads, a refueling facility, and a crew change area. A maximum of 14 aircraft are allowed to operate at one time at this NOLF.



NOLF HAROLD (SANTA ROSA COUNTY)

Located in Santa Rosa County and approximately 9 miles east of NAS Whiting, NOLF Harold is a rotary-wing/helicopter training NOLF. The airfield is owned and operated by the Navy, is 573 acres in size, and has an elevation of 159 feet MSL. The NOLF is grass with no paved runways or helipads. There is one small structure located at the airfield that is used by Crash Crews and for crew change. A maximum of 11 aircraft may operate at NOLF Harold during daytime operations and four aircraft can conduct operations during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.). A majority of operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.). In addition, some night vision goggle (NVG) operations take place during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.).

NOLF SANTA ROSA (SANTA ROSA COUNTY)



Located in Santa Rosa County, approximately 7 miles southeast of NAS Whiting Field and 1 mile south of Interstate 10, NOLF Santa Rosa is a rotary-wing/helicopter training NOLF and has both daytime and nighttime operations. NOLF Santa Rosa is the second busiest airfield in the NAS Whiting Field Complex. The airfield is owned and operated by the Navy, is 737 acres in size, and has an elevation of 150 feet MSL. Formerly used for fixed-wing operations, there are four paved runways/pads that are used as helicopter training aids. A maximum of 12 aircraft may operate at NOLF Santa Rosa during daytime operations and six aircraft can conduct operations during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.). Projected CY2025 operations are 274,225. While the majority of operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.), there are some NVG operations conducted during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.).

OTHER REGIONAL AIRFIELDS

NAS Pensacola is located approximately 30 miles south of NAS Whiting Field. NAS Pensacola, home of Sherman Field, hosts TRAWING SIX, the Navy Flight Demonstration Squadron (Blue Angels), and other non-flying tenants. The NAS Pensacola 2010 AICUZ Study provides noise and safety information associated with NAS Pensacola and its NOLF.

Eglin AFB, located 32 miles southeast of NAS Whiting Field, through the 2005 BRAC, is anticipated to conduct joint initial graduate-level pilot and maintenance training in the JSF for the Navy, Marine Corps, Air Force, and the United Kingdom. As such, there is anticipated to be approximately 59 F-35s permanently stationed at Eglin AFB. The F-35s are expected to use the regional airspace.

Hurlburt Field, located 28 miles south of NAS Whiting Field, is home to the Air Force Special Operations Command and their squadrons of fixed- and rotary-wing aircraft.

Non-DOD airfields are also prevalent in the region, including Pensacola International Airport, Northwest Florida Regional Airport, Mobile Regional Airport, and numerous other local and municipal airfields.

2.6 LOCAL ECONOMIC IMPACTS AND POPULATION GROWTH

As with many military installations, the NAS Whiting Field Complex has a positive impact on the area's economy. The NAS Whiting Field air operations mission represents a major activity that contributes to local employment and economic benefits to the City of Milton and the surrounding communities in Santa Rosa and Escambia counties. The installation contributes directly to the economic development of the surrounding communities through increased demand for local goods and services and household spending by service members, military retirees, and civilian employees.



Downtown Milton and the Milton Riverwalk

In 2014, it was estimated that NAS Whiting Field Main Station employed a workforce of approximately 1,955 active duty military personnel, 466 civilian personnel and 718 federal contractors (FL DOT 2014). In addition, approximately 1,600 students complete primary flight training at NAS Whiting Field each year. Although the 12 NOLFs are a small component of the overall economic impact of the complex, they do provide local jobs and are an integral part of the overall viability of the NAS Whiting Field Complex.

NAS Whiting Field Complex payroll and expenditures in 2014 totaled $128,473,000 and $139,298,000 respectively (FL DOT 2014). This includes active and inactive duty military pay, military retirement and disability payments, civilian pay, and procurements. As a result, the military creates a stable and consistent source of employment and tax revenue for the area's local economies. Besides military spending, other key economic drivers of the area around NAS Whiting Field include tourism, agriculture, and retiree spending. The 2015 Florida Defense Factbook stated that NAS Whiting Field's economic impact (in terms of gross regional product) for Santa Rosa County is an estimated $1.1 billion, and the impact on employment includes an estimated 13,369 jobs (Enterprise Florida and CareerSource Florida 2015).

NAS Whiting Field, is located approximately 6 miles north of the City of Milton and is situated in the Pensacola-Ferry Pass-Brent Metropolitan Statistical Area (Pensacola MSA), which includes Santa Rosa and Escambia counties. In 2000, there were 412,153 residents in the Pensacola MSA and 448,991 residents in 2010, resulting in a 8.9 percent increase, with most of the growth in Santa Rosa County (U.S. Census Bureau 2010). It is estimated that the population will increase to 505,783 by CY2025, or 12.6 percent greater than the 2000 population. Florida population data and growth projections for the City of Milton, Santa Rosa and Escambia counties, and the Pensacola MSA as a whole are summarized in Table 2-3.

Although the population of the City of Milton has only experienced modest growth since 2000, the population of Santa Rosa County has seen the most growth in the Pensacola MSA and is projected to continue to grow significantly in the coming decades. This regional growth has the potential to impact the NAS Whiting Field Complex in terms of new developments around the installation and the affected NOLFs. A discussion of local and regional compatibility issues is provided in Chapter 7 of this AICUZ Study.



Veterans Memorial – Milton, Florida

TABLE 2-3 POPULATION OF COUNTIES AND MUNICIPALITIES IN THE VICINITY OF NAS WHITING FIELD MAIN STATION

POPULATION AREA	1990	2000	2010	2025	% GROWTH 2000-2010	% GROWTH 2000-2025
City of Milton	7,216	7,045	8,826	--	25.3	--
Escambia County	262,798	294,410	297,619	312,947	1.1	5.2
Santa Rosa County	81,608	117,743	151,372	192,836	28.6	27.4
Pensacola MSA	344,406	412,153	448,991	505,783	8.9	12.6

Sources: U.S. Census Bureau, Census 2010; Florida Office of Economic and Demographic Research 2015, 2017, and n.d.

Key:
MSA = Metropolitan Statistical Area
-- = data not found

3

3.1 Aircraft Types
3.2 NAS Whiting Field Aircraft Operations
3.3 Inter-Facility Operations
3.4 Operational Alternatives for Noise Reduction

AIRCRAFT OPERATIONS

Based on the number of aircraft operations, NAS Whiting Field is the busiest naval air station in the world and is responsible for an estimated 60 percent of all CNATRA total flight time and over 14 percent of all Navy hours flown worldwide. This reputation is due, in part, to year-round pilot training for both fixed-wing and rotary-wing aircraft and the number of NOLFs available for training.

NAS Whiting Field and its NOLFs are primarily utilized by TRAWING FIVE for pilot training for the Navy, Marine Corps, Coast Guard, and several allied nations. NOLF Choctaw will be used by Eglin AFB for F-35 JSF operations, and all airfields are occasionally used by transient aircraft.

This chapter of the AICUZ Study discusses the types of aircraft stationed at NAS Whiting Field, the types and number of operations conducted by these aircraft, and historic and projected (CY2025) annual aircraft operations.

3.1 AIRCRAFT TYPES

There are two types of aircraft analyzed in this AICUZ Study: fixed-wing (more commonly referred to as airplanes or jets), and rotary-wing (more commonly referred to as helicopters). Both types of aircraft are permanently stationed at NAS Whiting Field. In addition, aircraft that operate at the NAS Whiting Field Complex are categorized as either based (permanently assigned at NAS Whiting Field) or transient (all other aircraft not permanently stationed at NAS Whiting Field). The sections below provide further discussion on aircraft types.

NAS Whiting Field is has been a premier naval aviation training facility since 1943 for fixed-wing aircraft and since 1973 for rotary-wing aircraft. The permanently stationed aircraft mix at NAS Whiting Field has been training aircraft, a tradition that is expected to continue into the foreseeable future.

The Navy replaced the primary undergraduate pilot training aircraft (T-34C Turbo Mentor) with the JPATS. The JPATS consists of the newly developed turbo prop T-6B Texan II aircraft, a Training Integration Management System (TIMS), logistic support, and ground-based flight simulators. The Navy and Air Force made this change so that training can be accomplished more efficiently to prepare pilots for operation of modern jet fighter aircraft. As a result, NAS Whiting Field replaced the T-34C Turbo Mentors with T-6B Texan IIs. The transition began in 2009 and is now complete. Past, present, and future aircraft loading at NAS Whiting Field is provided in Table 3-1.



T-34C Aircraft (Fixed-Wing)



T-6B Aircraft (Fixed-Wing)

TABLE 3-1 AIRCRAFT TYPES AT NAS WHITING FIELD

AIRCRAFT TYPE	1990[A]	2000[B]	2010[C]	2025[C]
FIXED-WING				
T-34C	222	140	125	0
T-6B	0	0	65	148
ROTARY-WING				
TH-57B/C	140	222	124	121
Totals	**362**	**362**	**314**	**269**

Sources: (a) Navy 1990; (b) Navy 2000; (c) NASWF 2010.
Note:
2025 aircraft numbers are projected.

Since aircraft stationed at NAS Whiting Field use the NOLFs on a regular basis, the aircraft mix at the NOLFs is nearly identical to the Main Station. In addition, NOLF Choctaw is utilized by F-35s stationed at Eglin AFB as a primary field carrier landing practice (FCLP) asset in support of Navy "C" variant aircraft.

3.1.1 BASED AIRCRAFT

Based aircraft utilizing NAS Whiting Field Complex airfields on a regular basis are the most common aircraft conducting operations around the airfields. There are two types of aircraft based at NAS Whiting Field: the T-6B "Texan II" and the TH-57 "Sea Ranger." The "T" designates these aircraft as training aircraft. Other nomenclatures serve as designators for different models/series of aircraft to identify changes to aircraft or equipment.

Santa Rosa County Aviation Park is adjacent to NAS Whiting Field. While not affiliated with the Navy, this AICUZ Study included aircraft and operations associated with the aviation park as based aircraft since these aircraft will utilize the runways at the installation. There are no aircraft permanently stationed at any of the NOLFs.

FIXED-WING AIRCRAFT

Historically, the T-34C was the Navy's primary undergraduate pilot training fixed-wing aircraft; however, the Navy replaced the T-34C with the T-6B JPATS. The T-6B aircraft have replaced the T-34Cs on NAS Whiting Field and are now fully integrated into the course curriculum.



C-130 (Fixed-Wing)

T-6B "Texan II." The T-6B "Texan II" is a military, single-engine, two-seat, primary training aircraft designed to train SNAs in basic flying skills common to all military pilots. This fully-aerobatic aircraft features a pressurized cockpit with an anti-G system ejection seat and an advanced avionics package. Stepped-tandem seating in the single cockpit places one crewmember in front of the other, with the student and instructor positions being interchangeable. A pilot may also fly the aircraft alone from the front seat. With a wingspan of 33 feet and a length of 33 feet, this aircraft can reach speeds of 280 knots (320 miles per hour) at altitudes of 31,000 feet and has a range of 950 NM.

Santa Rosa County Aviation Park. Aircraft projected to be associated with the Santa Rosa County Aviation Park include aircraft from three categories: multiple-engine propeller aircraft, multiple-engine propeller cargo aircraft, and corporate jets. For the purpose of this AICUZ Study, it is assumed that the aircraft in these groups are similar to the military's T-44 (King Air), C-130, and C-21A (Learjet), respectively.

ROTARY-WING AIRCRAFT

The current rotary-wing pilot training aircraft is the TH-57B/C and will remain the variant for the foreseeable future.

TH-57 "Sea Ranger." Initially deployed in 1968, the TH-57 is a derivative of the commercial Bell Jet Ranger 206. Although primarily used for training, these aircraft are also used for photo, chase, and utility missions. The TH-57 provides advanced IFR training to several hundred aviation students a year at NAS Whiting Field. This aircraft can reach a maximum speed of 138 miles per hour, altitudes of 18,900 feet, and has a range of 368 NM. The aircraft is typically crewed by one instructor and four student pilots.



TH-57 (Rotary-Wing)

3.1.2 TRANSIENT AIRCRAFT

Transient aircraft are all other aircraft not permanently stations at NAS Whiting Field. Transient aircraft often conduct training or other mission-related operations at one of the airfields, but may only land briefly to refuel. The most notable and common transient aircraft utilizing the NAS Whiting Field Complex airfields are T-45A aircraft from NAS Pensacola and F-35 aircraft from Eglin AFB. Due to the infrequent use of the T-45, only the F-35 is discussed below.

F-35 A/B/C Joint Strike Fighter, "Lightning II." The F-35 has three different variants: the first is the conventional takeoff and landing variant (Air Force F-35A); the second is a short takeoff and vertical-landing variant (STOVL) (Marine F-35B); and the third is a carrier-based variant (Navy F-35C). The F-35A and F-35B are very similar in size, but the F-35A has more fuel capacity, while the F-35B possesses vertical lift capability. The F-35C carrier variant has a larger, folding wing and larger control surfaces for improved low-speed control, and stronger landing gear for the stresses of carrier landings. None of the F-35 variants are expected to be stationed at NAS Whiting Field; however, F-35 aircraft will conduct routine touch-and-go and associated training syllabus operations at NOLF Choctaw. There will be no vertical takeoff/landing operations conducted at NOLF Choctaw in support of the F-35B variant.



F-35 A/B/C JSF

3.2 NAS WHITING FIELD AIRCRAFT OPERATIONS

The two major sources of aircraft noise are ground engine maintenance "run-up" operations (pre-flight maintenance checks) and flight operations (an aircraft crossing over the runway threshold).

A primary function of an AICUZ Study is to present noise contours and APZs for an airfield. The foundations for development of both noise contours and APZs are aircraft operations. "Aircraft operation" is a common term used to describe pre-flight and flying activities of an aircraft. These activities are the two major sources of aircraft noise. The main sources of community noise impacts around NAS Whiting Field and its NOLFs are pre-flight and maintenance check operations (e.g., ground engine maintenance "run-ups") and flight operations (i.e., any time an aircraft crosses over the runway threshold at an airfield: arriving, departing, or flying in a pattern).

The level of noise exposure from aircraft operations is related to several key variables, including:

- ☐ Duration of engine maintenance run-ups;
- ☐ Aircraft type and engine power settings;
- ☐ Altitude and direction of flight;
- ☐ Flight tracks and their frequency of use;
- ☐ Weather (temperature, relative humidity); and
- ☐ Frequency of air operations.

The specifics of how these variables affect the NAS Whiting Field Complex are discussed in detail throughout the remainder of this AICUZ Study.

Northwest Florida has seen the advent of six industrial airparks in recent years, including Whiting Aviation Park, owned and operated by Santa Rosa County, and located adjacent to NAS Whiting Field South. The projected CY2025 operations include 27,375 operations from the aviation park. Through a local agreement, the business community has access to the 6,000-foot runway at South Field to support the 269-acre airpark. Businesses engaged in aviation manufacture, maintenance, repair, and overhaul (MMRO) activities may locate at the business park and utilize the runway at South Field (Florida's Great Northwest, n.d.). This activity is included to ensure compatibility with long-term military operations at the installation and to fully represent community impacts.

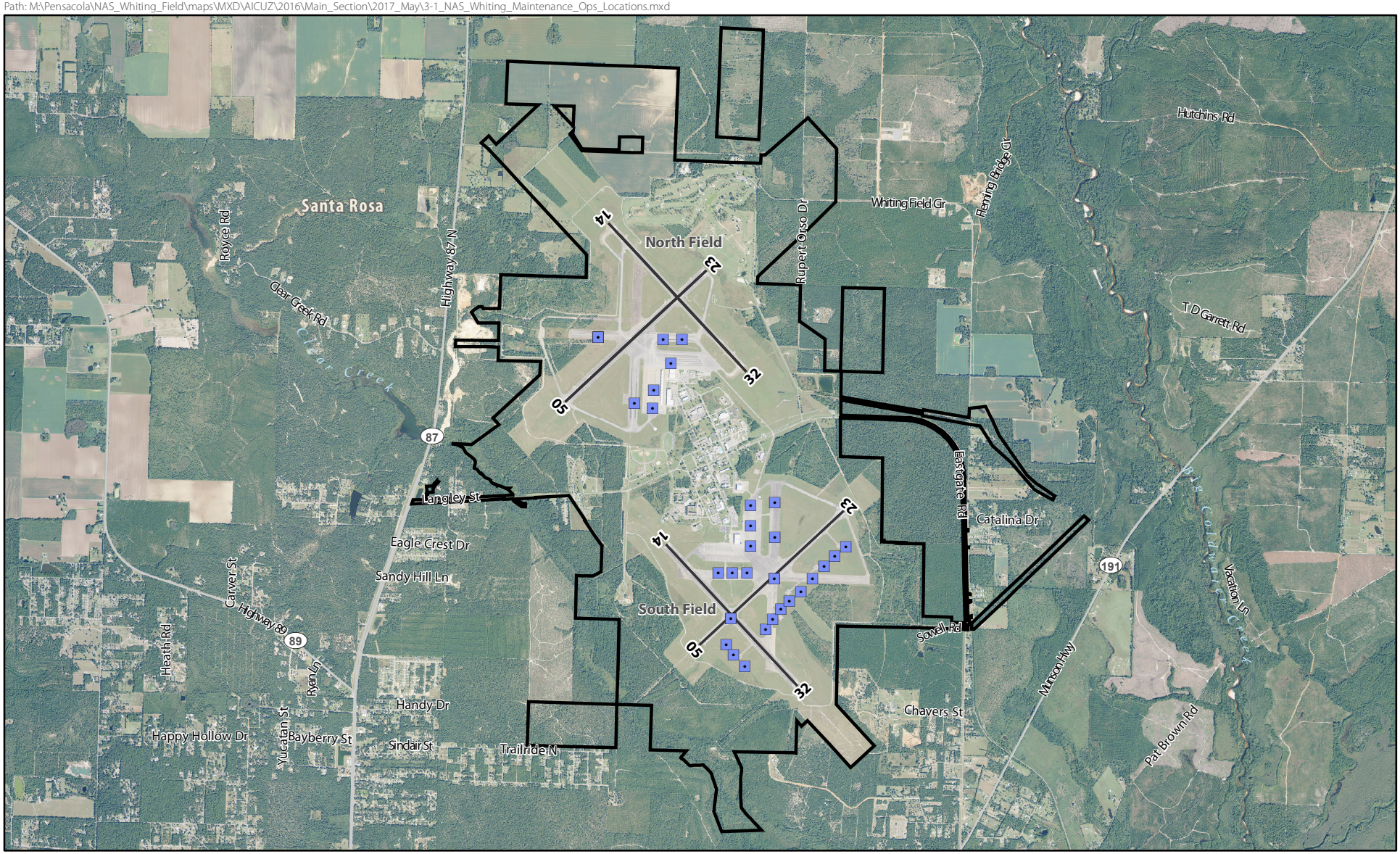
3.2.1 PRE-FLIGHT AND MAINTENANCE OPERATIONS

"Pre-flight run-ups" refer to aircraft engine checks conducted immediately prior to takeoff. Engine maintenance activities include engine rinses and washes, maintenance turns, and high-power turns. Sometimes the engine may be removed from the aircraft and placed on an engine stand. Pre-flight run-ups are conducted on the runway ends or within designated areas. To perform various tests or repairs, run-ups are also conducted when an aircraft is parked on the ground and the engine is running. Maintenance run-up operations are conducted along the flight line at designated areas commonly referred to as "high/low-power turn pads" or "static pads." For helicopter pre-flight operations, the static pads in the parking areas are representative of general locations where ground starts and hovers are commonly conducted. Pre-flight and engine maintenance run-up locations are depicted on Figure 3-1.

The noise associated with pre-flight and engine maintenance run-ups was included in the noise analysis and in the modeling associated with the Main Station. No such activities take place at the affiliated NOLFs.



Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Main_Section\2017_May\3-1_NAS_Whiting_Maintenance_Ops_Locations.mxd



SCALE
0 0.25 0.5 Miles

Legend

- Run-Up Locations
- Major Road
- Runway
- NAS Whiting Field Boundary

Figure 3-1
Pre-Flight and Engine Maintenance Operations Locations
NAS Whiting Field
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

3.2.2 FLIGHT OPERATIONS

Operations at NAS Whiting Field are tracked by ATC, AOD, and TRAWING FIVE and have been utilized for developing noise contours and APZs for this AICUZ Study.

As described above, a "flight operation" refers to any time an aircraft crosses over the runway threshold at an airfield (e.g., arriving, departing, or flying in a pattern). Arrivals and departures may be associated with aircraft going to or coming from defense-related SUA, or can include take-offs and landings that are part of a training maneuver (or pattern). A common example of a take-off operation is a departure of an aircraft to another location, and a landing operation is an aircraft arrival from another location to the airfield. Additionally, a take-off and landing may be part of a training maneuver or pattern (e.g., touch-and-go), which includes a take-off and landing back to the same runway. These patterns are considered as two operations because the departure and arrival each count as one operation.

Operations conducted at the NAS Whiting Field Complex follow the curriculum set forth by CNATRA for TRAWING FIVE student aviators and instructor pilots. All flight operations are conducted for the purpose of training student pilots and instructor pilots. Each student aviator must complete the required flights, thus creating a repetitious loop of flight operations as new students join the program and begin the flight curriculum. All basic flight maneuvers, as well as a selection of advanced operations, are flown at the NAS Whiting Field Complex.

Student aviators conduct over 160,000 flight hours and an average of 1.3 million flight operations each year at NAS Whiting Field Complex. Typical flight operations conducted by student aviators and transient aircraft at NAS Whiting Field and affiliated NOLFs are described below:

- ☐ Departure. An aircraft taking off to a training area, or as part of a training maneuver (i.e., touch-and-go).
- ☐ Straight-In/Full-Stop Arrival. An aircraft lines up on the runway centerline, descends gradually, lands, comes to a full stop, and then taxis off the runway.
- ☐ Overhead Break Arrival. An expeditious arrival using VFR. An aircraft approaches the runway 500 feet above the altitude of the landing pattern. Approximately halfway down the runway, the aircraft performs a 180-degree turn to enter the

landing pattern. Once established in the pattern, the aircraft lowers landing gear and flaps and performs another 180-degree descending turn to land on the runway.

- ☐ **Pattern Work.** Pattern work refers to traffic pattern training where the pilot performs take-offs and landings in quick succession by taking off, flying the pattern, and then making a touch-and-go landing. Traffic pattern training utilizes all the basic flying maneuvers a pilot learns: take-offs, climbs, turns, climbing turns, descents, descending turns, and straight landings. Specific types of pattern work include:
  - Touch-and-Go. An aircraft lands and takes off on a runway without coming to a full stop. After touching down, the pilot immediately goes to full power and takes off again. The touch-and-go pattern is counted as two operations (the landing is counted as one operation and the take-off is counted as another).
  - FCLP. A training procedure that simulates landing an aircraft on the flight deck of a carrier. It is similar to a touch-and-go, but has specific altitudes, turning radii, and power settings to replicate, as closely as possible, the procedures of landing on a carrier.
- ☐ **Ground Control Approach (GCA)**. A radar or "talk down" approach directed from the ground by ATC personnel. ATC personnel provide pilots with verbal course and glide slope information, allowing them to make an instrument approach during inclement weather. A box pattern is normally flown to practice GCA approaches and utilizes a "box-shaped" flight pattern with four 90-degree turns completed at a set altitude.
- ☐ **VFR Hold Pattern**. This pattern is flown at an established altitude and maintained to delay the aircraft approach to the airfield.
- ☐ **Practice Precautionary Emergency Landing (PPEL).** The PPEL is a procedure taught to student pilots to ensure that they know the protocol for a safe landing on a paved field should engine failure occur. A precautionary emergency landing is performed anytime engine reliability is questionable or there are indications of impending engine failure.

- ☐ Low Approach. This approach to a runway is conducted at a low altitude where the pilot does not make contact with the runway but, rather, increases altitude and departs the airfield's airspace.

- ☐ Radar Approach. This approach is a radar instrument approach provided with active assistance from ATC with the use of a radio transmitter and receiver. The ATC vectors the aircraft to align it with the runway centerline. The ATC continues the vectors to keep the aircraft on course until the pilot can complete the approach and landing by visual reference to the surface. A radar approach may be given to any aircraft upon request, and may be offered to pilots of aircraft in distress or to expedite traffic.


Formation Flight Operation

- ☐ Formation Flights. These flight operations are conducted with multiple aircraft flying in close proximity to one another.

- ☐ Sortie. A sortie is a flight by one aircraft and begins when the aircraft moves forward from rest to begin takeoff and ends after airborne flight when the aircraft returns to the surface and the engines are stopped, or the aircraft has been on the ground for five minutes, whichever comes first.

Rotary-wing-specific operations conducted at NAS Whiting Field and affiliated NOLFs are described below:

- ☐ Standard Pattern. A standard helicopter pattern is flown at altitudes less than 1,000 feet, and all turns are in the same direction (called a "racetrack" pattern).

- ☐ 90-Degree Autorotation Pattern. An autorotation pattern simulates a situation when engines are not producing sufficient power to continue in powered flight. The autorotation pattern is a racetrack pattern with descent initiated at mid-point of the turn with approximately 90 degrees of turn to the final landing direction.

- ☐ 180-Degree Autorotation Pattern. This racetrack pattern has descent initiated at the start of a turn with approximately 180 degrees of turn to the final landing direction.
- ☐ Tactical Pattern. A tactical pattern is a training flight that is flown at approximately 100 to 300 feet above the terrain and obstructions. This operation provides critical training for avoiding detection and engagement from hostile forces.
- ☐ Tail Rotor/Boost Off (TRBO) Pattern. TRBO is a racetrack pattern that has higher rates of climb and slower rates of descent during critical phases of flight.
- ☐ Confined Air Landing (CAL) Patterns. A CAL pattern consists of performing an approach to a hover to a point above the highest obstruction and then beginning a slow decent to a vertical landing.
- ☐ External Load Pattern. External load patterns begin with lifting the external load above all obstructions before joining a normal racetrack pattern. This operation is typically executed at a lower pattern altitude than normal pattern operations.
- ☐ Pinnacle Pattern. This standard racetrack pattern has a steeper than normal approach and landing on an elevated platform, surface, or hill.

Operations at NAS Whiting Field are tracked by ATC, AOD, and TRAWING FIVE personnel to gauge runway utilization and safety, and have been utilized for developing noise contours and APZs for this AICUZ Study.

The JPATS T-6B aircraft will be flown in the same general manner as the T-34C, including remaining above 1,300 feet until aircraft enter the pattern as they approach the airfield. The only airspace use changes anticipated would occur above 20,000 feet. There will be no changes in low-level airspace use (Navy 2000).

The complete integration of the T-6B aircraft at the NAS Whiting Field Complex will result in minor changes to flight tracks and will require adoption of T-6-specific flight procedures. However, there have been no notable changes that have occurred in existing flight tracks or procedures for rotary-wing aircraft in recent years. Chapter 7 provides specific flight tracks flown at

the NAS Whiting Field Complex for both fixed-wing and rotary-wing aircraft. Historic modifications to flight operation procedures associated with noise abatement are discussed in Section 4.3, Noise Abatement and Complaints.

FLIGHT RULES

As part of the TRAWING FIVE curriculum, both IFR and VFR are taught and flown at the NAS Whiting Field Complex. IFR is a standard set of rules that all pilots must follow when operating in select locations (e.g., major civilian airports), clouds, or above certain altitudes prescribed by FAA regulations. ATC ensures separation of all aircraft operating under IFR. VFR is a standard set of rules that all pilots, both civilian and military, must follow when not operating under IFR. These pilots remain clear of clouds and avoid other aircraft. Standard helicopter operations at NAS Whiting Field's helicopter runways and helipads operate under VFR conditions.

Nighttime flight instruction is conducted for student pilots at NAS Whiting Field Main Station, NOLF Santa Rosa, NOLF Site 8, NOLF Harold, and NOLF Choctaw, some of which occurs during acoustical nighttime (10:00 p.m. to 7:00 a.m.). Student helicopter pilots train at night with NVGs.

3.2.3 ANNUAL OPERATIONS

"Annual operations" describe all aircraft operations that occur at the NAS Whiting Field Complex during a calendar year, including based and transient aircraft. As described above, total annual operations account for each arrival and departure, including those conducted as part of a pattern operation. NAS Whiting Field aircraft operations are tracked using systems maintained by ATC personnel. Tracked data include historic flight information, such as flight operations by aircraft type, type of operation, runway utilized, and time of day of the operation.

The operational tempo at the NAS Whiting Field Complex has fluctuated due, in part, to training requirements, availability of NOLFs, number of SNAs assigned to pilot training, and change/transition of aircraft. Operational tempos for NAS Whiting Field Main Station and the 12 affiliated NOLFs are detailed in Table 3-2. Holley Field has been included for historical reference.

TABLE 3-2 OPERATIONAL TEMPO FOR NAS WHITING FIELD AND NOLFs

AIRFIELD	YEAR								
	2000 2001	2002 2003	2004 2005	2006 2007	2008 2009	2010 2011	2012 2013	2014	PROJECTED CY2025
North	78,295 84,172	68,573 74,532	67,787 66,052	78,207 81,918	78,593 79,893	77,032 71,474	60,554 64,429	71,650	94,926
South	73,857 80,262	73,585 89,934	82,035 87,107	100,553 124,541	137,843 139,577	155,049 123,205	106,939 92,726	96,823	151,079
Evergreen	81,812 92,158	58,269 57,865	63,360 52,467	59,134 55,343	33,030 33,416	68,226 86,894	45,725 79,154	61,621	104,273
Brewton	81,094 109,299	66,304 80,872	91,507 94,107	85,469 67,221	24,230 47,765	79,863 59,526	54,283 73,682	58,985	95,836
Silverhill	45,791 50,871	37,233 37,841	22,892 47,117	44,229 34,263	26,273 25,238	27,664 16,386	27,266 0	0	30,679
Summerdale	1,920 5,920	5,232 4,800	6,958 9,214	0 0	0 0	0 0	0 0	0	54,705
Barin	87,629 87,261	70,324 71,941	61,982 61,615	58,127 78,489	57,325 37,216	66,058 40,675	64,324 28,330	28,520	66,862
Wolf	2,358 2,400	1,200 2,400	2,400 0	0 0	0 0	0 0	0 0	0	73,512
Choctaw	20,259 23,630	36,727 74,685	70,748 44,246	46,585 37,213	42,531 45,995	36,650 22,113	147,223 32,954	17,090	96,571
Holley	6,744 6,374	4,009 5,156	1,700 0	0 0	0 0	0 0	0 0	0	0
Site 8	62,213 26,783	39,981 90,205	68,642 49,305	56,978 34,959	45,913 112,165	194,698 163,406	105,072 60,357	66,744	132,274
Pace	166,847 201,416	192,385 205,268	160,819 181,529	167,564 153,609	71,387 209,824	200,278 134,824	147,223 117,385	147,961	184,781
Spencer	282,360 338,025	319,417 345,244	339,806 327,324	339,284 330,009	353,273 290,903	315,561 315,628	299,711 228,432	257,883	385,290

TABLE 3-2 OPERATIONAL TEMPO FOR NAS WHITING FIELD AND NOLFs

AIRFIELD	YEAR								
	2000 2001	2002 2003	2004 2005	2006 2007	2008 2009	2010 2011	2012 2013	2014	PROJECTED CY2025
Harold	109,914 113,841	127,013 166,117	131,743 127,208	118,093 147,714	180,525 165,182	158,903 142,498	142,272 100,528	102,642	190,757
Santa Rosa	218,528 266,504	256,772 275,832	231,777 217,288	166,841 145,908	187,067 318,950	345,868 144,813	322,253 217,582	231,838	274,225
TOTAL OPS	**1,319,621 1,488,916**	**1,357,024 1,582,692**	**1,404,156 1,364,579**	**1,321,064 1,291,187**	**1,237,990 1,506,124**	**1,725,850 1,321,442**	**1,522,845 1,095,559**	**1,141,757**	**1,935,770**

Note: The AICUZ Study development and data collection occurred over a four-year period (2010-2014) and was modeled for 2015. To maintain document integrity and clear data sources, operational activities that occurred after this time were not incorporated into the AICUZ Study.

As a planning document, AICUZ studies account for future missions and operations. As such, this AICUZ Study provides analysis for projected year 2025 and incorporates known and anticipated changes in mission and operations through CY2025.

For the projected scenarios analyzed in this AICUZ Study, operation source data were acquired from ATC personnel, Air Traffic Activity Reports that are maintained by ATC personnel, interviews with ATC and squadron personnel, and key documents that reference projected operations at the individual airfields. The projected scenario was then adjusted to account for planned changes the Navy anticipates will occur prior to CY2025.

Table 3-3 provides a summary of the NAS Whiting Field Complex's airfields projected operations (CY2025), including aircraft type and primary operations conducted at the airfield. Airfield-specific operations, where available, are presented under corresponding headings in Chapter 7 of this AICUZ Study.

TABLE 3-3 NAS WHITING FIELD COMPLEX — SUMMARY OF CY2025 PROJECTED OPERATIONS BY AIRFIELD

AIRFIELD	AIRCRAFT	USE	PROJECTED ANNUAL OPERATIONS	CALCULATIONS NOTES
North	T-6	Solo/dual, primary and intermediate phases of fixed-wing aviation	94,926	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2006-2010) with a 20% increase in annual operations. The increase in operational tempo captures the extended transition efforts from the T-34 to T-6, pilot training requirements, and anticipated mission growth.
South	TH-57	Advanced phases of helicopter training	151,079	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2006-2010), including a 15% increase in annual operations. The increase accounts for increased TH-57 requirements and operations associated with the Aviation Commerce Park.
Evergreen	T-6	Solo, primary and intermediate phases of fixed-wing aviation	104,273	AICUZ annual aircraft operations projections are the highest annual operations in the recent 5-year period (2007-2010), including a 20% increase.
Brewton	T-6	Solo, PPELs and touch-and-go operations	95,836	AICUZ annual aircraft operations projections are the highest annual operations in the recent 5-year period (2007-2010), including a 20% increase.
Silverhill	T-6	Low approaches, maneuvering operations, currently inactive	30,679	AICUZ annual aircraft operations reflect the 1990 AICUZ Study.
Summerdale	T-6	Dual, primary and intermediate phases of fixed-wing aviation	54,705	AICUZ annual aircraft operations reflect the Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011.
Barin	T-6	Solo, primary and intermediate phases of fixed-wing aviation	66,862	AICUZ annual aircraft operations reflect the Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011.
Wolf	T-6	Low approaches, maneuvering operations, currently inactive	73,512	AICUZ annual aircraft operations reflect the 1990 AICUZ Study.
Choctaw	T-6, TH-57, F-35	T-6 solo, touch-and-go operations, PPELs, helicopter NVG,UAV training, F-35 FCLP and Simulated Flame-Out operations	96,571	AICUZ annual aircraft operations reflect the 2005 BRAC Decisions and Related Actions Final Environmental Impact Statement, Eglin Air Force Base, Florida, October 2008

TABLE 3-3 NAS WHITING FIELD COMPLEX — SUMMARY OF CY2025 PROJECTED OPERATIONS BY AIRFIELD

AIRFIELD	AIRCRAFT	USE	PROJECTED ANNUAL OPERATIONS	CALCULATIONS NOTES
Holley	Not applicable.	NOLF Holley closed as an aviation asset in early 2016; therefore, this airfield is not included in the AICUZ analysis.	0	Not applicable.
Site 8	TH-57	Normal and tactical operations, cold refueling, crew change, and low work	132,274	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2007-2011), with a 20% increase in annual operations. The increase accounts for increased TH-57 requirements.
Pace	TH-57	Advanced phases of helicopter training	184,781	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2007-2011), with a 20% increase in annual operations. The increase accounts for increased TH-57 requirements.
Spencer	TH-57	Touch-and-go, auto-rotations, low hover work	385,290	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2007-2011), with a 20% increase in annual operations. The increase accounts for increased TH-57 requirements.
Harold	TH-57	Tactical operations	190,757	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2007-2011), with a 20% increase in annual operations. The increase accounts for increased TH-57 requirements.
Santa Rosa	TH-57	Day-to-night operations including NVG training	274,225	AICUZ annual aircraft operations projections are an average of the recent 5-year period (2007-2011), with a 20% increase in annual operations. The increase accounts for increased TH-57 requirements.

Notes:
Solo – solo piloted training (student pilot only)
Dual – dual piloted training (student and instructor pilots)

For the purposes of this AICUZ Study and to aid in development of noise contours and APZs, annual operations are further detailed according the following factors:

- ☐ Type of aircraft conducting the operation;
- ☐ Based or transient aircraft;
- ☐ Time of day the operation is conducted;
- ☐ Type of operation performed;
- ☐ Runway or training aid the operation is conducted on; and
- ☐ Flight track flown to conduct the operation.

These factors all have differing effects on noise contours and APZs and provide key information into the changes in the AICUZ footprint from the historic and projected scenarios. Additional parameters, such as aircraft altitude, power setting, and speed, are collected and considered for the noise modeling analysis and are discussed in Chapters 4 and 7.

3.2.4 RUNWAY AND FLIGHT TRACK UTILIZATION

Airfields at the NAS Whiting Field Complex have designated runways or training aids, with designated flight procedures and flight tracks (i.e., track an aircraft follows while conducting an operation at an airfield, between airfields, or to/from the MOA) that provide for the safety, consistency, and control of an airfield. The following factors are essential in determining flight track utilization:

- ☐ Type of operation performed;
- ☐ Runway utilized for the operation; and

☐ Flight track followed to conduct the operation.

Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide. Flight tracks are typical or average representations based on pilot and ATC input. Chapter 7 provides representative flight tracks for both fixed-wing and rotary-wing aircraft at the NAS Whiting Field Complex for the primary operations conducted at select airfields.

Operations are not only tracked, but they are tracked according to flight track/runway. The frequency (utilization) with which a runway is used is determined by a variety of factors, including runway length, winds, location of airfield features (e.g., lights, arresting gear), number of aircraft in the pattern, or the preference of a runway for noise abatement or safety concerns (e.g., birds). Established by the Navy's AICUZ Instruction, APZs are warranted if a runway exceeds 5,000 annual operations. Therefore, pertinent to this AICUZ Study is the flight track utilization at each airfield in the NAS Whiting Field Complex. The flight tracks and utilization data collected as part of this AICUZ Study were utilized in the noise modeling efforts and the development of APZs for the projected scenario. The effect of flight tracks and utilization on noise contours and the association between flight tracks and APZs is included in Chapter 7.

3.3 INTER-FACILITY OPERATIONS

NAS Whiting Field is used as a starting point for all student aviator training flight operations. A majority of operations conducted from NAS Whiting Field involve operations at one of the nearby NOLFs. NAS Whiting Field and its extensive network of NOLFs provide a unique training opportunity for student pilots. A typical operation consists of a departure from NAS Whiting Field, a pattern operation(s) at a NOLF, and a return flight and landing at NAS Whiting Field. As aircraft that are in flight gain altitude, their noise contribution drops, often becoming indistinguishable from the background. Therefore, aircraft departing to or arriving from another airfield are considered only when they are in the general vicinity of an airfield in the NAS Whiting Field Complex where their noise contribution is greater. For the purpose of this AICUZ Study, should a fixed-wing aircraft conduct inter-facility operations (Main Station to NOLF back to Main Station), the operations are still counted as

they occur on a runway and the noise is modeled according to the operation at that specific airfield. This allows for an accurate representation of noise contours for each airfield.

3.4 OPERATIONAL ALTERNATIVES FOR NOISE REDUCTION

Operational alternatives should reduce noise and APZ impacts and can include flight track modifications, altering hours of operation, changes in pattern altitude, or construction of acoustical enclosures (for ground engine maintenance). This AICUZ Study evaluation of operational alternatives balanced noise and APZ changes with impacts on flight safety and operational capability.

NAS Whiting Field Air Ops and the FAA provide rules that all aircraft are required to follow when utilizing NAS Whiting Field controlled airspace and the airfield. The course rules establish control and safety by providing procedures that account for aircraft separation, traffic patterns for runway in use, arrivals/departures, noise abatement, altitudes and airspeed, allowable weather conditions, and aircraft emergencies. As such and as previously discussed, aviators performing operations at the NAS Whiting Field Complex follow established rules and procedures while operating at the airfield. Likewise, aviators perform operations at specific altitudes, airspeeds, power settings, and follow set flight tracks to operate the aircraft at peak performance and follow course curriculum. Aircraft operating procedures are performed according to Commander Naval Air Force Instruction 3510.4, Naval Air Training and Operating Procedures Standardization (NATOPS) and Instrument Flight Qualification Programs. NATOPS are published for the purpose of standardizing ground and flight procedures. The purpose of the NATOPS Program is to increase combat readiness and improve flight safety. Limitations or restrictions on performing such operations pose a risk to pilots and the mission at NAS Whiting Field.

NAS Whiting Field's course rules are updated in response to changes in mission and safety hazards and to minimize noise and safety impacts, some of which are operational alternatives. NAS Whiting Field operators adhere to noise abatement procedures (discussed in detail in Section 4.3, Noise Abatement and Complaints).

NAS Whiting Field is committed to the health, safety, and welfare of the local community, and considers operational alternatives to mitigate these impacts on the local community, as they are identified; however, NAS Whiting Field's capacity to implement operational alternatives is limited by several factors that are outlined in the Air Ops manuals.

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4

4.1 What is Sound/Noise?
4.2 Airfield Noise Sources and Noise Modeling
4.3 Noise Abatement and Complaints
4.4 2015 AICUZ Noise Contours

AIRCRAFT NOISE

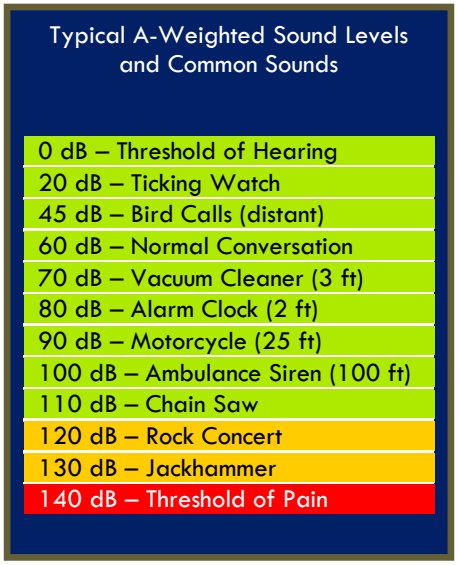
How an installation manages its aircraft noise plays a key role in the installation's relationship with neighboring communities. Aircraft noise is also a factor in local land use planning. Since noise from aircraft operations could impact areas near NAS Whiting Field Complex airfields, the Navy has analyzed the noise resulting from its aircraft and has established noise contours around the installation using the guidance provided in the AICUZ Instruction.

Noise contours provide communities and planning organizations with information to better plan for development near airfields. The noise contours developed for and incorporated into this AICUZ Study represent the noise generated by aircraft based on aircraft type, aircraft operations, and the time of day aircraft are flown.

This chapter of the AICUZ Study discusses noise associated with aircraft operations, including average noise levels, noise abatement/flight procedures, noise complaints, and sources of noise. Specific airfield noise contours and analysis are provided in Chapter 7.

4.1 WHAT IS SOUND/NOISE?

Sound is vibrations in the air that can be generated by multiple sources. When sound is invasive or unwanted, it is often considered noise. Generally, sound becomes noise to a listener when it interferes with normal activities. Common sources of noise include roadway traffic, recreational activities, railway activities, and aircraft operations. For further discussion of noise and its effect on people and the environment, see Appendix A.



In this AICUZ Study, all sound or noise levels are measured in A-weighted decibels (dBA), which represents sound pressure adjusted to better represent human hearing response. For brevity, the adjective "A-weighted" is often omitted in this AICUZ Study and the measurements are expressed as "dB."

Humans are most sensitive to sound frequencies within the range of human hearing and less sensitive to lower and higher frequencies. The A-weighted scale emphasizes those mid-range frequencies while de-emphasizing the remaining frequencies. On an A-weighted scale, barely audible sound is just above 0 decibels (dB), and normal speech has a sound level of approximately 60 to 65 dB. Generally, a sound level above 120 dB will cause discomfort to a listener (Berglund and Lindvall 1995), and the threshold of pain is 140 dB.

The noise exposure from aircraft at NAS Whiting Field, as with other installations, is measured using the day-night average sound level (DNL) noise metric. The DNL noise metric, established in 1980 by the Federal Interagency Committee on Urban Noise (FICUN), presents a reliable measure of community sensitivity to aircraft noise and has become the standard metric used in the United States (except California, which uses the Community Noise Equivalent Level [CNEL]). DNL averages the sound energy from aircraft operations at a location over a 24-hour period. DNL also adds an additional 10 dB to events occurring between 10:00 p.m. and 7:00 a.m. These decibel adjustments represent the added intrusiveness of sounds due to increased sensitivity to noise when ambient sound levels are low.

DNL provides a single measure of overall noise impact by combining disparate noise events (e.g., brief events with high noise levels, longer duration events at lower noise levels, and events occurring during different times of day which are more likely to disturb). Scientific studies and social surveys conducted to evaluate community annoyance with all types of environmental noise have found DNL and CNEL to be the best measures available for predicting community annoyance (FICUN 1980; Federal Interagency Committee on Noise [FICON] 1992). Although DNL provides a single measure of overall noise impact, it does not provide specific information on the number of noise events or the individual sound levels that occur during the day. For example, a DNL of 65 dBA could result from only a few noisy events or from a large number of quieter events.

DNL is depicted on a map as a noise contour that connects points of equal noise value. Contours are displayed in 5-dBA increments (i.e., 60, 65, 70, 75, 80, and 85 dB DNL). Noise levels inside a contour may be similar to those outside a contour line. Where the contour lines are close together, the change in noise level is greater. Where the lines are far apart, the change in noise level is gradual. Calculated noise contours do not represent exact measurements and are discussed further in Section 4.3, Noise Abatement and Complaints.

For land use planning purposes, the AICUZ Program divides noise exposure into three categories, known as "noise zones," based on DNL measurements:

- ☐ Noise Zone 1: 60 to less than 65 DNL (60 to <65 dB DNL);
- ☐ Noise Zone 2: 65 to less than 75 DNL (65 to <75 dB DNL); and
- ☐ Noise Zone 3: Greater than 75 DNL (>75 dB DNL).

Land use recommendations within these noise zones are discussed and provided in Chapters 6 and 7.

4.2 AIRFIELD NOISE SOURCES AND NOISE MODELING

The Navy conducts noise studies, as needed, to assess the noise impacts of aircraft operations. This AICUZ Study presents the baseline and projected (CY2025) noise contours at the airfields within the NAS Whiting Field Complex. The Navy utilized two computer models to determine noise exposure. The first computer model is NOISEMAP, the DOD standard model for assessing noise exposure from military fixed-wing aircraft operations at air installations. The second is the Rotorcraft Noise Model (RNM), which provides a more accurate analysis of the unique noise impacts associated with rotary-wing aircraft. Both NOISEMAP and RNM calculate DNL contours resulting from aircraft operations using such variables as power settings, aircraft model and type, maximum sound levels, and duration and flight profiles for a given airfield. The noise contours from the two computer models are then combined, if both fixed-wing and rotary-wing aircraft operate, to graphically illustrate where aircraft noise occurs in and around an airfield and at what sound level. The contours generally follow the flight paths of aircraft.

In support of this AICUZ Study, a noise analysis was conducted in 2015 to define noise exposure contours at select airfields within the NAS Whiting Field Complex. Noise modeling was conducted for the following nine airfields as part of this AICUZ Study:

- ☐ NAS Whiting Field, North and South airfields;
- ☐ NOLF Evergreen;
- ☐ NOLF Brewton;
- ☐ NOLF Site 8;
- ☐ NOLF Pace;
- ☐ NOLF Spencer;

- ☐ NOLF Harold; and
- ☐ NOLF Santa Rosa.

As noted above, a noise analysis was not conducted for all airfields within the NAS Whiting Field Complex. A list of the airfields not included in the noise analysis and justification/existing documentation for their exclusion are provided below:

- ☐ **NOLF Silverhill.** This airfield will not be actively used by T-6 aircraft due to runway restrictions; however, it is anticipated that the airfield will be periodically used to conduct low approaches by TRAWING FIVE for other operations. Projected operations for CY2025 do not include this airfield. Noise contours presented in the 1990 AICUZ Study have been adopted for this 2015 AICUZ Study as the 2015 AICUZ noise contours.
- ☐ **NOLF Summerdale.** A noise analysis conducted in 2009 and 2010, as part of the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida (Navy 2011) was determined to be applicable to this 2015 AICUZ Study. The contours presented in the Final EA have been adopted as the 2015 AICUZ noise contours.
- ☐ **NOLF Barin.** A noise analysis conducted in 2009 and 2010 as part of the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida (Navy 2011) was determined to be applicable to this 2015 AICUZ Study. The contours presented in the Final EA have been adopted as the 2015 AICUZ noise contours.
- ☐ **NOLF Wolf.** This airfield is periodically used to conduct low approaches and is not actively used by TRAWING FIVE for other operations. Projected operations for CY2025 do not include this airfield. Noise contours presented in the 1990 AICUZ Study have been adopted for this 2015 AICUZ Study as the 2015 AICUZ noise contours.
- ☐ **NOLF Choctaw.** A noise analysis conducted in 2006 as part of the U.S. Air Force Final Environmental Impact Statement for Proposed Implementation of the Base Realignment and Closure 2005 Decisions and Related Actions at Eglin AFB, Florida

(USAF 2008) was determined to be applicable to this 2015 AICUZ Study. The contours presented in the Final EIS have been adopted as the 2015 AICUZ noise contours.

As discussed in Section 3.2, the main sources of noise at an airfield are pre-flight and/or maintenance run-ups and flight operations. As part of this AICUZ Study, data were collected from NAS Whiting Field and then compiled and incorporated into computer models that graphically depict noise exposure as noise contours. The data collected from NAS Whiting Field for each airfield and the input data for the computer models include:

- ☐ Number and duration of pre-flight and maintenance run-ups;
- ☐ Type of operation (arrival, departure, and pattern);
- ☐ Number of operations per day;
- ☐ Time of operation;
- ☐ Flight track;
- ☐ Aircraft power settings, speeds, and altitudes;
- ☐ Terrain;
- ☐ Surface type; and
- ☐ Environmental data (temperature and humidity).

Noise contours generated from this information are discussed below. In addition, detailed information for each airfield is provided in Chapter 7.

4.3 NOISE ABATEMENT AND COMPLAINTS

NAS Whiting Field conducts noise abatement procedures (i.e., measures to reduce noise), as practicable, and commensurate with safety and operational training requirements. Noise abatement procedures at the NAS Whiting Field Complex are implemented under the Air Ops Manuals and are summarized below. The purpose of these procedures is to minimize impacts from aircraft noise.

Even with noise abatement procedures in place, noise impacts cannot be completely minimized or avoided; therefore, on occasion, NAS Whiting Field receives calls from concerned citizens regarding noise. NAS Whiting Field manages noise concerns and complaints according to the set protocol discussed below.

4.3.1 NOISE ABATEMENT

The NAS Whiting Field Complex actively employs noise abatement or avoidance procedures with which all aviators are required to comply. Noise abatement procedures also apply to engine maintenance operations conducted on-station, which are documented in the Air Ops Manual. The purpose of noise abatement and avoidance procedures is to minimize noise in recognition of community response to aircraft noise. While the Navy cannot alter critical portions of flight patterns to accommodate noise complaints without increasing the risk to pilots, there are other measures in place to reduce noise impacts. Noise abatement procedures at the NAS Whiting Field Complex airfields are listed below:

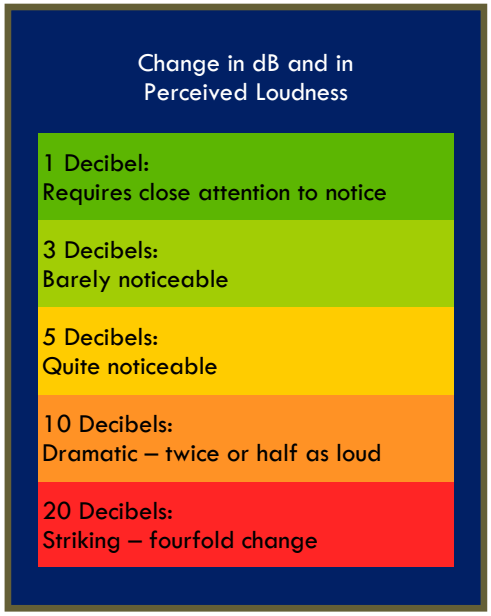
- ☐ Flight crews (pilots and ground maintenance) are required to attend a Course Rules Brief prior to commencing flight operations. All stationed pilots are required to attend an annual Course Rules Brief;
- ☐ The Air Ops Department conducts bi-weekly Airfield Users Group Meetings; and
- ☐ Pilots avoid densely populated areas when at low altitudes and avoid overflights of cities or towns in the local area whenever possible.

4.3.2 NOISE COMPLAINTS

NAS Whiting Field personnel are active members in the communities surrounding the airfields and continuously engage with stakeholders to establish open communication and resolution of noise issues.

The origin and nature of noise complaints within an airfield's geographic region is often a tangible barometer of the success or failure of noise abatement procedures. Noise complaints are related to the intensity and frequency of the events, as well as individual sensitivity. Complaints can arise from outside the areas depicted by noise contours. This is frequently due to a single event that is unusual, such when an aircraft flies over an area not commonly overflown or when a new aircraft begins operating in the region. In general, individual response to noise levels varies and is influenced by many factors including:

- ☐ Activity an individual is engaged in at the time of the noise event;
- ☐ An individual's general sensitivity to noise;
- ☐ Time of day or night;
- ☐ Length of time an individual is exposed to a noise;
- ☐ The predictability of noise; and
- ☐ Weather conditions.



Noise contours and land use recommendations are based on average annoyance responses of a population, but some individuals have greater noise sensitivity than others. Generally, a small increase in noise level will not be noticeable; however, as the change in noise level increases, individual perception becomes greater.

Noise complaints are received by Air Ops personnel and coordinated with the Public Affairs Office and CPLO. Noise complaints are recorded according to date, time, and location of the event and the general nature of the complaint. The complaint is mapped, and Air Ops consults on what event occurred during the time and place of the complaint. A follow-up call to the individual who initiated the complaint is made, and an explanation of the noise event is provided. Historically, noise

complaints have been minimal. Complaints typically occur with several calls regarding one event. Because the resident population in the NAS Whiting Field Complex area is generally accustomed to the presence of aircraft and the accompanying noise, noise complaints typically occur during unscheduled operations and repetitious aircraft activity. However, it should be noted that there has been a marked increase in noise complaints associated with the transition of the T-34 aircraft to the T-6B aircraft. This can be a typical outcome during changes in aircraft platforms in conjunction with communities that are experiencing economic and population growth patterns.

4.4 2015 AICUZ NOISE CONTOURS

Noise contours can be used to generate maps depicting noise exposure resulting from modeled aircraft operations. Noise contours, when overlaid with local land uses, can assist NAS Whiting Field and the local communities in locating and addressing incompatible land uses and in planning for future development.

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent CY2025 projected operations. The AICUZ process calls for evaluation of existing aircraft operations as well as any future aircraft operational changes that can be reasonably predicted for the air station. Inclusion of projected operations also helps to ensure the future operational capability of the air installation. Projected operations are incorporated into this AICUZ Study since its recommended use is as a planning document (i.e., typically forecasts 5 to 10 years into the future).

As discussed in Section 4.2 above, the NAS Whiting Field Complex 2015 Noise Study did not include all airfields in the NAS Whiting Field Complex; however, 2015 AICUZ noise contours are presented for all airfields within the Complex. Existing noise data for airfields not included in the 2015 Noise Study were verified and adopted by this 2015 AICUZ Study. Table 4-1 presents the sources for the 2015 AICUZ noise contours used as part of this AICUZ Study. The 2015 AICUZ noise contours for each airfield in the NAS Whiting Field Complex are presented under corresponding headings in Chapter 7 of this AICUZ Study along with a detailed description of the noise environment for each airfield and comparisons and figure overlays for the baseline and projected AICUZ noise contours.

TABLE 4-1 2015 AICUZ NOISE CONTOURS SOURCE DATA

AIRFIELD	SOURCE DATA FOR 2015 NOISE CONTOURS	NOTES
Whiting North	2015 Noise Study	Conducted as part of this AICUZ Study.
Whiting South	2015 Noise Study	Conducted as part of this AICUZ Study.
Evergreen	2015 Noise Study	Conducted as part of this AICUZ Study.
Brewton	2015 Noise Study	Conducted as part of this AICUZ Study.
Silverhill	1990 AICUZ Study	Use of this field is not in projected in CY2025 operations.
Summerdale	Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011	This report incorporated the results from the 2010 Noise Study (conducted as part of the EA) that presents CY2015 operations, which represents when the T-6 will be in full operation.
Barin	Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011	This report incorporated the results from the 2010 Noise Study (conducted as part of the EA) that presents CY2015 operations, which represents when the T-6 will be in full operation.
Wolf	1990 AICUZ Study	Use of this field is not in projected in CY2025 operations.
Choctaw	Final U.S. Air Force Environmental Impact Statement for Proposed Implementation of the Base Realignment and Closure 2005 Decisions and Related Actions at Eglin AFB, Florida. October 2008	Final Supplemental EIS published June 2014; Draft Supplemental EIS published September 2010. Navy determined to incorporate data presented in the Final EIS due to best available data.
Site 8	2015 Noise Study	Conducted as part of this AICUZ Study.
Pace	2015 Noise Study	Conducted as part of this AICUZ Study.
Spencer	2015 Noise Study	Conducted as part of this AICUZ Study.
Harold	2015 Noise Study	Conducted as part of this AICUZ Study.
Santa Rosa	2015 Noise Study	Conducted as part of this AICUZ Study.

5

5.1 Accident Potential Zones
5.2 Airfield-Specific Accident Potential Zone Data
5.3 Imaginary Surfaces
5.4 Flight Safety

AIRFIELD SAFETY

Community and airfield safety is paramount to the Navy. It is also a shared responsibility between the Navy and the surrounding communities, with each playing a vital role. The Navy has established a flight safety program and areas of accident potential around NAS Whiting Field airfields to assist in planning for the health, safety, and welfare in communities near these airfields. Cooperation between the Navy and local communities can improve land use planning and development surrounding naval airfields.

Identifying safety issues assists communities with developing land uses compatible with airfield operations. These issues include areas of accident potential and hazards around the airfield that obstruct or interfere with aircraft arrivals and departures, pilot vision, communications, or aircraft electronics. While aircraft mishaps are rare, they do occur. Aircraft safety and mishaps at the NAS Whiting Field Complex are discussed in detail in this chapter.

5.1 ACCIDENT POTENTIAL ZONES

Recognizing the need to identify areas of accident potential, in the 1970s and 1980s, the military conducted studies of historic accident and operations data throughout the military. The studies showed that most aircraft mishaps would most likely occur, if one were to occur, on or near the runway, diminishing in likelihood with distance from the runway. Based on the studies, the DOD identified APZs as areas where an aircraft accident would most likely occur. APZs are not a prediction of the number of accidents or the odds of an accident occurring; APZs only reflect the most likely location of an accident.

APZs align with departure, arrival, and pattern flight tracks, and are designed to minimize potential harm if a mishap were to occur by limiting high-density or intensive uses in the designated APZs. The Navy and local planning authorities use APZs to ensure compatible development in close proximity to runway ends and slightly beyond. Although the likelihood of an

accident is remote, the Navy recommends that land uses that concentrate large numbers of people (e.g., apartments, churches, and schools) be avoided within APZs.

5.1.1 CLEAR ZONE AND ACCIDENT POTENTIAL ZONE REQUIREMENTS AND DIMENSIONS

APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and have been established for all runway classifications. There are three different APZs: Clear Zone, APZ I, and APZ II. APZs are, in part, based on the number of operations conducted at the airfield—more specifically, the number of operations conducted for specific flight tracks.

An accident is more likely to occur in APZ I than in APZ II, and is more likely to occur in the Clear Zone than in APZ I or APZ II. An APZ II area is designated whenever APZ I is required. APZs extend from the end of the runway, but apply to the predominant arrival and departure flight tracks used by the aircraft. Therefore, if an airfield has more than one predominant flight track to or from the runway, APZs can extend in the direction of each flight track.

Within the Clear Zone, most uses are incompatible with military aircraft operations. For this reason, the Navy's policy is to acquire real property interests in land within the Clear Zone to ensure incompatible development does not occur. Within APZ I and APZ II, a variety of land uses are compatible; however, people-intensive uses should be restricted because of the greater risk in these areas.

In addition to the Clear Zone, there is a lateral Clear Zone, also called the "primary surface," which extends outwards from each side and for the length of the runway. The width of the primary surface area is 1,000 feet for Class A runways and 1,500 feet for Class B runways.

The AICUZ Instruction defines the components of standard APZs for Class A and Class B fixed-wing runways and rotary-wing runways as follows, and as shown on Figures 5-1 and 5-2, respectively.

Class A Runways
- ☐ NAS Whiting Field North and South
- ☐ NOLF Evergreen
- ☐ NOLF Brewton
- ☐ NOLF Silverhill
- ☐ NOLF Summerdale
- ☐ NOLF Barin
- ☐ NOLF Wolf

Class B Runway
- ☐ NOLF Choctaw

Rotary-Wing Facilities
- ☐ NOLF Site 8
- ☐ NOLF Pace
- ☐ NOLF Spencer
- ☐ NOLF Harold
- ☐ NOLF Santa Rosa

FIXED-WING CLASS A RUNWAYS

Except for NOLF Choctaw, all fixed-wing runways within the NAS Whiting Field Complex are Class A.

☐ **Clear Zone.** The Clear Zone is a rectangular area lying immediately beyond the end of the runway and outward along the extended runway centerline for a distance of 3,000 feet. The Clear Zone measures 1,000 feet in width. A Clear Zone is required for all active runways and should remain undeveloped.

☐ **APZ I.** APZ I is the rectangular area beyond the Clear Zone that still has a measurable potential for aircraft accidents relative to the Clear Zone. APZ I is provided under flight tracks which experience 5,000 or more annual operations (departures or approaches). APZ I is typically 1,000 feet in width and 2,500 feet in length and may be rectangular or curved to conform to the shape of the predominant flight track.

☐ **APZ II.** APZ II is the rectangular area beyond APZ I (or the Clear Zone, if APZ I is not used) that has a measurable potential for aircraft accidents relative to APZ I or the Clear Zone. APZ II is always provided where APZ I is required. The dimensions of APZ II are typically 1,000 feet in width by 2,500 feet in length and, as with APZ I, may be curved to correspond with the predominant flight track.

FIXED-WING CLASS B RUNWAYS

NOLF Choctaw is the only Class B fixed-wing runway within the NAS Whiting Field Complex.

☐ **Clear Zone.** The Clear Zone is a trapezoidal area lying immediately beyond the end of the runway and outward along the extended runway centerline for a distance of 3,000 feet. The Clear Zone measures 1,500 feet in width at the runway threshold and 2,284 feet in width at the outer edge. A Clear Zone is required for all active runways and should remain undeveloped.

☐ **APZ I.** APZ I is the rectangular area beyond the Clear Zone which still has a measurable potential for aircraft accidents relative to the Clear Zone. APZ I is provided under flight tracks which experience 5,000 or more annual operations

(departures or approaches). APZ I is typically 3,000 feet in width and 5,000 feet in length and may be rectangular or curved to conform to the shape of the predominant flight track.

☐ APZ II. APZ II is the rectangular area beyond APZ I (or the Clear Zone if APZ I is not used) that has a measurable potential for aircraft accidents relative to APZ I or the Clear Zone. APZ II is always provided where APZ I is required. The dimensions of APZ II are typically 3,000 feet in width by 7,000 feet in length and, as with APZ I, may be curved to correspond with the predominant flight track.

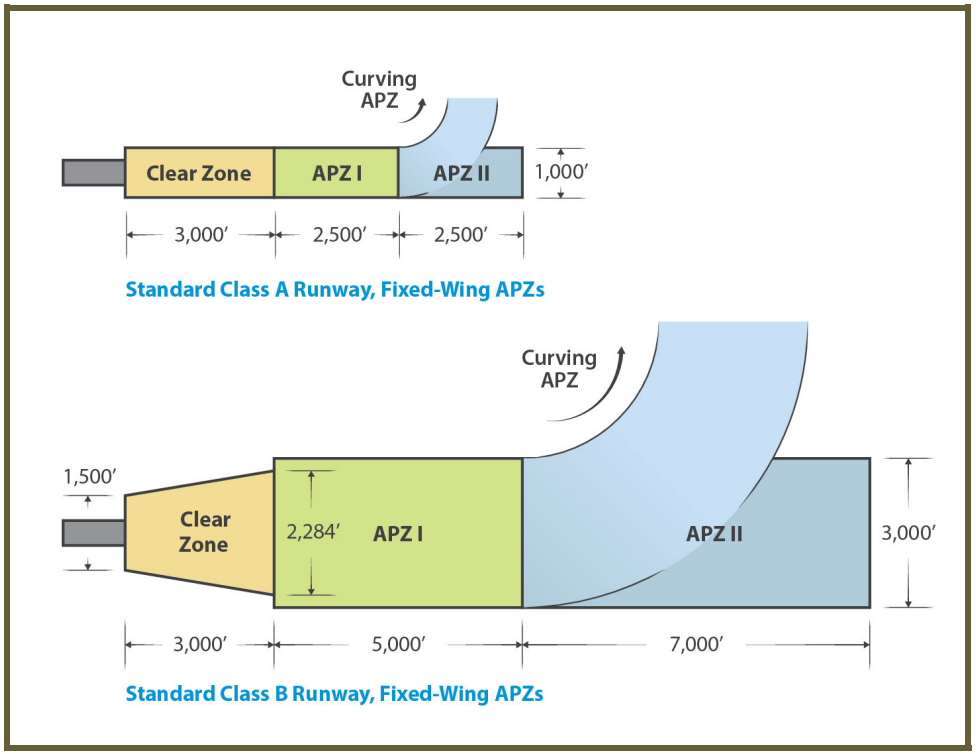


Figure 5-1 Accident Potential Zones for Class A and B Runways

APZs extend from the end of the runway, but apply to the predominant arrival and/or departure flight tracks used by the aircraft. Therefore, if an airfield has more than one predominant flight track to or from the runway, APZs can extend in the direction of each flight track, as shown on Figure 5-1. As the distance of a flight track to an installation decreases, the potential for flight tracks to overlap or converge increases.

When similar mode tracks align (e.g., straight-in arrival, overhead break arrival, arrival portion of a pattern operation), the operation counts are combined to determine if the number of annual operations requires the designation as APZ I. The AICUZ Instruction permits modification of APZ dimensions for safety purposes and specific operations. Per the Instruction, if the APZ annual operations threshold is fulfilled due to FCLP operations, then APZ II shall extend the entire length of the FCLP track, resulting in a closed loop for the entire pattern.

ROTARY-WING FACILITIES

The components of standard APZs for helicopters, which are much smaller than those for fixed-wing aircraft, are defined in the AICUZ Instruction (OPNAVINST 11010.36C) as follows and as illustrated on Figure 5-2:

- **Clear Zone.** The Takeoff Safety Zone for VFR rotary-wing facilities shall be used as the Clear Zone. The Takeoff Safety Zone is that area under the VFR approach/departure surface until that surface is 50 feet above the established landing area elevation.

- **APZ I.** APZ I is the area beyond the Clear Zone for the remainder of the approach/departure zone, which is defined as the area under the VFR approach/departure surface until that surface is 150 feet above the established landing area elevation.

- **APZ II.** APZ II is generally not applied to helicopter flight paths unless the local accident history indicates the need for additional protection

In addition to the standard APZs defined in the AICUZ Instruction, modified APZs were approved and used for the NOLFs in this AICUZ Study (Appendix B).

The Clear Zones for helicopters are provided for all VFR landing pads/runways or training aids. The use of APZ I is provided for all VFR landing pads/runways or training aids located at air installations that support daily training and operations missions.

Since extensive land use controls apply to IFR landing pads/runways, additional Clear Zones and APZs are not normally required for IFR helicopter facilities due to the extensive IFR primary surface area.

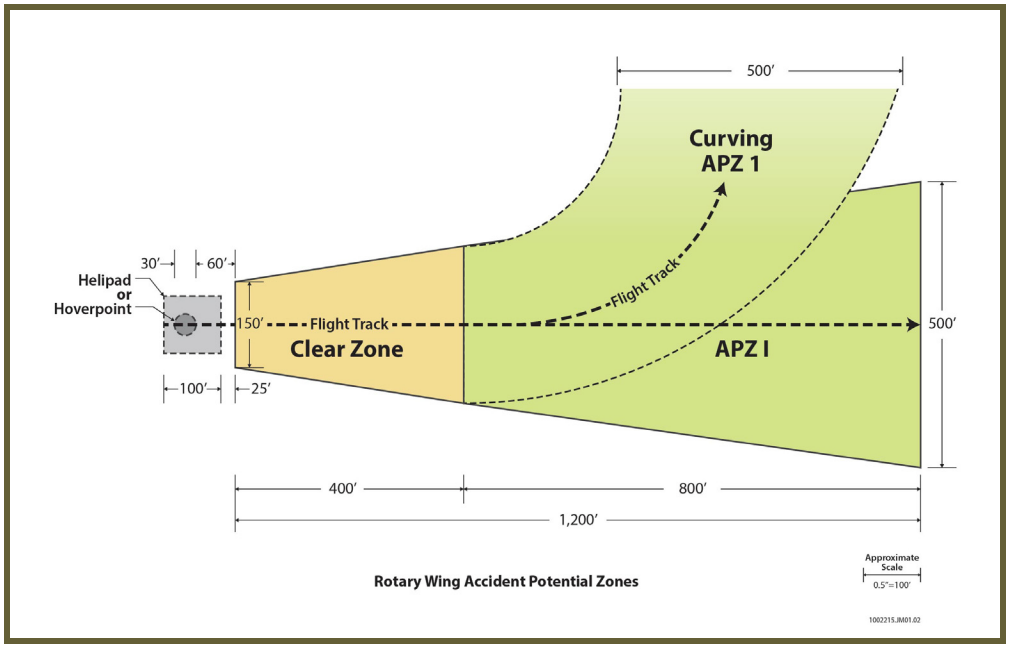


Figure 5-2 Rotary-Wing Accident Potential Zones

5.2 AIRFIELD-SPECIFIC ACCIDENT POTENTIAL ZONE DATA

The 2015 AICUZ APZs for each airfield in the NAS Whiting Field Complex are presented under corresponding headings in Chapter 7 of this document. Chapter 7 includes a detailed analysis of areas impacted and comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ APZs. Refer to Chapter 7 for APZ data for NAS Whiting Field Main Station and the 12 affiliated NOLFs.

Unless listed below, airfield APZs for the NAS Whiting Field Complex were established using the operations provided in the 2015 Noise Study conducted as part of this 2015 AICUZ Study. The airfield APZs that were provided by other existing documents and the justification for their inclusion are summarized in Table 5-1:

- ☐ NOLF Silverhill. This airfield is periodically used to conduct low approaches and is not actively used by TRAWING FIVE for other operations. APZs presented in the 1990 AICUZ are presented in this AICUZ Study as the 2015 AICUZ APZs.
- ☐ NOLF Summerdale. Operational data and APZs were developed in 2011 as part of the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011.
- ☐ NOLF Barin. Operational data and APZs were developed in 2011 as part of the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011.
- ☐ NOLF Wolf. This airfield is periodically used to conduct low approaches and not actively used by TRAWING FIVE for other operations. APZs presented in the 1990 AICUZ are presented in this AICUZ Study as the 2015 AICUZ APZs.
- ☐ NOLF Choctaw. Noise analysis and APZ development conducted as part of the U.S. Air Force Final Environmental Impact Statement for Proposed Implementation of the Base Realignment and Closure 2005 Decisions and Related Actions at Eglin AFB, Florida, October 2008, and modified in this AICUZ Study to include closed-loop APZs to account for FCLP operations.

TABLE 5-1 2015 AICUZ APZ SOURCE DATA

AIRFIELD	SOURCE DATA FOR 2015 AICUZ APZs	NOTES
North	Developed as part of this AICUZ Study.	None.
South	Developed as part of this AICUZ Study	None.
Evergreen	Developed as part of this AICUZ Study	None.
Brewton	Developed as part of this AICUZ Study	None.
Silverhill	1990 AICUZ Study	Use of this field is not in projected in CY2025 operations.
Summerdale	Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011	This report presents CY2015 operations, which represents when the T-6 will be in full operation.
Barin	Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields Naval Air Station Whiting Field, Florida, January 2011	This report presents CY2015 operations, which represents when the T-6 will be in full operation.
Wolf	1990 AICUZ Study	Use of this field is not in projected in CY2025 operations.
Choctaw	Final U.S. Air Force Environmental Impact Statement for Proposed Implementation of the Base Realignment and Closure 2005 Decisions and Related Actions at Eglin AFB, Florida. October 2008	Final Supplemental EIS published June 2014, Draft Supplemental EIS published September 2010. Navy determined to incorporate data presented in the Final EIS due to best available data. APZs were modified as part of this AICUZ Study to incorporate closed-loop APZs to account for existing FCLP operations.
Site 8	Developed as part of this AICUZ Study	APZs developed according to the modified APZ geometry approved by Chief of Naval Operations (CNO) in December 2015, Appendix B
Pace	Developed as part of this AICUZ Study	APZs developed according to the modified APZ geometry approved by CNO in December 2015, Appendix B
Spencer	Developed as part of this AICUZ Study	APZs developed according to the modified APZ geometry approved by CNO in December 2015, Appendix B
Harold	Developed as part of this AICUZ Study	APZs developed according to the modified APZ geometry approved by CNO in December 2015, Appendix B
Santa Rosa	Developed as part of this AICUZ Study	APZs developed according to the modified APZ geometry approved by CNO in December 2015, Appendix B

5.3 IMAGINARY SURFACES

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

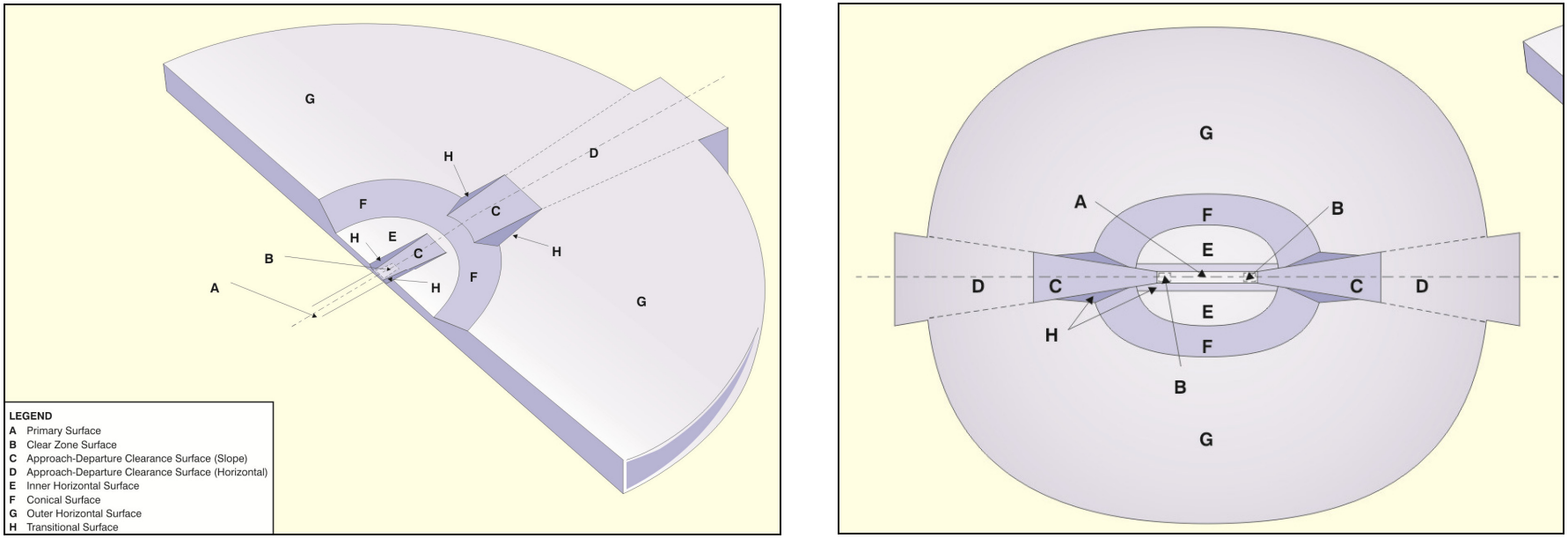
In general, no aboveground structures are permitted in the primary surface of Clear Zones, and height restrictions apply to transitional surfaces and approach and departure surfaces. Height restrictions are more stringent as one approaches the runway and flight path.

As noted above, each runway has assigned imaginary surfaces; therefore, imaginary surfaces are applied to each runway, resulting in overlapping surfaces. Fixed-wing runways and rotary-wing runways/helipads have different imaginary surfaces. Brief descriptions and illustrations of the imaginary surfaces for fixed-wing Class A and B runways and rotary-wing airfields are provided in Table 5-2 and Figure 5-3 (fixed-wing runways). While the Navy and FAA identify imaginary surfaces for both fixed-wing Class A and Class B runways and rotary-wing airfields, imaginary surface data for NAS Whiting Field Complex's rotary-wing airfields were unavailable. Therefore, imaginary surfaces for rotary-wing airfields were not analyzed as part of this AICUZ Study. The imaginary surfaces for select airfields in the NAS Whiting Field Complex are presented under corresponding headings in Chapter 7 of this document.

TABLE 5-2 IMAGINARY SURFACES – CLASS A AND B FIXED-WING RUNWAYS

PLANES AND SURFACES	GEOGRAPHICAL DIMENSIONS
Class A (All fixed-wing runways, excluding NOLF Choctaw)	
Primary Surface	Aligned (longitudinally) with each runway and extending 200 feet from each runway end. The width is 1,000 feet.
Clear Zone	Located immediately adjacent to the end of the runway, and extending 3,000 feet beyond the end of the runway. The width is 1,000 feet wide.
Approach - Departure Clearance Surface	An inclined or combination inclined and horizontal plane, symmetrical about the runway centerline. The slope of the surface is 40:1 until an elevation of 500 feet and continues horizontally 50,000 feet from the beginning. The outer width is 16,000 feet.
Inner Horizontal Surface	An oval-shaped plane 150 feet above the established airfield elevation. Constructed by scribing an arc with a radius of 7,500 feet around the centerline of the runway.
Outer Horizontal Surface	A horizontal plane located 500 feet above the established airfield elevation, extending outward from the conical surface for 30,000 feet.
Conical Surface	An inclined plane that extends from the inner horizontal surface outward and upward at a 20:1 slope and extends for 7,000 feet and to a height of 500 feet above the established airfield elevation.
Transitional Surface	An inclined plane that connects the primary surface and the approach-departure clearance surface to the inner horizontal surface, conical surface, and outer horizontal surface. These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline, extended at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surfaces.
Class B (NOLF Choctaw)	
Primary Surface	Aligned (longitudinally) with each runway and extending 200 feet from each runway end. The width is 1,500 feet.
Clear Zone	Located immediately adjacent to the end of the runway, extending 3,000 feet beyond the end of the runway. The width is 1,500 feet and flares out to 2,284 feet wide.
Approach- Departure Clearance Surfaces	An inclined or combination inclined and horizontal plane, symmetrical about the runway centerline. The slope of the surface is 50:1 until an elevation of 500 feet and continues horizontally 50,000 feet from the beginning. The outer width is 16,000 feet.
Inner Horizontal Surface	An oval-shaped plane 150 feet above the established airfield elevation. Constructed by scribing an arc with a radius of 7,500 feet around the centerline of the runway.
Outer Horizontal Surface	A horizontal plane located 500 feet above the established airfield elevation, extending outward from the conical surface for 30,000 feet.
Conical Surface	An inclined plane that extends from the inner horizontal surface outward and upward at a 20:1 slope and extends for 7,000 feet and to a height of 500 feet above the established airfield elevation.
Transitional Surface	An inclined plane that connects the primary surface and the approach-departure clearance surface to the inner horizontal surface, conical surface, and outer horizontal surface. These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline, extended at a slope of 7:1 from the sides of the primary surface and from the sides of the approach surfaces.

Source: Navy 1982



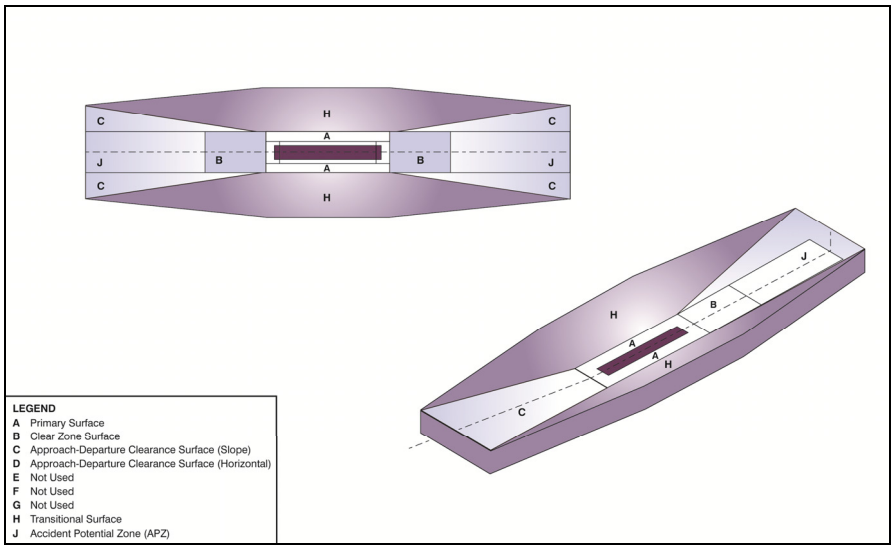
Class A Runway

Class B Runway

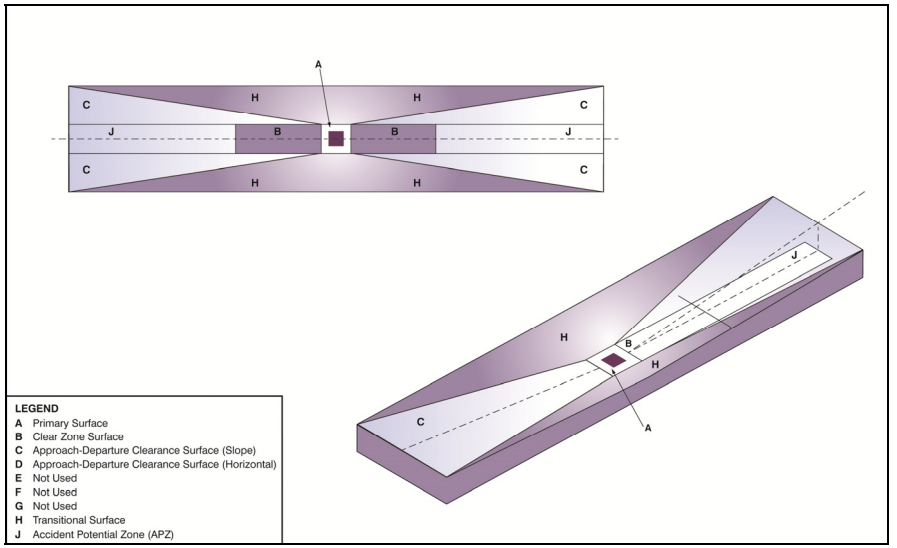
Figure 5-3 Imaginary Surfaces and Transition Planes for Class A and Class B Runways

The major helicopter landing facilities consist of helipads and helicopter runways. Airspace clearances for helicopter facilities differ for IFR and VFR; therefore, the type of flight operations must be identified before the obstruction standards may be applied. Standard helicopter operations at NAS Whiting Field's helicopter runways and helipads do not operate under IFR conditions; therefore, imaginary surfaces, as they apply to IFR operations, are not presented in this AICUZ Study.

NAS Whiting Field South Field runways meet Class A runway requirements and have VFR helicopter facilities, along with NOLFs Pace, Spencer, Harold, Site 8, and Santa Rosa (Figure 5-4 and Table 5-3).



Helicopter VFR Runway



Helipad VFR Runway

Figure 5-4 Imaginary Surfaces and Transition Planes for Helicopter and Helipad Runways

TABLE 5-3 IMAGINARY SURFACES – ROTARY-WING LANDING FACILITIES

PLANES AND SURFACES	GEOGRAPHICAL DIMENSIONS
Primary Surface	A horizontal plane symmetrically centered on the helicopter runway or helipad at the established elevation of the landing surface. Dimensions for facilities by type of operations are provided below: – VFR Helipad: extends 150 feet and is 150 feet wide – VFR Runway: extends the runway length plus 75 feet at each end and is 300 feet wide – IFR Helipad: extends 1,550 feet and is 750 feet wide – IFR Runway (single GPI): extends 1,550 and is 750 feet wide – IFR Runway (double GPI): extends 2,450 feet and is 750 feet wide *Note: GPI, ground point intercept, the helicopter touchdown point.
Horizontal Surface (IFR only)	A circular or oval level plan, located 150 feet above the established runway or helipad elevation, defined by an arc with a 4,600-foot radius from the GPI.
Approach-Departure Clearance Surface	An included plane which flares outward and upward above the runway or helipad. It starts at the end of the primary surface with the same width as the primary surface at the established elevation of the landing surface. The area under this surface is referred to as the approach-departure zone. Dimensions for facilities by type of operations are provided below: – VFR Helipad: starting width 150 feet, flares to 500 feet, and extends 1,200 feet – VFR Runway: starting width 300 feet, flares to 600 feet, and extends 1,200 feet – IFR Helipad and Runway: starting width 750 feet, flares to 8,000 feet and extends 24,225 feet.
Transitional Surfaces	Planes that connect the primary surface and the approach-departure clearance surface and horizontal surface. Each surface is outward and upward from the edge of the primary surface or approach-departure surface at a specified slope measured perpendicular to the runway centerline or helipad centerline. – VFR Runway: Slope ratio is 2:1 and rises150 feet above the landing surface – VFR Helipad: Slope ratio is 2:1 until it reaches a distance of 250 feet from the centerline, then rises to 150 feet above the landing surface – IFR Facilities: Slope ratio is 4:1 and rises to the horizontal surface and continues until an elevation of 375 feet above the approach-departure surface is reached.
Take Off Safety Zone	Required under the first 400 feet of VFR approach-departure clearance surfaces and has the same width as the approach-departure surface. Not required at IFR facilities due to the extensive primary surface provided at these facilities.

Source: Navy 1982

5.4 FLIGHT SAFETY

APZs identify probable impact areas if an accident were to occur; however, APZs do not predict the probability of an accident occurring.

Flight safety programs are designed to reduce the hazards that can cause aircraft mishaps; APZs are designed to minimize the potential harm if a mishap were to occur.

Flight safety not only includes measures for pilot safety during aircraft operations, but also for the safety of those in the community. The FAA and the military define flight safety zones (imaginary surfaces, see Section 5.3) below aircraft arrival and departure flight tracks around airfields and runways. Heights of structures and trees are restricted in these imaginary surfaces, and the FAA evaluates proposed construction to mitigate impacts. The flight safety zones are designed to reduce the hazards that can cause an aircraft mishap. This section discusses aircraft mishaps at the NAS Whiting Field Complex, hazards to flight safety that should be avoided in the airfield vicinity, and measures to avoid potential pilot interferences.

5.4.1 AIRCRAFT MISHAPS

The Navy categorizes aircraft mishaps into one of three primary groups: Class A, B, or C. The classification system is based on the severity of injury to the individuals involved and the total property damage. The most severe is a Class A mishap, and the least severe is a Class C mishap (for reportable mishaps). Mishaps have been reported at NAS Whiting Field since the 1990 AICUZ Study was released.

5.4.2 BIRD/ANIMAL AIRCRAFT STRIKE HAZARD

Wildlife can be a significant hazard to flight operations. Birds and wildlife are drawn to different habitat types found in the airfield environment (edges, grass, brush, forest, water, and even the warm pavement of the runways). Due to the speed of the aircraft, collisions with wildlife can happen with considerable force and can cause substantial damage. Although most bird and animal strikes do not result in crashes, they can cause structural and mechanical damage to aircraft, as well as loss of flight time.

Most bird collisions occur when the aircraft is at an elevation of less than 1,000 feet. To reduce bird/animal aircraft strike hazard (BASH), the FAA and the military recommend locating land uses that attract birds at least 10,000 feet from active movement areas of the airfields. Land uses that attract birds and other wildlife include transfer stations, landfills, golf courses, wetlands, stormwater ponds, and dredge disposal sites. Design modification can reduce the attraction of these land uses. NAS Whiting Field employs a BASH coordinator whose objective is to mitigate and address BASH incidents.

5.4.3 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 electromagnetic interference (EMI). EMI is defined by the American National Standards Institute as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. EMI 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. Mega-watt wind turbines cause EMI and pose a hazard to air navigation. 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. EMI can also moderately interfere with consumer devices, such as cell phones, FM radios, television reception, and garage door openers.

5.4.4 LIGHTING

Bright lights, either direct or reflected, in the airfield vicinity can impair a pilot's vision, especially at night or during use of night-vision devices. 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. This is particularly dangerous at night when the flash can diminish the eye's adaptation to darkness. Partial recovery takes only a few minutes, but full recovery typically requires 40 to 45 minutes. Visible lasers, including low-powered legal laser pointers, are emerging as a safety concern for pilots. Visual interference with pilot performance due to lasers can result in temporary flashblindness, glare, disruptions, and distractions. These are most hazardous during critical phases of flight (i.e., landings, takeoffs, and emergency maneuvers). There is also

concern about urban lighting that is not downward-directed, as well as the potential impacts of light-emitting diode, or "LED," lights on pilots who are training with NVGs.

5.4.5 SMOKE, DUST, AND STEAM

Land uses that generate smoke, dust, and steam in the airfield vicinity could obstruct the pilot's vision during takeoff, landing, or other periods of low-altitude flight. While the potential for land uses to generate dust and steam in the vicinity of the airfields is low, wildfires have the potential to generate smoke. Wildfires and their potential impacts could be reduced through prescribed burns in areas located adjacent to NAS Whiting Field Complex airfields.

6

6.1 Land Use Compatibility Guidelines and Classifications

6.2 Planning Authorities

6.3 Airfield-Specific Land Use Compatibility Analysis

LAND USE COMPATIBILITY AND PLANNING AUTHORITIES

APZs and noise contours make up the AICUZ footprint for an air installation and NOLFs. The AICUZ footprint defines the minimum recommended acceptable area within which land use controls are needed to protect the health, safety, and welfare of those living or working near a military airfield and to preserve the defense flying mission. The AICUZ guidance and recommendations set forth in this AICUZ Study are the fundamental tools necessary for the AICUZ planning process. The AICUZ noise zones and APZs should be adopted into individual county planning processes to best guide compatible development around the installation and NOLFs.

The information presented in this section of the AICUZ Study is intended for consideration by the NAS Whiting Field Complex, government entities at the city, state, and county levels, surrounding communities, and other interested groups and participating agencies.

The purpose of the AICUZ Program is to use the data as a planning tool to encourage cooperative land use planning between the air installations and the community so that future growth and development are compatible with the operational missions of the installations; and to seek ways to lessen the operational impacts on adjacent land (Navy 2008). Although ultimate control over land use and development surrounding the air installation is the responsibility of local governments, through information in AICUZ studies, the Navy encourages localities to implement programs, policies, and regulations that advance compatible development near air installations.

Military installations can make recommendations or advise local governments and agencies on land use outside an installation, but development of the land is dictated by local land use planning, ordinances, and regulations.

This section begins with a discussion of the generalized land use compatibility criteria used in AICUZ studies to evaluate land use compatibility, followed by descriptions of the of the local planning authorities in Conecuh, Escambia, and Baldwin counties Alabama, and Escambia and Santa Rosa counties, Florida.

6.1 LAND USE COMPATIBILITY GUIDELINES AND CLASSIFICATIONS

OPNAVINST 11010.36C Recommendations

Noise-sensitive land uses (e.g., houses, churches, schools) be placed outside high noise zones

People-intensive uses (e.g., apartments, theaters, shopping centers) be placed outside APZs.

The Navy has developed land use compatibility recommendations for noise zones and APZs. These recommendations, which are found in OPNAVINST 11010.36C, Air Installations Compatible Use Zones Program (Navy 2008), are intended to serve as guidelines for development of land uses around military air installations. The guidelines are based on federal and DOD standards, and recommend that noise-sensitive land uses (e.g., houses, churches, schools) be placed outside high-noise zones, and people-intensive uses (e.g., apartments, theaters, shopping centers) not be placed in APZs. Certain land uses are considered incompatible with APZs and high noise zones, while other land uses may be considered compatible or compatible under certain conditions (compatible with restrictions).

The land use compatibility analysis conducted for the NAS Whiting Field Complex was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

6.1.1 SUGGESTED LAND USE COMPATIBILITY FOR NOISE

Noise Zone 1 - an area of minimal impact where less than 15 percent of the population is expected to be highly annoyed.

Noise Zone 2 - an area of moderate impact where between 15 percent and 39 percent of the population is expected to be highly annoyed.

Noise Zone 3 - an area of most severe impact where greater than 39 percent of the population is expected to be highly annoyed.

As discussed in Section 4.1, What is Sound/Noise?, DNL metrics present reliable measures of community sensitivity to aircraft noise. For land use planning purposes in AICUZ studies, noise exposure areas are divided into three noise zones, based on DNL measurements:

- ☐ Noise Zone 1 (60 to <65 dB DNL) is essentially an area of low or no impact.
- ☐ Noise Zone 2 (65 to <75 dB DNL) is an area of moderate impact where some land use controls are recommended.
- ☐ Noise Zone 3 (>75 dB DNL) is the most severely impacted area where the greatest degree of compatible land use controls are recommended.

In addition to noise zones, areas of concern may be defined where noise levels are not generally considered to be objectionable (less than DNL 65), but land use controls should be applied in that particular area. It is important to note that the noise contours described in Chapter 4, Aircraft Noise, are not intended to be precise representations of the noise perceived by an individual. A number of factors can influence the propagation of, and reaction to, noise, including geographic features, weather, and the receiver's perception of the source. It is noted that a portion of the population will be annoyed even by the lower levels of noise in Noise Zone 1.

OPNAVINST 11010.36C Recommendations

Noise-sensitive land uses (e.g., houses, churches, schools) be placed outside high noise zones

People-intensive uses (e.g., apartments, theaters, shopping centers) be placed outside APZs.

6.1.2 SUGGESTED LAND USE COMPATIBILITY FOR ACCIDENT POTENTIAL ZONES

For land use planning purposes, the Navy's recommended land use compatibility guidelines for Clear Zones and APZs are shown in Table 6-1. Local planning and zoning authorities may wish to implement different criteria than those included herein to reflect specific local conditions. Chief of Naval Operations (CNO) approval is required prior to an installation's public support of any criteria other than that contained in OPNAVINST 11010.36C.

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL
10	Residential							
11	Household units	NA	NA	NA	N[28]	N[28]	N	N
11.11	Single units; detached	N	N	Y[2]	N[28]	N[28]	N	N
11.12	Single units; semidetached	N	N	N	N[28]	N[28]	N	N
11.13	Single units; attached row	N	N	N	N[28]	N[28]	N	N
11.21	Two units; side-by-side	N	N	N	N[28]	N[28]	N	N
11.22	Two units; one above the other	N	N	N	N[28]	N[28]	N	N
11.31	Apartments; walk up	N	N	N	N[28]	N[28]	N	N
11.32	Apartments; elevator	N	N	N	N[28]	N[28]	N	N
12	Group quarters	N	N	N	N[28]	N[28]	N	N
13	Residential hotels	N	N	N	N[28]	N[28]	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	N[28]	N[28]	N[28]	N
16	Other residential	N	N	N	N[28]	N[28]	N	N
20	Manufacturing[3]							
21	Food and kindred products; manufacturing	N	N	Y[4]	Y	Y[29]	Y[30]	Y[31]
22	Textile mill products; manufacturing	N	N	Y[4]	Y	Y[29]	Y[30]	Y[31]
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	Y	Y[29]	Y[30]	Y[31]
24	Lumber and wood products (except furniture); manufacturing	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]
25	Furniture and fixtures; manufacturing	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]
26	Paper and allied products; manufacturing	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL
27	Printing, publishing, and allied industries	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]
28	Chemicals and allied products; manufacturing	N	N	N	Y	Y[29]	Y[30]	Y[31]
29	Petroleum refining and related industries	N	N	N	Y	Y[29]	Y[30]	Y[31]
30	Manufacturing (continued) [3]							
31	Rubber and misc. plastic products; manufacturing	N	N	N	Y	Y[29]	Y[30]	Y[31]
32	Stone, clay, and glass products; manufacturing	N	N	Y[4]	Y	Y[29]	Y[30]	Y[31]
33	Primary metal products; manufacturing	N	N	Y[4]	Y	Y[29]	Y[30]	Y[31]
34	Fabricated metal products; manufacturing	N	N	Y[4]	Y	Y[29]	Y[30]	Y[31]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	Y	25	30	N
39	Miscellaneous manufacturing	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]
40	Transportation, communication and utilities[6,7]							
41	Railroad, rapid rail transit, and street railway transportation	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
42	Motor vehicle transportation	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
43	Aircraft transportation	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
44	Marine craft transportation	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
45	Highway and street right-of-way	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
46	Automobile parking	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
47	Communication	N	Y [5,7]	Y[5]	Y	25[32]	30[32]	N
48	Utilities	N	Y [5,7]	Y[5]	Y	Y[29]	Y[30]	Y[31]
485	Solid waste disposal (landfills, incineration, etc.)	N	N	N	NA	NA	NA	NA
49	Other transportation, communication, and utilities	N	Y [7]	Y[7]	Y	25[32]	30[32]	N

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL
50	Trade							
51	Wholesale trade	N	Y[5]	Y[5]	Y	Y[29]	Y[30]	Y[31]
52	Retail trade – building materials, hardware, and farm equipment	N	Y[8]	Y[8]	Y	Y[29]	Y[30]	Y[31]
53	Retail trade[10] – shopping centers, home improvement store, discount club, electronics superstore	N	N	Y[9]	Y	25	30	N
54	Retail trade – food	N	N	Y[11]	Y	25	30	N
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y[12]	Y[12]	Y	25	30	N
56	Retail trade – apparel and accessories	N	N	Y[13]	Y	25	30	N
57	Retail trade – furniture, home furnishings, and equipment	N	N	Y[13]	Y	25	30	N
58	Retail trade – eating and drinking establishments	N	N	N	Y	25	30	N
59	Other retail trade	N	N	Y[9]	Y	25	30	N
60	Services[14]							
61	Finance, insurance, and real estate services	N	N	Y[15]	Y	25	30	N
62	Personal services	N	N	Y[16]	Y	25	30	N
62.4	Cemeteries	N	Y[17]	Y[17]	Y	Y[29]	Y[30]	Y [31,37]
63	Business services (credit reporting; mail, stenographic reproduction; advertising)	N	N	Y[18]	Y	25	30	N
63.7	Warehousing and storage services	N	Y[19]	Y[19]	Y	Y[29]	Y[30]	Y[31]
64	Repair services	N	Y[20]	Y[20]	Y	Y[29]	Y[30]	Y[31]
65	Professional services	N	N	Y[18]	Y	25	30	N
65.1	Hospitals, other medical facilities	N	N	N	25	30	N	N

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL
65.16	Nursing homes	N	N	N	N[28]	N[28]	N	N
66	Contract construction services	N	Y[20]	Y[20]	Y	25	30	N
67	Governmental services	N	N	Y[11]	Y[28]	25	30	N
68	Educational services	N	N	N	25	30	N	N
69	Miscellaneous	N	N	Y[18]	Y	25	30	N
70	Cultural, entertainment and recreational							
71	Cultural activities (and churches)	N	N	N	25	30	N	N
71.2	Nature exhibits	N	Y[21]	Y[21]	Y[28]	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	25	30	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y[33]	Y[33]	N	N
73	Amusements- fairgrounds, miniature golf, driving ranges; amusement parks, etc.	N	N	Y	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[20, 21]	Y[20, 21]	Y[28]	25	30	N
75	Resorts and group camps	N	N	N	Y[28]	Y[28]	N	N
76	Parks	N	Y[20, 21]	Y[20, 21]	Y[28]	Y[28]	N	N
79	Other cultural, entertainment and recreation	N	Y[17, 20]	Y[17, 20]	Y[28]	Y[28]	N	N
80	Resource production and extraction							
81	Agriculture (except livestock)	Y[6]	Y[22]	Y[22]	Y[34]	Y[35]	Y[36]	Y[36, 37]
81.5, 81.7	Livestock farming and breeding	N	Y[22, 23]	Y[22, 23]	Y[34]	Y[35]	N	N

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL
82	Agricultural related activities	N	Y[22, 24]	Y[22, 24]	Y[34]	Y[35]	Y[36]	Y[36, 37]
83	Forestry activities[25]	N	Y[24]	Y[24]	Y[34]	Y[35]	Y[36]	Y[36, 37]
84	Fishing activities[26]	N[26]	Y[24]	Y[24]	Y	Y	Y	Y
85	Mining activities	N	Y[24]	Y[24]	Y	Y	Y	Y
89	Other resource production and extraction	N	Y[24]	Y[24]	Y	Y	Y	Y
90	Other							
91	Undeveloped Land	Y	Y	Y	NA	NA	NA	NA
93	Water areas	N[27]	N[27]	N[27]	NA	NA	NA	NA

Adapted from OPNAVINST 11010.36.C (Navy 2008).

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 installations and local governments, general suggestions as to FARs are provided as a guide to densities in some categories. In general, land-use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ 1 and 50 per acre in APZ 2 are the range of occupancy levels, including employees, considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ 1, and Maximum (MAX) assemblies of 50 people per acre in APZ 2.
2. The suggested maximum density for detached single-family housing is 1 to 2 dwelling units per acre (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, provided the amount of surface area covered by structures does not exceed 20 % 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. Maximum FAR of 0.56 in APZ 2.
5. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2.
6. No structures (except airfield lighting), buildings, or aboveground utility/communications lines should normally be located in clear zone areas on or off the installation. The clear zone is subject to severe restrictions. See UFC 3-260-01 "Airfield and Heliport Planning and Design" dated 10 November 2001 for specific design details.
7. No passenger terminals and no major aboveground transmission lines in APZ 1.
8. Within SLUCM Code 52, Max FARs for lumber yards (SLUCM Code 521) are 0.20 in APZ 1 and 0.40 in APZ 2. For hardware/paint and farm equipment stores, SLUCM Code 525, the Max FARs are 0.12 in APZ 1 and 0.24 in APZ 2.
9. Maximum FAR of 0.16 in APZ 2.
10. 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, supermarket or drug store, discount retailer, department store, or several department stores, respectively. Included in this category are such uses as big box discount and electronics superstores. The Max recommended FAR for SLUCM 53 should be

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL

applied to the gross leasable area of the shopping center rather than attempting to use other recommended FARs listed in Table 2 under "Retail" or "Trade."

11. Maximum FAR of 0.24 in APZ 2.
12. Maximum FAR of 0.14 in APZ 1 and 0.28 in APZ 2.
13. Maximum FAR of 0.28 in APZ 2.
14. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc., are not recommended.
15. Maximum FAR of 0.22 for "General Office/Office park" In APZ 2.
16. Office uses only. Maximum FAR of 0.22 in APZ 2.
17. No chapels are allowed within APZ 1 or APZ 2.
18. Maximum FAR of 0.22 in APZ 2.
19. Maximum FAR of 1.0 in APZ 1 and 2.0 in APZ 2.
20. Maximum FAR of 0.11 in APZ 1 and 0.22 in APZ 2.
21. Facilities must be low intensity and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc., are not recommended.
22. Includes livestock grazing but excludes feedlots and intensive animal husbandry. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.
23. Includes feedlots and intensive animal husbandry.
24. Maximum FAR of 0.28 in APZ 1 and 0.56 in APZ 2. No activity that produces smoke or glare or involves explosives.
25. Lumber and timber products removed due to establishment, expansion, or maintenance of clear zones will be disposed of in accordance with appropriate DOD Natural Resources Instructions.
26. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
27. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are compatible.
28. 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 approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.
    b. Where the community determines that residential uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB in DNL 65-69 and NLR of 30 dB DNL 70-74 should be incorporated into building codes and be in individual approvals; for transient housing a 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 and site planning, design, and use of berms and barriers can help mitigate outdoor exposure, particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures which only protect interior spaces.
29. Measures to achieve an 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.
30. Measures to achieve an 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.
31. Measures to achieve an 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.
32. If the project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.
33. Land use compatible provided special sound reinforcement systems are installed.

TABLE 6-1 LAND USE COMPATIBILITY RECOMMENDATIONS

LAND USE		ACCIDENT POTENTIAL ZONES[1]			NOISE LEVELS			
					NOISE ZONE 2		NOISE ZONE 3	
SLUCM NO.	NAME	CLEAR ZONE	APZ 1	APZ 2	65 TO 69 DNL	70 TO 74 DNL	75 TO 79 DNL	80 TO 84 DNL

34. Residential buildings require an NLR of 25.
35. Residential buildings require an NLR of 30.
36. Residential buildings not permitted.
37. Land-use not recommended, but if the community decides use is necessary, hearing protection devices should be worn.

Key:

Y (Yes) = Land use and related structures compatible without restrictions.
N (No) = Land use and related structures are not compatible and should be prohibited.
Y^x = (Yes with restrictions) The land use and related structures are generally compatible. However, see notes indicated by superscript.
N^x = (No with exceptions) The land use and related structures are generally incompatible. However, see notes indicated by superscript.
SLUCM = Standard Land Use Coding Manual, U.S. Department of Transportation.
NA = Not Applicable (no data available for that category).
FAR = (Floor Area Ratio) A floor area ratio is the ratio between the square feet of floor area of the building and the site area. It is customarily used to measure non-residential intensities.
Du/Ac = (Dwelling Units per Acre) = This metric is customarily used to measure residential densities.
DNL = Day-night average sound level.
L_{dn} = Mathematical symbol for DNL.
NLR = (Noise-Level Reduction) = NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35 = The numbers refer to NLR levels. Land use and related structures generally compatible however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structure. 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.

6.1.3 STANDARD LAND USE CODING MANUAL

The Navy uses the Standard Land Use Coding Manual (SLUCM) classifications in OPNAVINST 11010.36C to assess compatibility with noise zones and APZs. The SLUCM reflects generic land use categories for illustrating a basic and high-level understanding of land use compatibility across some common land use types. Table 6-1 shows SLUCM generalized land use classifications and the associated land use compatibility with each land use designation for noise zones and APZs. However, it is important to note that the land uses provided in Table 6-1 do not represent the local community's land use designations. The local county and city land uses are different coding systems when compared to SLUCM's two- and four-

digit coding system and draw different distinctions between land uses. With local coding systems, there may be multiple land use types per parcel (e.g., agricultural and residential use), whereas the SLUCM identifies parcels by a single type. Therefore, for the purposes of this analysis, the noise zones or APZs for each parcel within the NAS Whiting Field Complex were compared to the closest and most reasonable SLUCM classification.

6.2 PLANNING AUTHORITIES

FEDERAL

The following are federal regulations and programs that provide the NAS Whiting Field Complex the opportunity to guide development and land use within the vicinity of the base and the AICUZ footprint.

NATIONAL ENVIRONMENTAL POLICY ACT

Under the National Environmental Policy Act (NEPA), federal agencies, including the Navy, are required to consider the environmental impacts of any major federal action to determine if they may be significant impacts to the environment. NEPA requires federal agencies to provide the public an opportunity to comment on actions that may significantly impact the environment. Impacts of the action are generally documented in an EA or EIS. NEPA's environmental review process is a viable means for incorporating the fundamentals of an AICUZ study into the planning and review process of a project.

EXECUTIVE ORDER 12372, INTERGOVERNMENTAL REVIEW OF FEDERAL PROGRAMS (JULY 1982)

In accordance with the Intergovernmental Cooperation Act of 1968, the United States Office of Management and Budget requires federal agencies to coordinate and communicate with state, regional, and local officials in the early planning stages of any federal aid development projects. The Intergovernmental Review Program, Executive Order 12372, allows state governments, in consultation with local governments, to establish review periods and processes for federal projects. This provides the Navy with an early entry point to discuss AICUZ issues and introduce AICUZ concepts into the process.

HOUSING AND URBAN DEVELOPMENT CIRCULAR 1390.2: NOISE ABATEMENT AND CONTROL

Under United States Department of Housing and Urban Development (HUD) Circular 1390.2: Noise Abatement and Control, HUD established noise standards and polices for approving noise attenuation measures and HUD-assisted housing projects in high-noise areas. The HUD regulations set forth a discretionary policy to withhold funds for housing projects when noise exposure is in excess of prescribed levels. The HUD regulations allow for new housing construction assisted or supported by HUD within a noise area of 65 dB DNL or less. Construction within a 65 to 75 dB DNL noise area is subject to appropriate sound attenuation measures (e.g., dense wall material [concrete, brick], cavity partitions [airspace between two walls], acoustical blankets [insolation], double-paned windows, solid core wood doors), and construction within an area exceeding a 75 dB DNL noise level is not acceptable. Due to the discretionary framework of the HUD policy, variances may be permitted, depending on regional interpretation and local conditions. HUD regulations include policies that prohibit funding for HUD-assisted projects sited in Clear Zones and APZs unless the project is compatible with the AICUZ. The approval of all mortgage loans from the Federal Housing Administration or the Veterans Administration is subject to the standards and polices of HUD noise regulations.

NAVY

DOD AICUZ PROGRAM

The DOD began the AICUZ Program in the early 1970s to help government entities and communities anticipate, identify, and promote compatible land use and development near military installations. The purpose of the AICUZ Program is to achieve compatibility between air installations and neighboring communities. To satisfy the purpose of the AICUZ Program, the military installation must work with the local community to encourage compatible development of lands adjacent to the installation. Under the AICUZ Program, the Navy has established guidelines that define high noise zones and APZs surrounding the NAS Whiting Field Complex. This AICUZ Study is the latest update to NAS Whiting Field's AICUZ Program, and local governments are encouraged to incorporate the new AICUZ footprint in their land use planning, and development practices.

DOD ENCROACHMENT PARTNERING PROGRAM

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

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

READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION

The National Defense Authorization Act of 2004 granted the DOD the authority to enter into agreements (or partnerships) with private conservation organizations or state and local governments to establish buffers around military training and testing areas to restrict incompatible land use. Funding for the compatible land use efforts is provided to the DOD by Congress under the Readiness and Environmental Protection Integration (REPI). REPI program funding will support service agreements that, as authorized by 10 U.S.C. Section 2684a, seek to: (1) limit any development or use of property that would be incompatible with the mission of the installations; or (2) preserve off-installation habitat to relieve current or future environmental restrictions on military operations.

The REPI program helps military installations sustain operational capabilities and ensure the future use of military training areas. Under the REPI program, the DOD provides funding to military services in support of cost-sharing partnerships with non-federal organizations to purchase easements or acquire an interest in land. Land acquisition initiatives must be negotiated with a willing seller. Through partnerships, military services work with local and state agencies or conservation organizations to identify areas where land acquisition or conservation easements would be mutually beneficial for all parties. The partnership obtains property interest with the goal of controlling growth, preserving open space, and ultimately preventing future encroachment. The protected land obtained through REPI funding is not owned by the military or used for military training or testing.

ALABAMA

ALABAMA STATE LAW

The State of Alabama enacted the Military Land Use Planning Act in February 2014. The Act, 2014-13 (SB 80), adds a new chapter (Chapter 106 Military Land Use Planning) to Title 11 relating to land use development near military installations encouraging compatible land use and helps prevent incompatible urban encroachment upon military installations. The Act requires the local government to notify military installations of certain land use changes by local governments that could significantly affect any area or airspace within 2 miles of the installation and allowing the military installation an opportunity to comment on the proposed land use changes. The Act also amends Section 11-52-8, Code of Alabama 1975, requiring military installations to be included in the local government's Master Plan.

REGIONAL PLANNING AGENCY

Alabama Legislature's Act Nos. 584 and 585 of 1963 established regional planning commissions and authorized existing state and local organizations to participate in the planning process. Subsequently, Act No. 1126 of 1969 authorized the Governor to establish the subdivisions of the state into planning and development districts. Various executive orders have led to the current subdivisions. Today, 12 regional planning organizations make up the Alabama Association of Regional Councils Alabama (AARC). The regional planning organizations, typically called "commissions" or "councils of governments," provide

planning support to their local member governments, address regional issues in areas such as local planning, economic and community development, and human resources coordination, and serve as area-wide clearinghouses to coordinate and distribute information about state and federal programs, and review local plans, applications, and activities. These organizations are comprised of neighboring counties and local communities in a given region where residents are joined economically, socially, and geographically. The governing bodies of the councils are primarily comprised of local government elected officials and appointed representatives of local communities and the state government (ATRC 2015).

NOLF EVERGREEN (CONECUH COUNTY)

Conecuh County, Alabama

850 square miles

Pop. 12,887

Planning Authority for NOLF Evergreen: City of Evergreen

NOLF Evergreen is located in the central portion of Conecuh County, approximately 5 miles west of the City of Evergreen, Alabama. According to the U.S. Census Bureau, Conecuh County has a total land area of 850 square miles of land area. The population of the county in 2010 was estimated at 13,228 by the U.S. Census Bureau. However, the 2013 population estimates reflect a decrease in the county population to approximately 12,887 people, which is a 2.6 percent decrease over that time frame (USCB 2015). This rate of decline is expected to continue for the foreseeable future, as this county is rural and has limited resources (CBER 2014).

PLANNING AUTHORITY

Conecuh County does not have a county-wide planning authority. All planning actions related to comprehensive planning, land use regulations, and zoning are under the jurisdiction of the individual cities and municipalities in the county. The local planning authority in the area of NOLF Evergreen is the City of Evergreen. The City of Evergreen is in the process of annexing land that will eventually extend to NOLF Evergreen (Navy 2008). The City Council of Evergreen, under authority granted by Title 37, Chapters 1 and 2, Sections 772 and 785, Code of Alabama, adopted zoning ordinances for the purpose of guiding development in accordance with existing and future needs of the community (City of Evergreen 1979).

The City of Evergreen is authorized to make and adopt a Master Plan for the development of the city. Evergreen's Master Plan, Comprehensive Community Master Plan, Evergreen, Alabama, was developed by a private contractor based on the input from private citizens, businesses, and government with an assessment of the city's assets and challenges. The purpose of a plan for Evergreen is to provide a guide for the long-term development of the City of Evergreen and recommendations

for action to implement such a plan on a day-to-day basis (City of Evergreen 2009). The Master Plan recommends the adoption of a new zoning ordinance, zoning map, and subdivision regulations consistent with future land uses (City of Evergreen 2009).

Conecuh County and the municipalities of Castleberry, Evergreen, and Repton are members of the Alabama-Tombigbee Regional Commission (ATRC). The ATRC was commissioned in 1969 under the Alabama Legislature's Act No. 1126 and is composed of 10 counties, including Conecuh County, and 48 municipalities in southeastern Alabama. The Regional Commission's goal is to promote area-wide progress through regional planning and development concepts in such areas as local planning, economic and community development and human resources (ATRC 2015).

NOLF BREWTON (ESCAMBIA COUNTY)

Escambia County, Alabama

945 square miles

Pop. 37,983

Planning Authority for NOLF Brewton: Brewton City Planning Commission

NOLF Brewton is located in Escambia County, Alabama, just south of the city of Brewton. Escambia County is located in the southern part of Alabama, sharing its southern boundary with the state of Florida. The county has a total land area of 945 square miles according to the U.S. Census Bureau. The 2013 population estimate of 37,983 indicates a small decrease in the county's population from the 38,319 population census in 2010 (USCB 2015).

PLANNING AUTHORITY

Similar to Conecuh County, Escambia County, Alabama, does not have a county-wide planning authority. All planning actions related to comprehensive planning, land use regulations, and zoning are under the jurisdiction of the individual cities and municipalities in the county. Therefore, the local planning authority in the area of NOLF Brewton is the Brewton City Planning Commission. The City Planning Commission, which consists of nine members appointed by the Mayor, was created pursuant to Section 11-52-2, Code of Alabama 1975, as amended. The Brewton City Planning Commission is authorized to make and adopt a Master Plan for the physical development of the city, including areas outside its boundaries (City of Brewton 2014).

The City has adopted a Land Use and Development Ordinance establishing rules and regulations for zoning, platting, and subdividing land, classifying land, establishing zoning districts and district requirements, prescribing procedures for plat approval, setting standards and specifications for streets, utilities, and other public improvements in subdivisions, and

prescribing methods for enforcement, exceptions, and amendments (City of Brewton 2014). The main responsibilities of the City Planning Commission are to review all requests for area zoning and rezoning while the City's Board of Zoning Adjustments reviews requests for zoning amendments (City of Brewton 2014a).

Brewton City's Master Plan, A Brewton Master Plan, was developed by all City departments with public input to aid City officials and private citizens in their decisions and policies regarding future growth. The plan is supervised and administered by all City department heads under the oversight of the Mayor. The Brewton City Planning Commission has recognized the need for a Master Plan to guide public policy in making decisions consistent with the vision and mission statement for the City of Brewton. The County of Escambia and the City of Brewton are members of the South Alabama Regional Planning Commission (SARPC), along with Baldwin and Mobile counties. The tri-county regional commission is one of 12 in the state of Alabama. The SARPC serves its member governments and citizens of the region by providing technical and advisory services to encourage and facilitate local government cooperation and state and local cooperation in addressing regional planning issues.

Baldwin County, Alabama

1,590 square miles

Pop. 195,540

Planning Authority for NOLFs Silverhill, Summerdale, Barin, and Wolf:
Baldwin County Planning and Zoning Commission

NOLFS SILVERHILL, SUMMERDALE, BARIN, AND WOLF (BALDWIN COUNTY)

Baldwin County, Alabama, is the location of four of the 12 NOLFs (Silverhill, Summerdale, Barin, and Wolf) associated with the NAS Whiting Field Complex. The county is comprised of approximately 1,590 square miles (USCB 2015). The 2013 population of 195,540 by the U.S. Census Bureau indicates a 7.3 percent increase from the 2010 census population of 182,265 (USCB 2015). The county's population is projected to increase to approximately 245,841 by 2025 (CBER 2014).

PLANNING AUTHORITY

The local planning authority in Baldwin County is the Baldwin County Planning and Zoning Commission. The Baldwin County Planning and Zoning Act (Act No. 91-719), passed by the Alabama State Legislature in 1991, provides the basic framework for the county's growth management activities and required the development and maintenance of a comprehensive plan for Baldwin County (Baldwin County 2015b). The Act includes the authorization for the development of the Baldwin County Planning and Zoning Commission, the creation of planning districts within the unincorporated areas of the county, and authorized zoning within each of the planning districts (Baldwin County 2015b). Eighteen of the 33 planning districts have

zoning designations; the remaining unzoned districts are not subject to the planning and zoning authority of the Baldwin County Commission.

The Baldwin County Planning and Zoning Department was established in 1996 by the Commission to oversee the county's growth management activities. The Baldwin County Planning and Zoning Department develops the long-range comprehensive land use plans and implements zoning and subdivision regulations in unincorporated Baldwin County. In addition, the department provides staff support for the Baldwin County Planning and Zoning Commission and the various Boards of Adjustment in the zoned areas (Baldwin County 2015a). All land use changes are recommended by the Baldwin County Planning and Zoning Commission to the Baldwin County Commission for final decision.

The Baldwin County Master Plan – 2013 was developed as a guide for elected and appointed officials, staff, and private citizens to manage growth and development with regards to land uses and zoning, in particular, as well as the development of public improvements and infrastructure in the unincorporated areas of the county (Baldwin County 2015a).

NOLF Silverhill is located in the southwest region of Baldwin County in Planning District 15, approximately 3.5 miles northwest of the town of Silverhill. In 2006, a majority of qualified electors in Planning District 15 voted to institute County Zoning; therefore, areas surrounding NOLF Silverhill are subject to the planning and zoning authority of the Baldwin County Commission (Baldwin County 2014). NOLF Summerdale and NOLF Barin are located in Planning District 18 of Baldwin County. In 2007 and 2008, a zoning referendum was put forth in District 18 to come under the planning and zoning authority of the county; however, the referendum did not pass on either occasion. Therefore, no zoning exists in this planning district.

NOLF Wolf is located in the southeast region of Baldwin County in Planning District 32. On September 13, 1994, a majority of qualified electors in Planning District 32 voted to institute county zoning. On December 19, 1995, the Baldwin County Planning and Zoning Commission adopted the Planning District 32 zoning map and ordinances (Baldwin County 2014).

The County of Baldwin is also a member of the SARPC, along with Escambia and Mobile counties. The tri-county regional commission is one of 12 in the state of Alabama. The SARPC serves its member governments and private citizens of the

region by providing technical and advisory services to encourage and facilitate local government cooperation and state and local cooperation in addressing regional planning issues.

FLORIDA

FLORIDA STATE LAW

The State of Florida enacted Senate Bill 1604 relating to military affairs in March 2004. Chapter 2004-230, Florida Laws SB 2004-1604, created s.163.3175, Florida Statutes, promoting compatibility of lands adjacent to or in close proximity to military installations. The Act requires the exchange of information relating to proposed land use decisions between counties and local governments and military installations and allowing the military installation an opportunity to comment on the proposed land use decisions. The Act also requires a representative of the military installation to be an ex-officio, non-voting member of the local government's planning or zoning board. The Act modifies s.163.3177, Florida Statutes, requiring the future land use plan element of the local government's comprehensive plan to include compatibility with military installations.

REGIONAL PLANNING AGENCY

The Florida Interlocal Cooperation Act of 1969 and the Florida Regional Planning Council Act (Chapters 163 and 186, Florida Statutes) authorized local governments to cooperate with each other to efficiently utilize and share resources by entering into interlocal agreements and authorized the creation of regional planning councils in each of the several comprehensive planning districts of the state. The Florida Regional Councils Association is the statewide organization of the 11 regional planning councils. Each Florida Regional Planning Council acts as the primary organization to address the multitude of issues posed by the state's continued growth and development and advocate solutions that are of greater-than-local concern to include geographic, economic, population, and other factors influencing the needs and development of local communities. The councils also conduct research to develop and maintain area-wide goals, objectives, and policies, and assist in implementing local, state, and federal programs. Representatives serving as voting members on the governing bodies include a minimum of two-thirds local elected officials and one-third appointed by the Governor. The Governor may also appoint ex-officio non-voting members to each regional planning council (s.186.504, Florida Statues).

Escambia County, Florida

656 square miles

Pop. 305,817

Planning Authority for NOLF Site 8: Development Services Bureau

NOLF SITE 8 (ESCAMBIA COUNTY)

NOLF Site 8 of the NAS Whiting Field Complex is located in the central portion of Escambia County near Interstate 10. Escambia County is comprised of approximately 656 square miles of land area (USCB 2015). The 2013 population estimate of 305,817 indicates a small increase in the county's population from the 297,619 population census in 2010 (USCB 2015).

PLANNING AUTHORITY

The local planning authorities in Escambia County are the Board of County Commissioners (BCC), the Planning Board and the Development Services Department. The BCC is made up of five commissioners representing the five county districts. The Planning Board is comprised of seven voting members appointed by the BCC, as well as two ex-officio non-voting members, with one appointed by the Escambia County School Board and the other appointed by the commanding officers of NAS Pensacola and NAS Whiting Field. The Escambia County Planning Board was established by the BCC as a local planning agency to facilitate the Development Services Department's duties. The Planning Board hears matters related to comprehensive planning, land development regulations, rezoning, planned units developments, as well as amendments and interpretations to the Land Development Code and makes recommendations to the BCC as to the consistency of proposed regulations or amendments with the Comprehensive Plan. The Development Services Department provides professional inspection, plans review, mapping, planning, and zoning services to the citizens of Escambia County in accordance with the Florida Building Code and the County's Comprehensive Plan and Land Development Code to maintain quality and sustainable growth within Escambia County (Escambia County 2015).

The Escambia County Comprehensive Plan: 2030, developed as the guideline for the future growth of the community, is a long-range Master Plan that directs future growth and development and serves as a guide for making local land use decisions. The Comprehensive Plan deals with issues related to the appropriate uses of land, and addresses compatibility issues between various uses of land, the management and preservation of natural resources, identification and preservation of historically significant lands and structures, and adequate planning for infrastructure needs (Escambia County 2014). The goals, objectives, and policies contained in the Comprehensive Plan are implemented through the Land Development Code.

The County of Escambia is a member of the West Florida Regional Planning Council (WFRPC), which is one of 11 regional planning councils in the state of Florida and is comprised of Escambia, Santa Rosa, Okaloosa, Walton, Bay, Washington, and Holmes counties and their respective municipalities. The mission of the WFRPC is to provide professional planning, coordination, and advisory services to local governments, state and federal agencies, and the public in order to preserve and enhance quality of life in northwest Florida (WFRPC 2015).

In 2003, Escambia County adopted the JLUS, which encourages partnership between NAS Whiting Field/NOLF Site 8 and the surrounding community, and promotes balanced development while protecting the military's operational mission. The 2003 JLUS also analyzed land uses surrounding NOLF Site 8 and identified strategies to reduce encroachment and promote land use compatibility (EDAW, Inc. 2003). As part of the JLUS, Escambia County created and implemented Airfield Influence Planning Districts (AIPDs) to serve as a tool for land use regulations. AIPDs create a broader framework for making planning decisions around military airfields and to more accurately identify areas that affect or can be affected by military airfield operations. AIPD-1 for NOLF Site 8 is a buffer 1,000 feet from the installation boundary (refer to Chapter 7). AIPD-2 boundary is a buffer drawn 0.5 mile from the installation boundary (EDAW, Inc. 2003).

Santa Rosa County, Florida

1,012 square miles

Pop. 161,096

Planning Authority for NAS Whiting Field Main Station, NOLFs Pace, Spencer, Harold, Santa Rosa, and Choctaw: Santa Rosa County Planning Board

NAS WHITING FIELD, AND NOLFS PACE, SPENCER, HAROLD, SANTA ROSA, AND CHOCTAW (SANTA ROSA COUNTY)

The majority of the NAS Whiting Field Complex is located within Santa Rosa County, to include the NAS Whiting Field Main Station as well as five of the 12 NOLFs (Pace, Spencer, Harold, Santa Rosa, and Choctaw). With a land area of 1,012 square miles and 2013 estimated population of 161,096, Santa Rosa County is experiencing rapid population growth as well as increasing urbanization (USCB 2015). The population in Santa Rosa County increased from 117,743 to 151,372 between the 2000 and 2010 censuses, representing a 28.6 percent change over 10 years (USCB 2015). In terms of population, Santa Rosa County is one of the fastest growing counties in Florida.

PLANNING AUTHORITY

The local planning authorities in Santa Rosa County are the Board of County Commissioners (BOCC), the Zoning Board, and the Development Services Center. In early 2011, the BOCC combined the Local Planning Board and the Zoning Board of

Adjustments as identified by the Land Development Code (Santa Rosa County 2015). The Zoning Board is comprised of 10 voting members, with each County Commissioner appointing two members, and two non-voting members (one school district representative and one military representative). The primary role of the Santa Rosa County Zoning Board, serving as the State-required local planning agency, is to hear and make recommendations to the BOCC for conditional use, rezoning, and comprehensive plan amendment requests.

The Santa Rosa County Comprehensive Plan 2008-2025 was developed to aid county officials, planners, and private citizens in their decisions and policies regarding future land use development. As with other comprehensive plans, the Santa Rosa County Comprehensive Plan is a long-range Master Plan that directs future growth and development and serves as a guide for making local land use decisions. The plan identifies goals, objectives, and policies that should be followed in county planning decisions to regulate the development and use of land in the county for the health, safety, and general welfare of its citizens (Santa Rosa 2009).

Santa Rosa County is a part of the same regional planning council (WFRPC) as Escambia County, Florida. The WFRPC supports Santa Rosa County by planning for and coordinating intergovernmental solutions to growth-related problems and providing technical assistance to the local board (WFRPC 2015).

In 2003, Santa Rosa County adopted the JLUS and, since the adoption, has incorporated a variety of the recommendations in their Comprehensive Plan and Land Development Code. The County established military airport zones (MAZs) and public airport zones (PAZs) that serve as overlay districts, within which growth management policies and regulatory techniques shall guide land use activities and construction in a manner compatible with the long-term viability of airports and military installations and the protection of public health and safety (Santa Rosa County 2009). The County ensures that future development within adopted MAZs and PAZs will not negatively impact current and long-term viable use of the airfield (Santa Rosa County 2009).

6.3 AIRFIELD-SPECIFIC LAND USE COMPATIBILITY ANALYSIS DATA

The land use compatibility analysis examining existing and planned land uses within the noise zones and APZs for each airfield in the NAS Whiting Field Complex is presented under corresponding headings in Chapter 7 of this document. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Section 6.1. The land use compatibility assessment and analysis conducted for each NOLF considers existing land use and zoning compatibility and compatibility concerns. Please refer to Chapter 7 for land use compatibility data for NAS Whiting Field Main Station and NOLFs.

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7

7.1 NAS Whiting Field
7.2 NOLF Evergreen
7.3 NOLF Brewton
7.4 NOLF Silverhill
7.5 NOLF Summerdale
7.6 NOLF Barin
7.7 NOLF Wolf
7.8 NOLF Choctaw
7.9 NOLF Site 8
7.10 NOLF Pace
7.11 NOLF Spencer
7.12 NOLF Harold
7.13 NOLF Santa Rosa

AIRFIELD-SPECIFIC ANALYSIS

This chapter provides a comprehensive evaluation for NAS Whiting Field Main Station and the 12 NOLFs. The detailed evaluations for specific airfields include discussions on:

- ☐ Airfield operations;
- ☐ Runways and flight tracks;
- ☐ Noise contours;
- ☐ Imaginary surfaces;
- ☐ APZs;
- ☐ Land use compatibility; and
- ☐ Land use recommendations.

Figures for each airfield are presented at the conclusion of each section.

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NAS WHITING FIELD

SANTA ROSA COUNTY

FLORIDA

7.1 NAS WHITING FIELD COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NAS Whiting Field Main Station. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NAS Whiting Field Comprehensive Evaluation.]

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2015 AICUZ Footprint with Existing Zoning, NAS Whiting Field, Santa Rosa County, Florida	Figure 7.1-12
Compatibility Concerns - 2015 Composite Map, NAS Whiting Field, Santa Rosa County, Florida	Figure 7.1-13

AIRFIELD OPERATIONS

NAS Whiting Field is located in Santa Rosa County, Florida (Figure 7.1-1) and is composed of two separate and fully-operational airfields, North Field and South Field. Primary and intermediate fixed-wing flight training is conducted at North Field, and South Field is used for primary fixed-wing training and helicopter training. North Field has two runways, Runway 05/23, which is 6,000 feet, and 14/32 which is 6,307 feet. Both runways are long enough to accommodate T-6 solo and dual operations. South Field has two runways, Runway 05/23, which is 6,130 feet, and Runway 14/32, which is 6,000 feet, and six helicopter pads.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The number of aircraft operations at North Field and South Field have fluctuated over time, as shown in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs. Operations have ranged from a peak of 81,927 in 2007 to a low of 60,554 in 2012 for North Field, and from a peak of 155,049 in 2010 to a low of 73,585 in 2002 for South Field.

The Navy forecasts that total operations at North Field will be approximately 94,926 annual flight operations in CY2025. This will represent a decrease in annual flight operations relative to the reported operations of 158,551 in the baseline 1990 AICUZ Study. However, the projected aircraft operations at North Field represent a 20 percent increase over the recent five-year average (2009-2014). The Navy forecasts that total operations at the South Field will be approximately 151,079 annual flight operations in CY2025. This will represent a slight decrease in annual flight operations relative to the reported operations of 152,662 in the baseline 1990 AICUZ Study; however, this is above the recent five-year average (2009-2014). The total number of annual fixed-wing operations projected (CY2025) for NAS Whiting Field is 246,005. Table 7.1-1 shows the modeled distribution of these annual airfield operations by operation type.

TABLE 7.1-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NAS WHITING FIELD

OPERATION TYPE	NUMBER OF OPERATIONS	
	NORTH FIELD	SOUTH FIELD
Departure	40,818	61,943
Overhead Break Arrival	29,427	61,942
IFR Arrival	5,696	
PEL Arrival	5,696	
Pattern	13,289	22,662
T-6 GCA	0	4,532
TOTAL	**94,926**	**151,079**
1990 AICUZ Total	**158,551**	**152,662**

Sources: BRRC 2015; NAS Whiting Field 2010

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. Flight tracks provide for safety, consistency, and control of an airfield. Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide.

NAS Whiting Field supports helicopter and fixed-wing flight training. Standard operating procedures and flight patterns have been established for both. Fixed-wing aircraft follow designated flight patterns for entering and departing the airfields. Helicopter departure patterns occur at the southeast and west/southwest corners of NAS Whiting Field South. Operations are tracked according to flight track/runway utilization at each airfield to determine APZs. Figure 7.1-2 depicts predominant arrival, departure, and pattern flight tracks at NAS Whiting Field.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section discusses the 2015 AICUZ noise contours for NAS Whiting Field and describes the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the 2003 JLUS (1990) and the 2015 AICUZ noise contours. This comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. The comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NAS Whiting Field's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The T-6 aircraft replaced the T-34C; therefore, the primary fixed-wing noise sources considered for NAS Whiting Field in the noise model are T-6 operations. The 2015 AICUZ noise contours for NAS Whiting Field overlay the area in the immediate vicinity of the airfield, with the vast majority of the higher noise contours concentrated within the installation boundary (Figure 7.1-3). The 65 to 70 dB DNL noise contour, which is within Noise Zone 2 (area of moderate impact) extends off station only marginally to the north and east of North Field. None of the 65 to 70 dB DNL noise contours at the South Field extend off-station. All 70 to 85 dB DNL noise contours are contained within the airfield boundary, with the highest (80 to 85 dB DNL, which is within Noise Zone 3—area of severe impact) centered on the two airfields. Figure 7.1-4 provides DNL color gradients that illustrate how the noise originating at the airfields dissipates over NAS Whiting Field's surrounding land areas.

The 2015 AICUZ noise contours for NAS Whiting Field are similar in size, shape, and location when compared to the 2003 JLUS (1990) noise contours (Figure 7.1-5). The slight changes between the 2003 JLUS (1990) and 2015 AICUZ noise contours are attributed to several factors, including:

- ☐ Changes in aircraft types (1990 noise contours modeled T-34 aircraft operations and civilian operations, and 2015 contours only modeled T-6 operations);
- ☐ Changes in aircraft flight patterns;

- ☐ Changes in operational levels (the number of operations has slightly decreased from the 2003 JLUS (1990) to the 2015 AICUZ studies); and

- ☐ Improved noise mapping techniques (discussed in Section 1.4).

When comparing impacts between the 2003 JLUS (1990) and 2015 AICUZ noise contours (both on- and off-station), noise contours have decreased by 22 percent. There has been an overall increase in off-station noise impacts within the 60+ dB DNL noise contours. The 2015 AICUZ noise contours show the 60 to 65 dB DNL noise contour, which is within Noise Zone 1 (area of low to no impact) extending farther off-station when compared to the 2003 JLUS (1990) noise contours. While most off-station impacts are within Noise Zone 1, 108 acres of off-station impacts are within Noise Zone 2 (area of moderate impact). Table 7.1-2 provides acreages of land areas within specific noise contours at NAS Whiting Field; acreages for off-station impacts are also provided.

TABLE 7.1-2 AREAS WITHIN NOISE CONTOURS (DNL), NAS WHITING FIELD

NOISE CONTOUR	2003 JLUS (1990) NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	0	0	0	0
55-60 dB DNL	4,560	2,512	0	0
60-65 dB DNL	1,301	156	2,987	1,198
65-70 dB DNL	586	0	1,447	108
70-75 dB DNL	230	0	552	0
>75 dB DNL	33	0	283	0
TOTAL AREA	**6,710**	**2,668**	**5,269**	**1,306**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours.
Off Station includes water area.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the North and South Fields that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.1-6 presents the imaginary surfaces and transition planes for NAS Whiting Field.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NAS Whiting Field (Figure 7.1-7), including a detailed analysis of areas impacted (Figure 7.1-7). Also provided are comparisons and figure overlays for the 2003 JLUS (1990) and the 2015 AICUZ Study APZs (Figure 7.1-8). The comparison helps identify changes to APZs based on projected changes in aircraft operations and assist in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NAS Whiting Field are provided in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all runway ends at both the North Field and the South Field at NAS Whiting Field. APZ I and APZ II are required for both runways at the North Field because flight tracks include operations that exceed 5,000 operations annually. APZ I and APZ II are only required for the end of Runway 32 at the South Field. Table 7.1-3 compares the 2003 JLUS (1990) and 2015 AICUZ acreages within the Clear Zones and APZs for NAS Whiting Field. Approximately 943 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural and publically owned property. A comparison of the 1990 and 2015 AICUZ Study Clear Zones and APZs shows a significant

change in coverage, primarily associated with runway extensions, changes in flight tracks and patterns, and a decrease in annual operations. These changes have resulted in multiple APZ I and APZ II areas for each end of North Field Runways 05/23 and 14/32. The North Field changes include the extension and shifting of APZs at the end of Runway 05 and the end of Runway 32. Additional APZs we added to the end of Runway 23 along with the previous APZs. The South Field Clear Zones and APZs did not have any changes from the 1990 AICUZ Study. Overall, the total off-station area impacted has increased by approximately 351 acres from the 1990 to the 2015 AICUZ studies.

TABLE 7.1-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NAS WHITING FIELD

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
2003 JLUS (1990)	On-Station	511	1	327	0	200	0	1,039
	Off-Station	35	1	206	0	350	0	592
	TOTALS	546	2	533	0	550	0	**1,631**
		548		**533**		**550**		
2015 AICUZ	On-Station	585	0.6	779	0.1	264	0	1,629
	Off-Station	34	1	227	0.2	680	0	942
	TOTALS	619	2	1,006	0.3	944	0	**2,571**
		621		**1,006**		**944**		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to: U.S. Waterbodies (USGS 2012)
Totals are rounded up

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses and zoning near NAS Whiting Field. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NAS Whiting Field, presented on Figure 7.1-9, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility for this AICUZ Study were previously presented in Chapter 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NAS Whiting Field is located in Florida's northwest coastal area, approximately 6 miles north of Milton, in unincorporated areas of Santa Rosa County. Therefore, the land use ordinances covering the off-station property within the AICUZ footprint are within the County's jurisdictions. Section 6.2 provides more information on the local planning authorities in Santa Rosa County. Land use patterns and zoning in the immediate vicinity of NAS Whiting Field, along with the land use compatibility assessment and analysis conducted, are presented below.

Santa Rosa County Residential Densities

Agriculture: 1 du/15 acres

Rural Residential Single-Family: 2 du/acre

Single-Family Residential: 4 du/acre

Medium-Density Residential: 10 du/acre

Mixed Residential Subdivision: 4 du/acre

EXISTING LAND USE

Land use is a term given to describe the management of land and the extent to which it has been modified. Typical land cover types include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities and are fundamental to the physical form of the county and municipalities, and are normally a key component of the comprehensive plans, which are the primary policy documents that guide local land use and development. Figure 7.1-10 illustrates land uses surrounding the airfields. Land use surrounding NAS Whiting Field features low- to medium-intensity development with a mix of residential, agricultural, forest, publically owned property, and recreational lands. The vast majority of land use surrounding the airfield is identified as agricultural/forest. The residential uses are typically single-family dwellings (including manufactured mobile homes) on large parcels (greater than one acre). However, there are limited areas surrounding NAS Whiting Field where the residential density increases to more than one

dwelling per acre. The majority of the residential uses are located south of the airfield along local and regional roadway corridors (Highway 87 and Highway 191).

There are single-family residential developments west of the South Airfield along Highway 87 towards the town of Milton. These areas include the Clear Creek Estates, Harvest Point, Roundup Valley, and Rosewood subdivisions. These developments include both traditional "stick-built" homes and manufactured mobile homes. Other residential developments include a mobile home park and RV campgrounds. There are small-scale commercial uses along the Highway 87 corridor that are mainly associated with service type businesses (e.g., gas and convenience stores, grocery, and local banking). Land uses southeast of the airfield are mainly agriculture; however, there is a cluster of rural residential uses located along Eastgate Road and Munson Highway (Highway 191). The residential uses are located on large parcels (greater than one acre) and are considered low-density. There are multiple churches located in these areas, as well as a small cemetery. In fact, there are numerous churches and worship facilities surrounding NAS Whiting Field. Churches and other types of gathering places are important to note because they are public assembly locations and are considered people-intensive land uses.

The lands around the North Airfield are less developed and more rural, including large tracks of land for agricultural uses; however, there are low-density residential dwellings scattered along the Highway 87 N corridor. These residential units are typically located on parcels larger than one acre and are associated with agriculture homestead farming. There is an industrial land use directly adjacent to the western boundary of the North Field associated with pit mining.

There are multiple large parcels along the eastern boundary of NAS Whiting Field designated as publically owned property. These lands include property owned by the Country and State are vacant timberland. Other notable land uses surrounding NAS Whiting Field include the recreation/open space designation northeast of the North Airfield associated with the Blackwater River State Forest and Clear Creek off-highway vehicle (OVH) area. The Clear Creek OVH trail area includes over 27 miles of trails and was the result of a joint effort between local OHV clubs, the Florida Forest Service, the Nature Conservancy, the Navy, and the Santa Rosa County Commission.

Overall, the land use around NAS Whiting Field reveals a pattern of low-density development, as there is still a large amount of undeveloped property. However, there are areas that may experience an increase in development and densities in the

future, due to the need for local housing. It is reasonable to assume that increased development along Highway 87 and Munson Highway (Highway 191) and other roadway connectors east and south of the airfields towards the city of Milton, could further act as an attractant for addition residential development. From a land use compatibility standpoint, some of the current residential land uses surrounding NAS Whiting Field are incompatible in specific APZs and noise zones. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.1-11 illustrates existing zoning surrounding NAS Whiting Field. The lands surrounding the airfield have an array of future zoning classifications. The predominant classifications include agriculture (AG), rural residential single-family (RR-1), single-family residential (R-1), general industrial (M-2), and highway commercial development (HCD).

Per Santa Rosa County's Comprehensive Plan 2008-2025, a Military Airport Zone (MAZ) overlay district extending over the lands within the 2003 JLUS AICUZ footprint and noise zones was established for NAS Whiting Field as part of the JLUS adopted by the County. The MAZ is an overlay district providing regulatory measures and zoning standards to achieve land use compatibility and protection of public health and safety in the areas exposed to impacts generated by military flight activities occurring at the airfield. For NAS Whiting Field North and South, the MAZ boundaries extend 0.5 mile from the perimeter of each airfield and encompass all APZs and noise zones. Figure 7.1-11 also illustrates the land area designated as a MAZ that encompass the 2003 JLUS AICUZ footprint and/or noise zones for NAS Whiting Field. In addition, residential zones within APZs have been identified and designated as R1/R2/R1M-APZ zones. This designation is used so that proper notification and awareness is available for any future development within these APZ areas. The MAZ district and residential within an APZ zones are regulatory designations intended to implement specific growth management policies that guide land

Residential Zoning District Classifications

- AG: Agriculture
- RR-1: Rural Residential Single-Family
- R-1: Single Family Residential
- R-2: Medium-Density Residential
- R-1M: Mixed Residential Subdivision
- HCD: Highway Commercial Development
- M-2: General Industrial
- MAZ: Military Airport Zone

Source: City's Land Use and Development Ordinance

use activities and construction in a manner compatible with the long-term viability of the airfields by guiding compatible land uses within the area.

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.1-12 illustrates the future land uses surrounding NAS Whiting Field North and South. The future land use patterns around NAS Whiting Field are consistent with current development trends with the majority future land use being agriculture with single-family residential along the Highway 87 corridor. There is an increase in future commercial land uses along Highway 87, just south of the Highway 89 intersection towards Milton. It is also important to note that the existing publically owned property west of the airfield (within the APZs) has a future land use designation of industrial and agriculture. However, there are ongoing efforts to work cooperatively with local and regional governments to ensure compatibility.

Overall, the land uses around the airfield is agriculture and residential, and future growth is expected to follow current development trends of low- and medium-density residential and commercial development. The future land uses within these classifications may be incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility concerns for NAS Whiting Field are presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NAS Whiting Field's noise zones, Clear Zones, and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NAS Whiting Field, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County land use and parcel data. The evaluation was conducted at the land parcel level using the Navy's land use compatibility guidance. In addition, reasonable assumptions were made on land uses and zoning surrounding the airfield. Table 6-1 (see Chapter 6) provides a generalized breakdown of land use compatibility and provides the Navy's land use

compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. The 2015 AICUZ noise contours for NAS Whiting Field North and South that extend off the installation include the 60 to 65 and the 65 to 70 dB DNL noise contours. The 65 to 70 dB DNL, which are within Noise Zone 2 (area of moderate impact) can pose a compatibility concern with certain types of land uses. In addition, there are incompatible land uses and existing compatibility concerns within APZs for NAS Whiting Field North and South. As illustrated in previous figures, APZs impact areas off the installation in all directions. Areas impacted are mainly agriculture (i.e., forest and grassland), but limited amounts of low- to medium-density residential areas are located within certain APZs and noise zones. Land use compatibility concerns identified around NAS Whiting Field are presented on Figure 7.1-13 and further discussed below.

- Area 1: Area 1 is located northwest of the North Field in land areas impacted by the APZs associated with Runway 14. There are low-density single-family residential dwellings located along Highway 87 that are within APZ I and APZ II. These residences are located on large parcels of 5 to 10 acres and are designated as agriculture and silviculture land uses. There is one residences located within APZ I near the corner of George Leonard Road and Highway 87. The AICUZ instruction states residential uses are incompatible with APZ I and should be prohibited.

  There are two residential parcels located in APZ II that have multiple structures onsite. The residences in APZ II occur at a generalized density of one dwelling per 5 to 25 acres, which is considered a compatible use in this zone. However, the zoning and future land use in this area allows for future residential development that could be deemed incompatible.

- Area 2: Area 2 is located directly east of the North Field in land areas impacted by the APZs and noise contours associated with Runway 14/32. There are single-family residential dwellings located along Rupert Orso Drive within the 65 to 70 dB DNL noise contour (Noise Zone 2). The current land uses are designated as agriculture homestead and silviculture. The AICUZ instruction states residential uses within Noise Zone 2 are considered an incompatible land use and strongly discouraged. This land area is also within APZ II, but is considered compatible due to its low-density development of one dwelling per 5 to 10 acres.

- Area 3: Area 3 is located southeast of the South Field in land areas impacted by the APZs associated with Runway 32. There are single-family residential dwellings, including manufactured homes, located within APZ I and APZ II. These residences are associated with the Clear Creek, Pine Hill, and Miniature Estates subdivision as well as other residential developments in the vicinity along East Gate Road and Munson Highway. There are six to eight residential dwellings, along with three other vacant residential parcels (totaling approximately 39 acres) all within APZ I located along Whiting Acres Lane, Barnhill Road, and Brake Road. The AICUZ instruction states residential uses are incompatible with APZ I and should be prohibited.

  Area 3 also includes between 15 to 17 residential dwellings located in APZ II located along Trinity Church Road, Lund Road, Munson Highway and Roeville Road. Some of the homes in APZ II occur at a density above the recommended two dwellings per acre threshold for this APZ and are considered an incompatible land use. The majority of the residential structures are traditional built homes, but there are manufactured mobile homes in the area, as well. Manufactured homes are important to identify because they are more sensitive to noise exposure due to less noise abatement construction standards. The zoning and future land use, as well as the vacant residential parcels, in this area allow for future residential development that could be deemed incompatible.

LAND USE RECOMMENDATIONS SPECIFIC TO NAS WHITING FIELD

The neighborhoods and land uses identified in this section are, and continue to be, compatibility concerns in the area around NAS Whiting Field North and South. The Navy and Santa Rosa County should continue to monitor these areas of incompatible land use, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NAS Whiting Field. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zone, APZs, and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly residential and pose compatibility concerns. The County's Comprehensive Plan provides a MAZ overlay district around the airfield and encompassing the AICUZ footprint for NAS Whiting Field. The Santa Rosa County Planning and Zoning Commission should update their MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study. Additionally, the County and NAS Whiting Field should continue to continue to work together to fully implement the MAZ district with development restrictions for areas inside and outside the established APZ at NAS Whiting Field that have been identified as current compatibility concerns or are most likely to present compatibility issues in the future.

Per Article Eleven of the Santa Rosa County's Land Development Code, no structure will be constructed within the Clear Zones and there will be a height restriction of 35 feet for single-family residential and non-residential structures within APZ I. Multi-family residential, water towers, communication towers/radio or TV transmission towers, and regional electric transmission lines are incompatible structures within APZ I. Article Eleven also states that any contract for the sale of residential property that is located in whole or part within a Military Airport Notification Zone, shall include, as an attachment to the contract of sale, a Military Airport Disclosure Notice, in a form approved by Santa Rosa County. Furthermore, the County, as stated in the 2003 JLUS, should require that subdivision plans delineate boundaries of all current APZs and noise contours, or indicate whether the entire property occurs within such zones. The Santa Rosa County Planning Department should notify the NAS Whiting Field CPLO when reviewing and approving building permits and development proposals that may impact parcels within the AICUZ footprint.

The Navy should continue to monitor the City of Milton's future growth plans and potential annexation actions within Santa Rosa County.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NAS Whiting Field North and South airfields and OPNAVINST 11010.36C. These updates will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NAS Whiting Field.

MONITOR AREAS OF POTENTIAL CONCERN

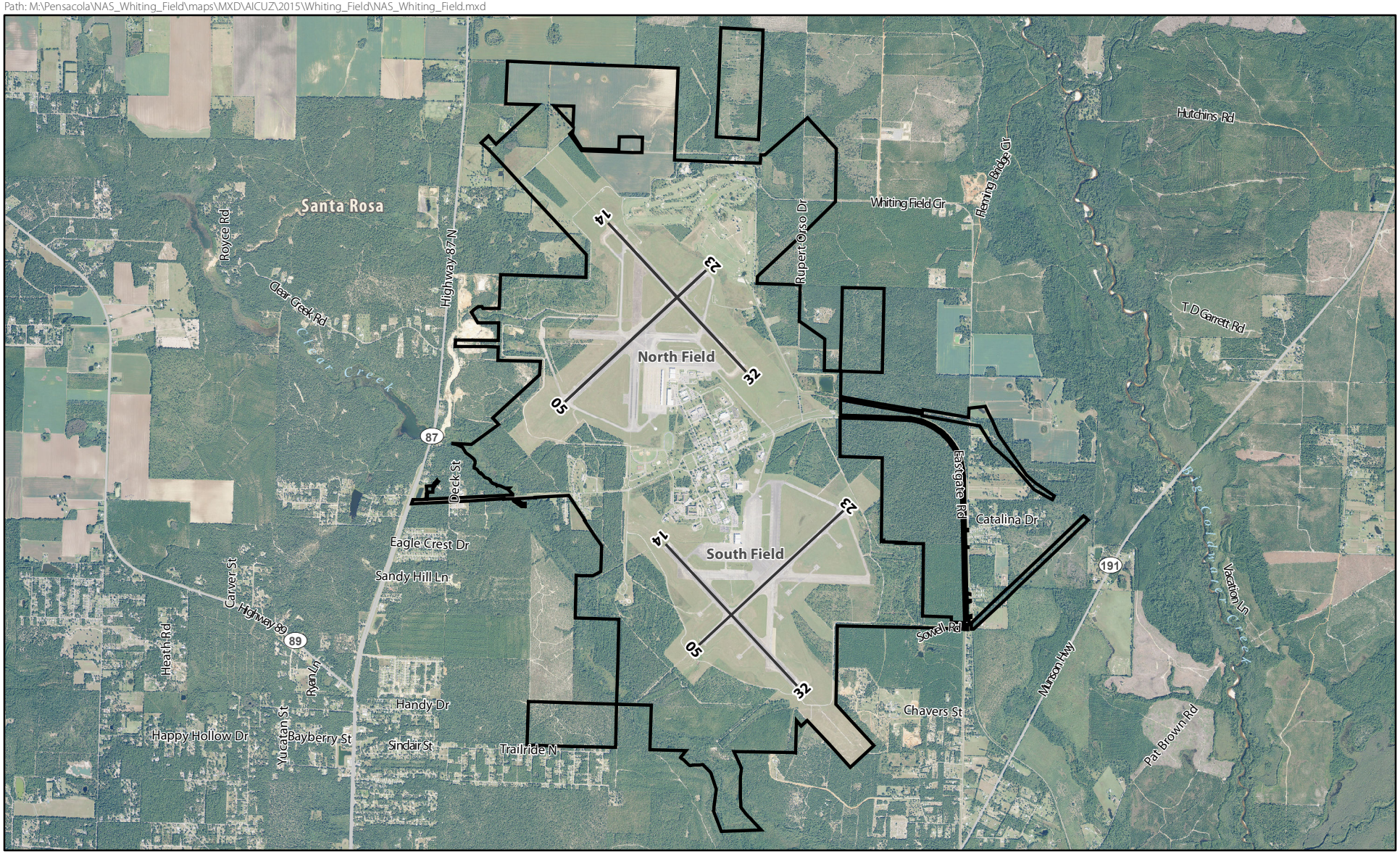
To address compatibility concerns in Area 1 regarding existing residential land uses within APZ I, the Navy should make efforts to purchase developments rights and/or available property. To address the future conversion of agricultural land to residential and more intensive land uses within APZs, the Navy should monitor the expiration of, and potentially take steps to prevent incompatible development.

To mitigate the existing incompatibility land use associated with the residential dwellings within the 65 to 70 dB DNL noise contour (Noise Zone 2) in Area 2, the Navy should communicate with the planning authorities to discuss concerns regarding further development; ensure the buyers/renters are properly informed about potential noise impacts, and request that the Navy be provided the opportunity to purchase the development rights if and when the properties are sold.

To address the existing incompatible land use associated with the residential dwellings within APZ I and APZ II for Runway 32 in Area 3, the Navy should communicate with the planning authorities to prevent further development, ensure the buyers/renters are properly informed about the potential safety and noise impacts, and request that the Navy be provided the opportunity to purchase the development rights if and when the properties are sold. There are some vacant agriculture and residential lots scattered throughout the neighborhoods surrounding NAS Whiting Field that are within APZs and the 65 to 70 dB DNL noise contour (Noise Zone 2). Steps should be taken to acquire real estate control of these parcels and/or continuously monitor these parcels for changes to the development density to prevent further incompatible land uses. These areas will become a concern per the AICUZ criteria, if further residential development is allowed.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. The Navy should continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals, especially within APZ I. In addition, Santa Rosa County should continue Policy 2.1.B.1 of the Comprehensive Plan to pursue the purchase of land surrounding NAS Whiting Field and associated outlying fields for the purposes of protecting these bases from encroachment and to attract complementary business uses. If it is not possible to purchase development rights and/or property, then the County should approach property owners for potential partnering to ensure compatible land uses. Whether accomplished by the Navy or the County, such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field.mxd



Legend

- Other Major Road
- Runway
- NAS Whiting Field Boundary

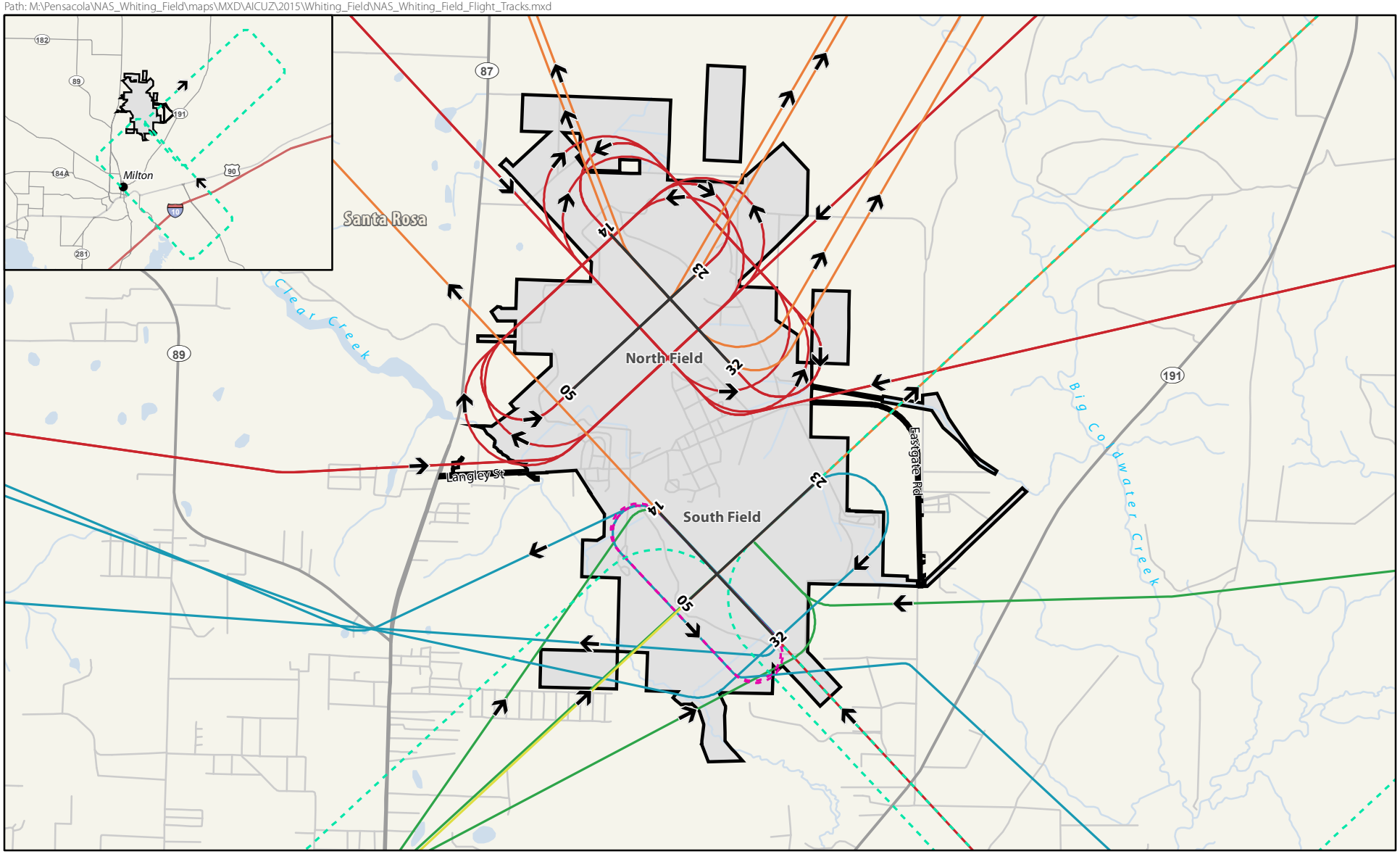
SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.1-1
NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_Flight_Tracks.mxd



SCALE
0 0.5 1 Miles

Legend

Rotary-Wing Flight Tracks
- Arrival
- Departure
- Closed Pattern

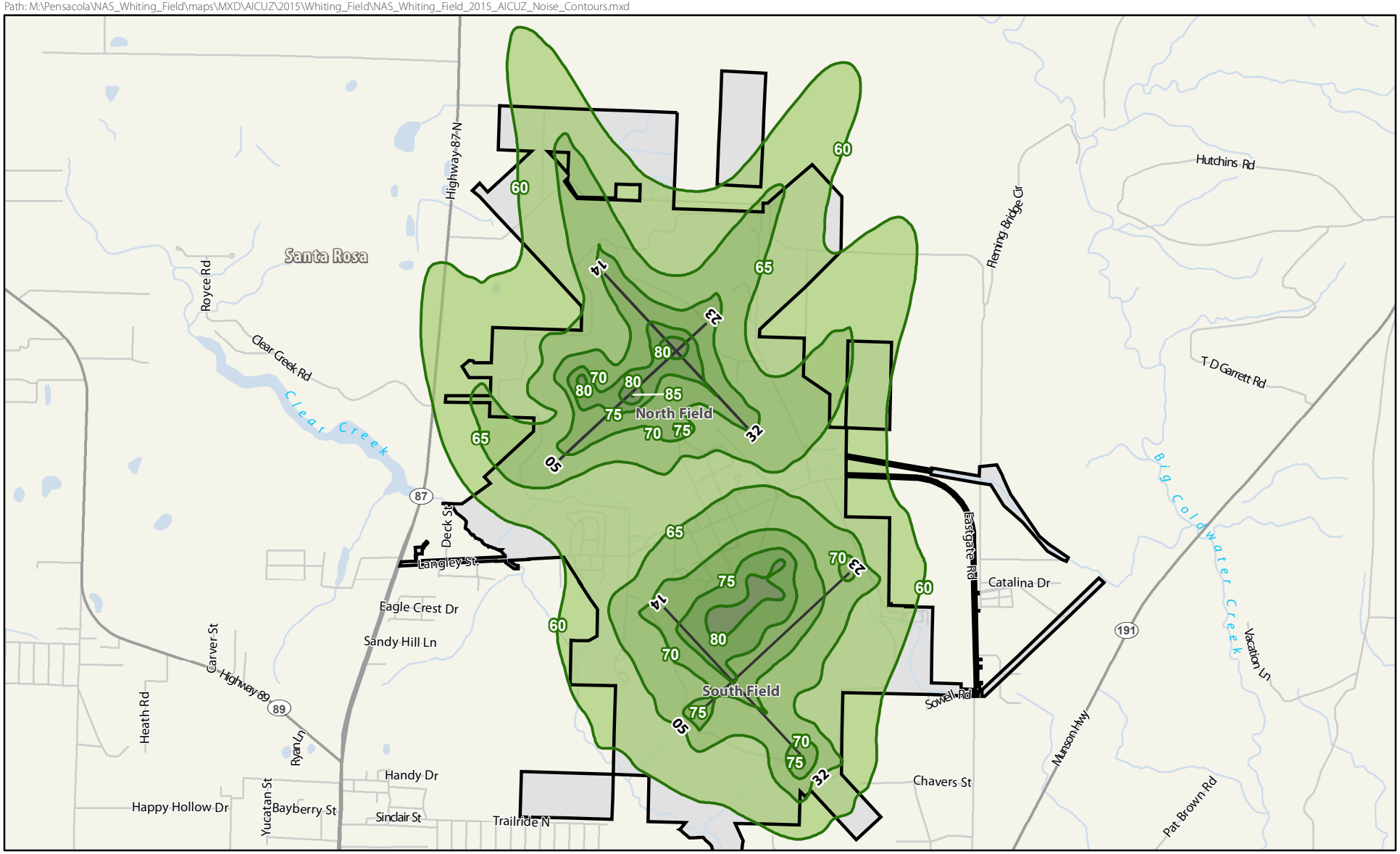
Fixed-Wing Flight Tracks
- Straight-In Arrival
- Overhead Break Arrival
- Departure
- Closed Pattern

- Interstate
- Major Road
- Local Road
- Runway
- NAS Whiting Field Boundary
- Waterbody

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.1-2
Representative Flight Tracks
NAS Whiting Field Complex
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_2015_AICUZ_Noise_Contours.mxd



SCALE

0 2,000 4,000 Feet

Legend

- Local Road
- Major Road
- Runway
- NAS Whiting Field Boundary

dB DNL Value

- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL
- 85 dB DNL

Figure 7.1-3
2015 AICUZ Noise Contours
NAS Whiting Field
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2013;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_Noise_Gradients.mxd

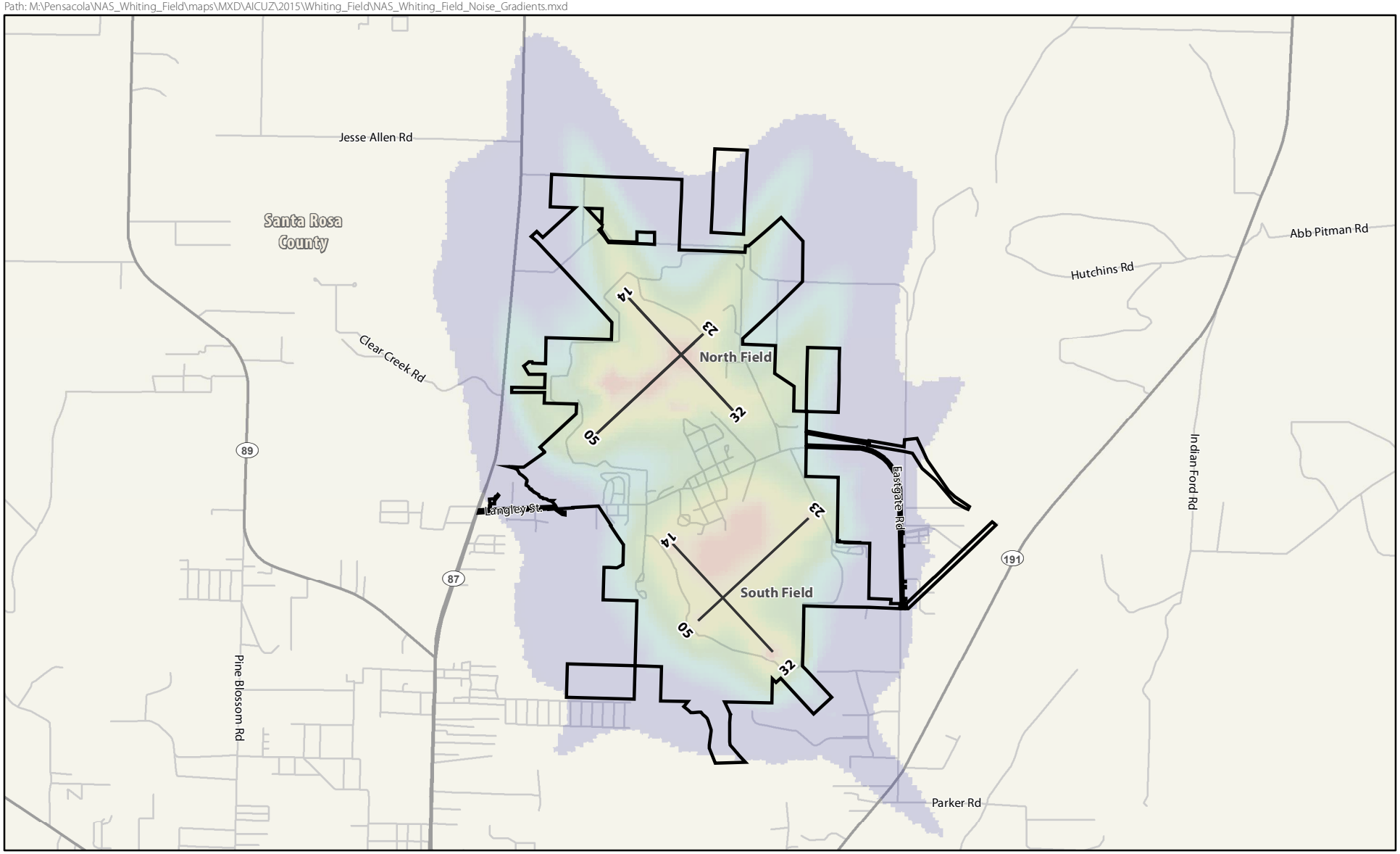
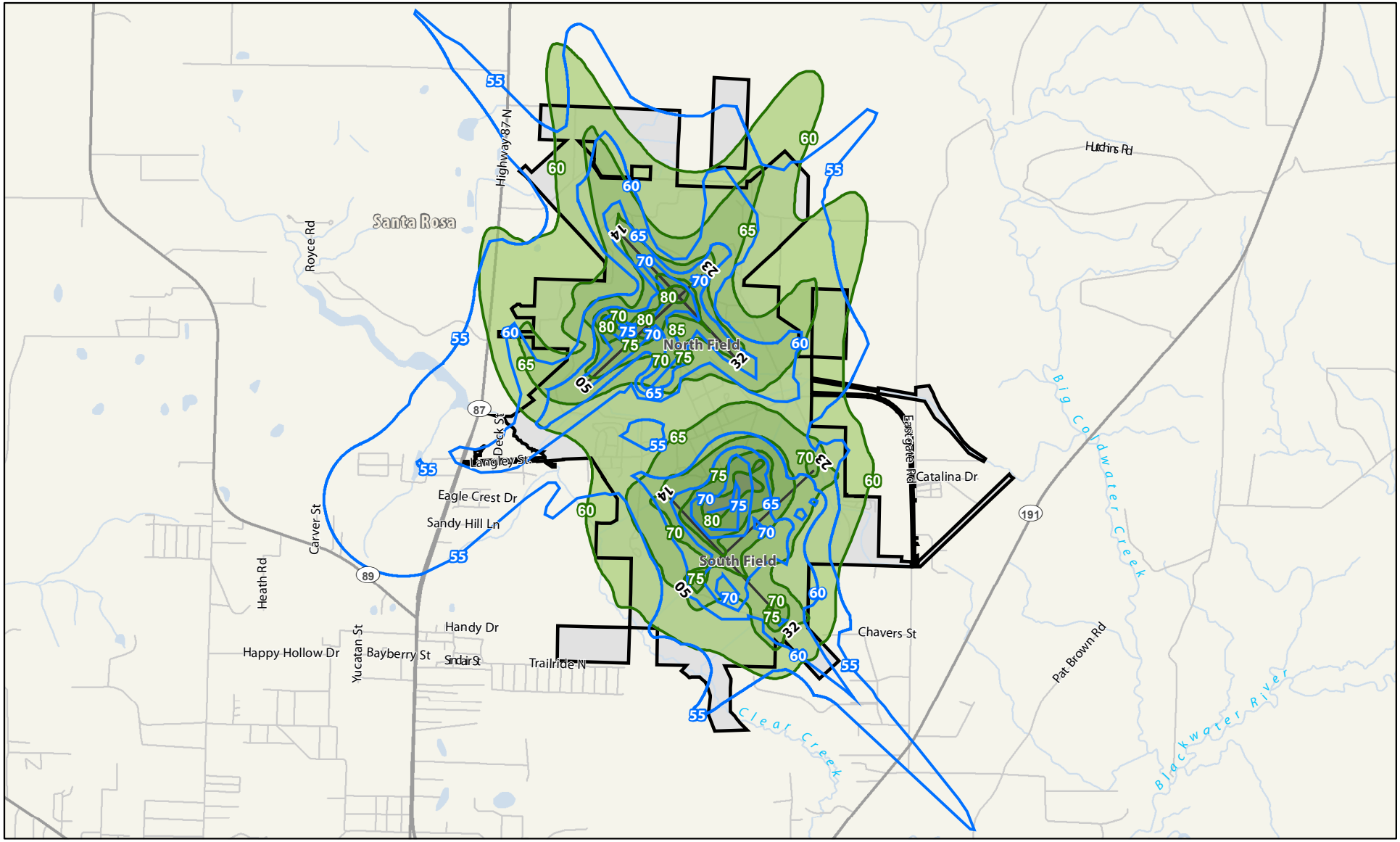


Figure 7.1-4
2015 Noise Gradients
NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Whiting_Field\2016_Dec\7_1-5_NAS_Whiting_Field_Noise_Contours_Comparison.mxd



SCALE
0 2,000 4,000 Feet

Legend

- Local Road
- Major Road
- Runway
- 2003 JLUS Noise Contours
- NAS Whiting Field Boundary

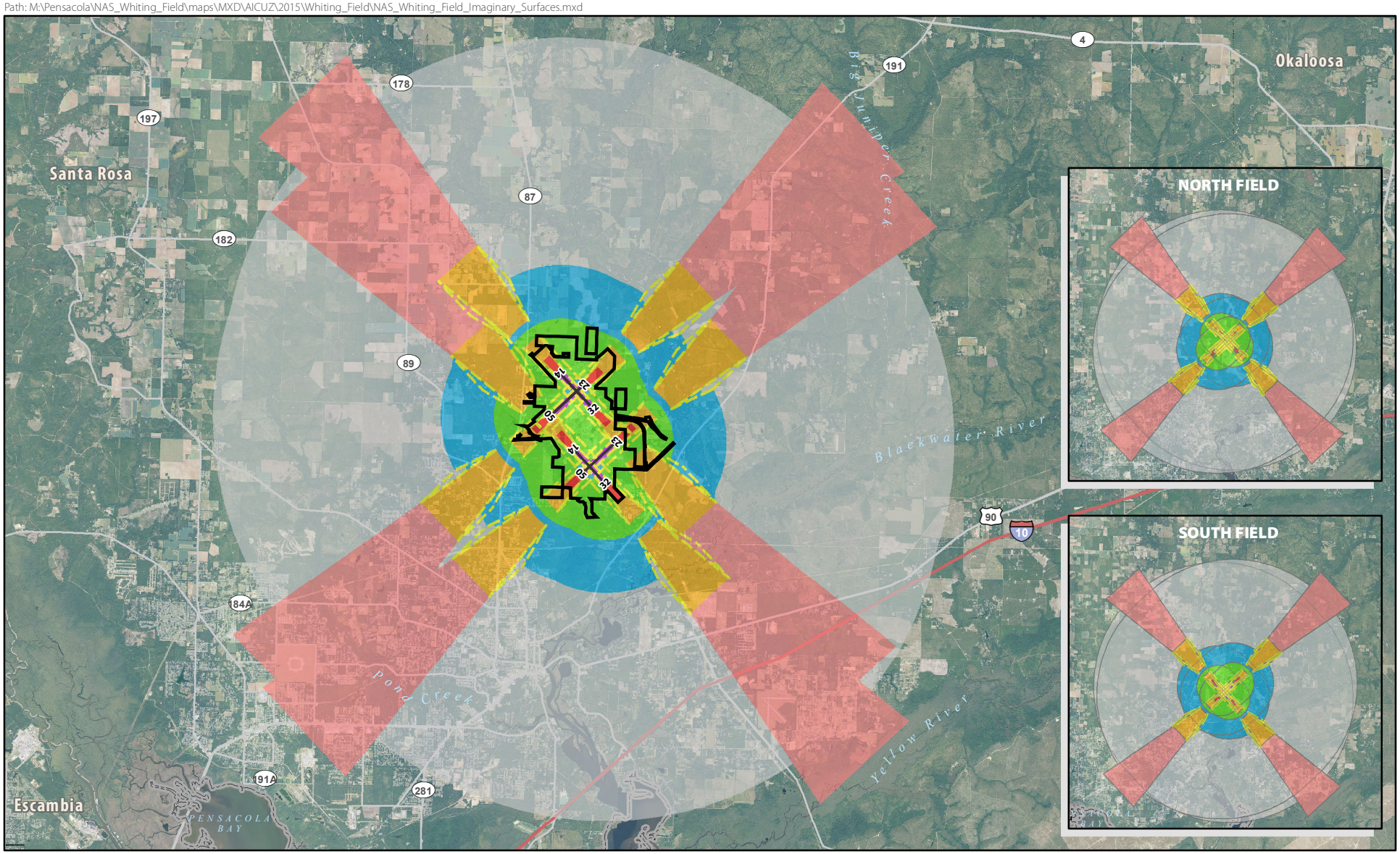
2015 AICUZ Noise Contours

- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL
- 85 dB DNL

SOURCE: ESRI 2012; BRRC 2013;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.1-5
Comparison of 2003 JLUS and 2015 AICUZ Noise Contours
NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_Imaginary_Surfaces.mxd



SCALE
0 1 2 Miles

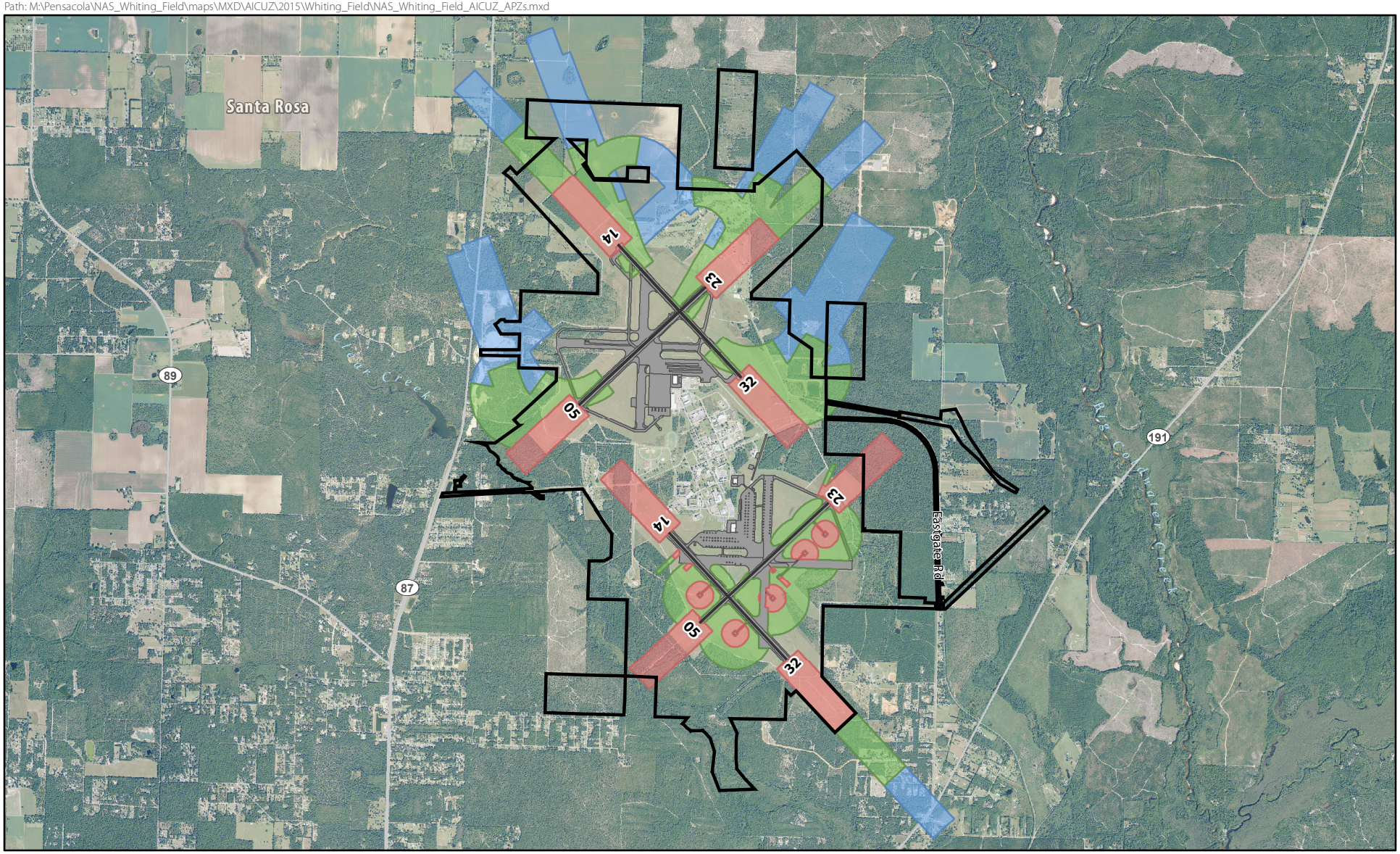
SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015; NAIP 2013.

Legend

- State Boundary
- County Boundary
- Interstate
- Major Highway
- Other Major Road
- Runway
- NAS Whiting Field Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- D: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- G: Outer Horizontal Surface
- H: Transitional Surface

Figure 7.1-6
Imaginary Surfaces, NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_AICUZ_APZs.mxd



N

SCALE

0 0.25 0.5 Miles

Legend

- Other Major Road
- Runway
- Airfield
- NAS Whiting Field Boundary

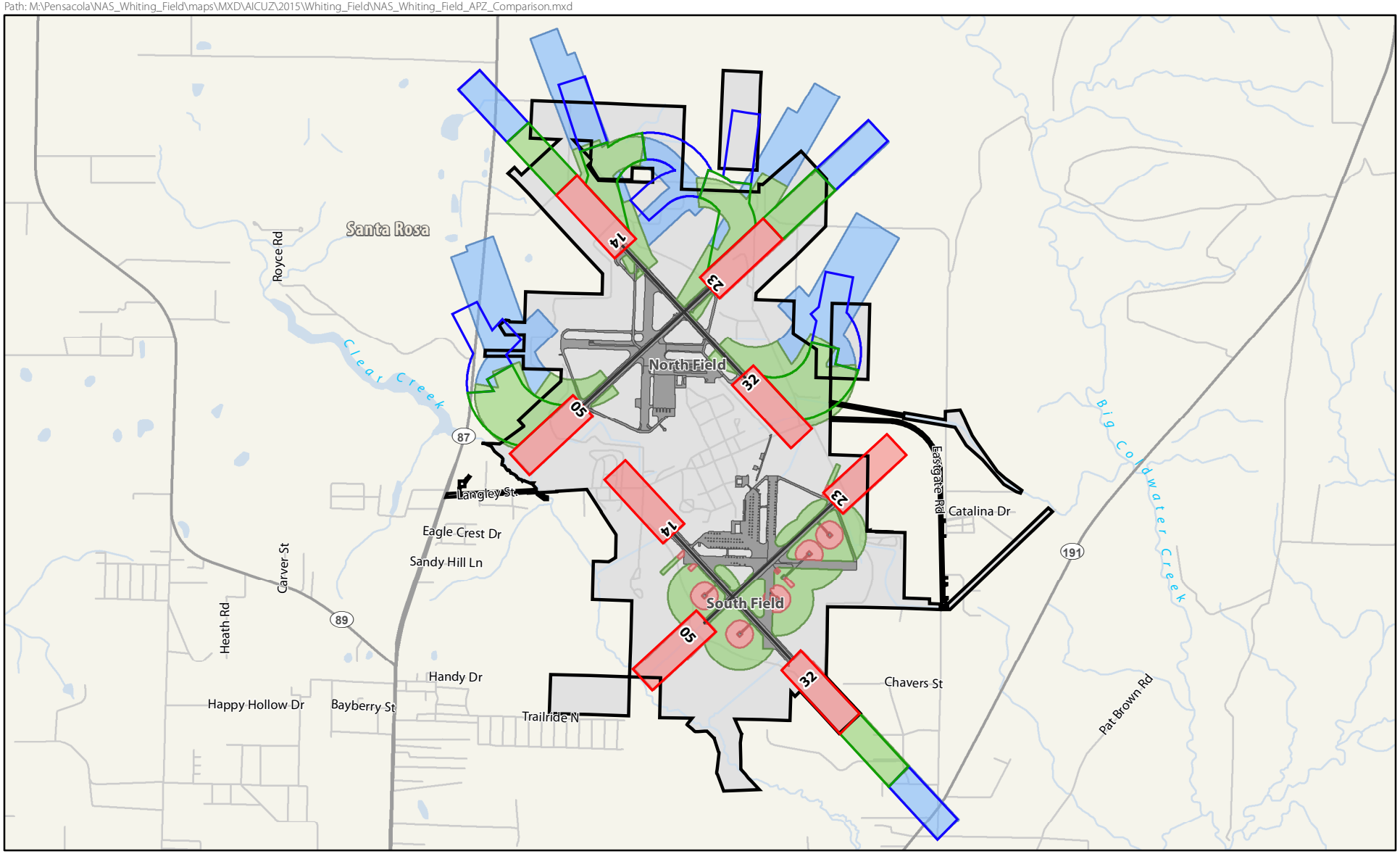
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.1-7
2015 AICUZ APZs, NAS Whiting Field
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_APZ_Comparison.mxd



N

SCALE

0 0.25 0.5 Miles

Legend

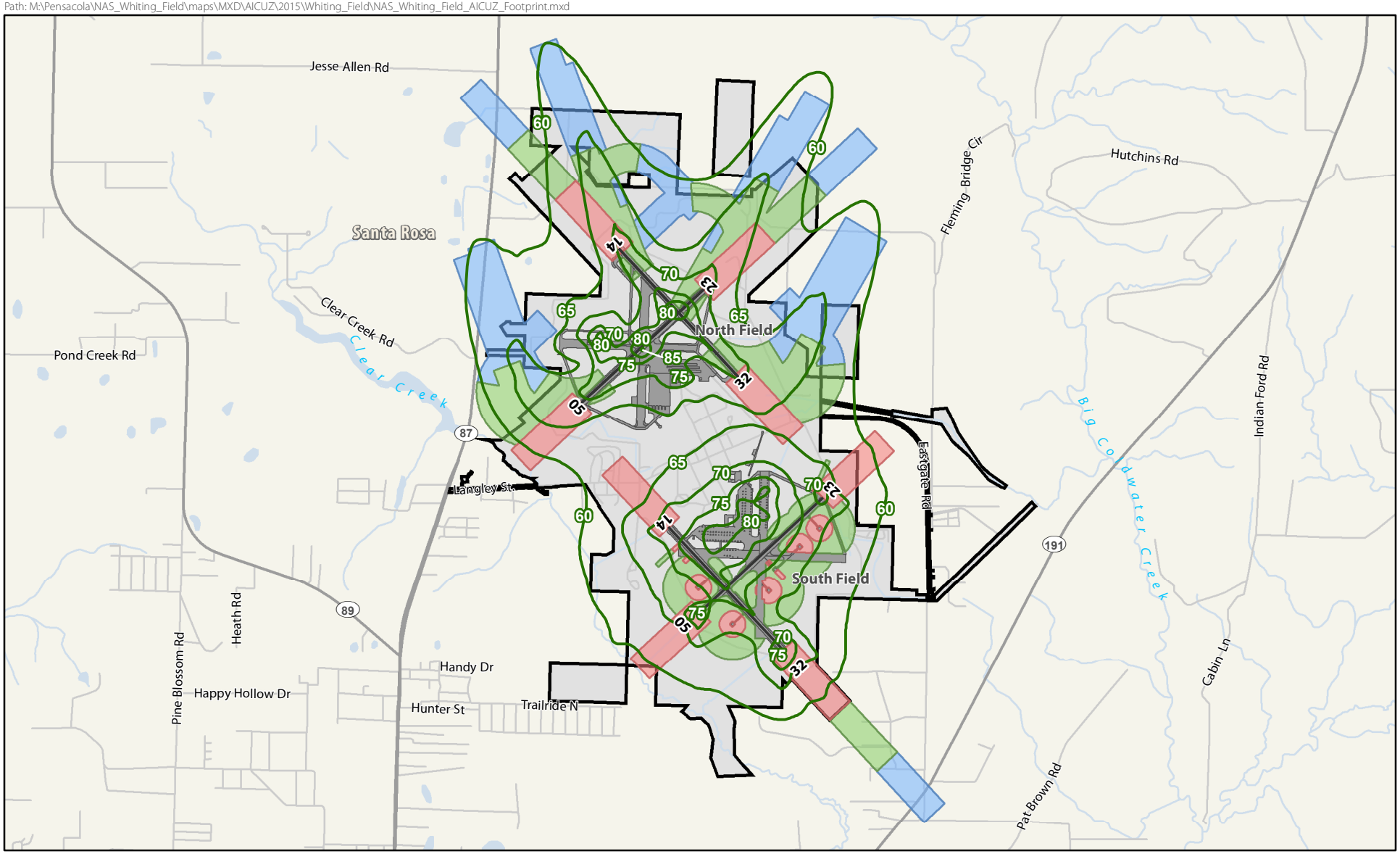
- Local Road
- Major Road
- Runway
- Airfield
- NAS Whiting Field Boundary

Accident Potential Zone (2015)	Accident Potential Zone (1990)
Clear Zone	Clear Zone
APZ I	APZ I
APZ II	APZ II

SOURCE: ESRI 2012; BRRC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.1-8
Comparison of 2003 JLUS and 2015 AICUZ APZs, NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_AICUZ_Footprint.mxd



SCALE

0 2,000 4,000 Feet

SOURCE: ESRI 2012; BRRC 2013;
Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

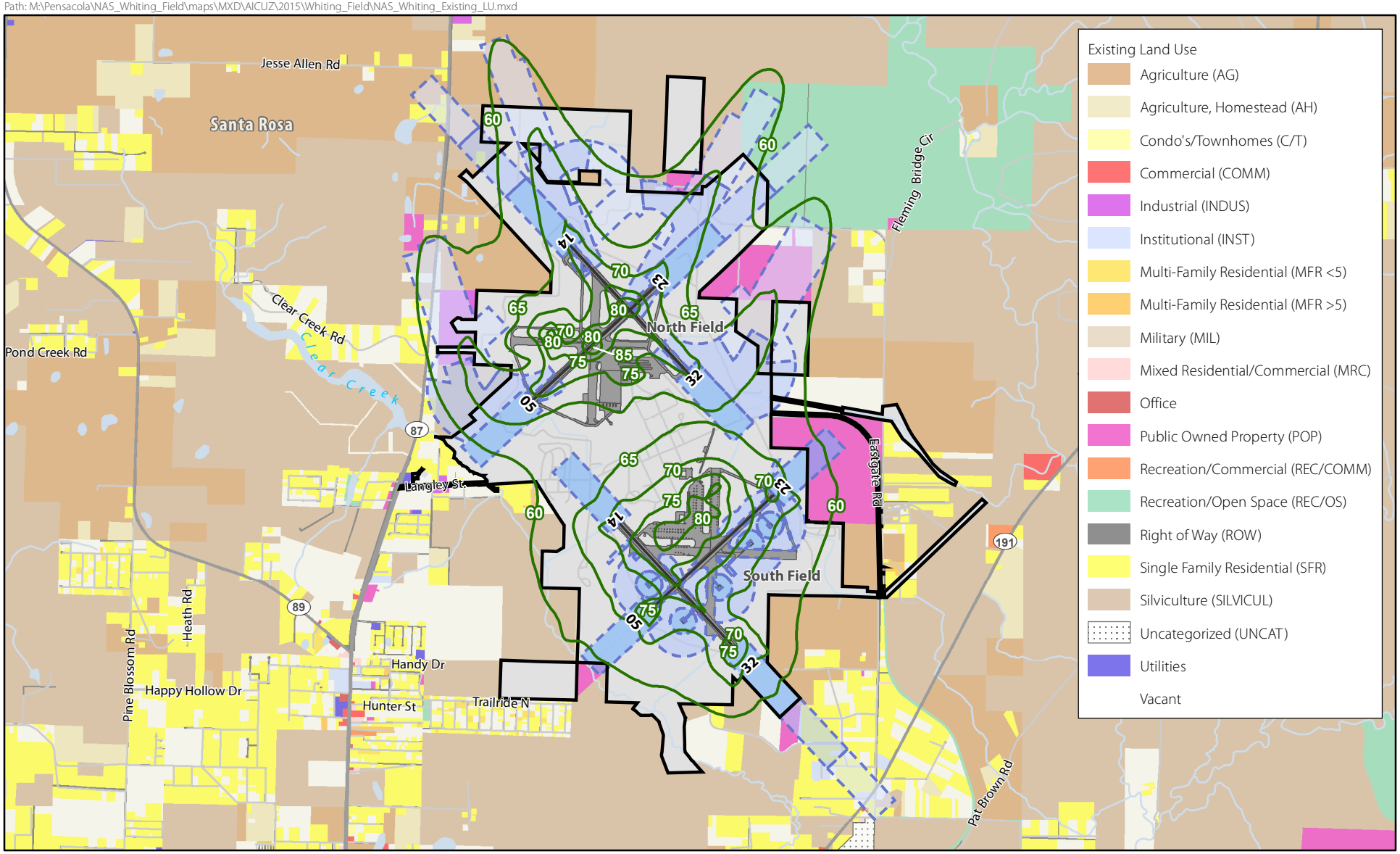
- Local Road
- Major Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NAS Whiting Field Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.1-9
2015 AICUZ Footprint
NAS Whiting Field
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Existing_LU.mxd



SCALE
0 2,000 4,000 Feet

Legend

- Major Road
- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NAS Whiting Field Boundary

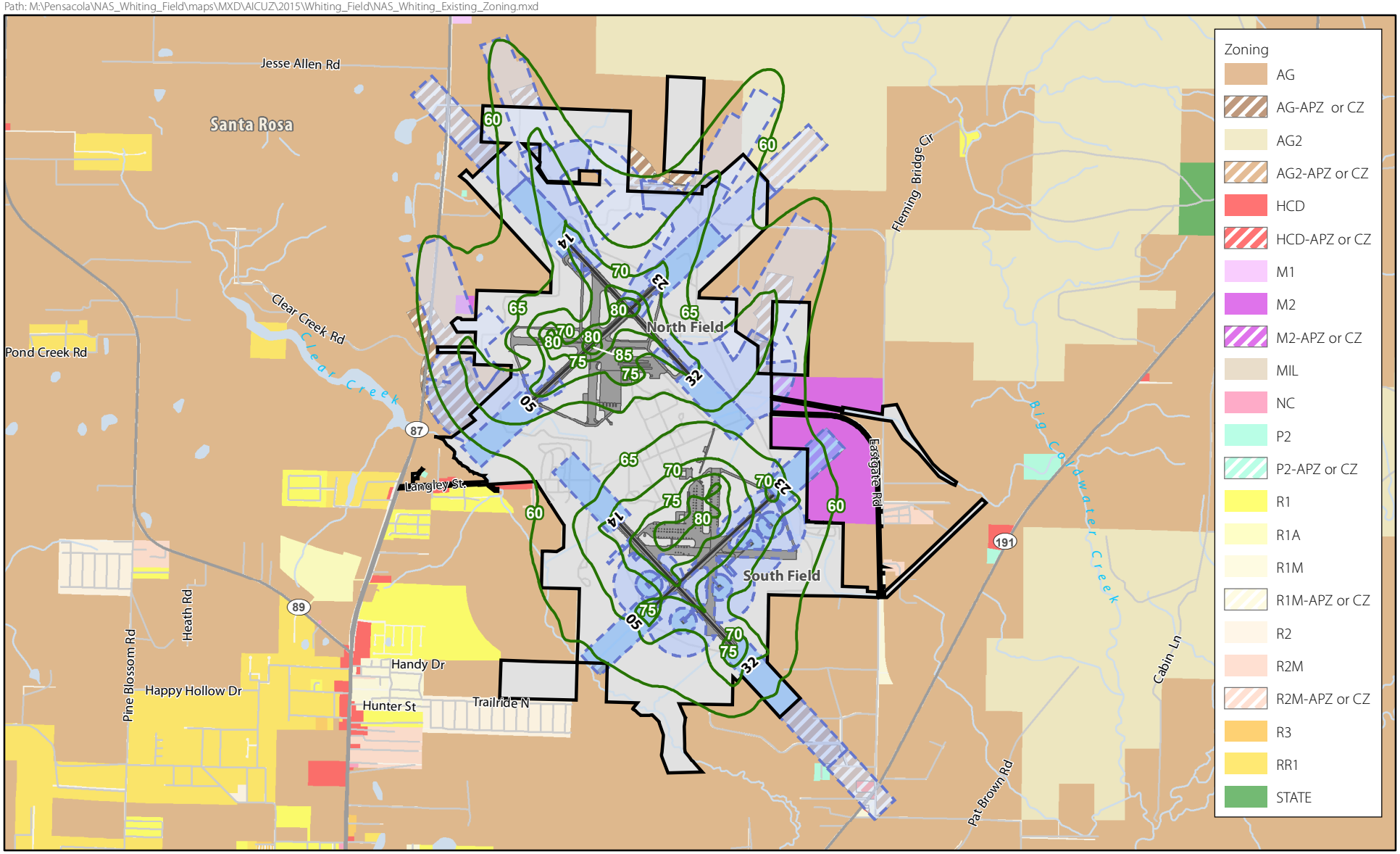
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2013;
Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.1-10
2015 Composite AICUZ Map, Existing Land Use, NAS Whiting Field,
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Existing_Zoning.mxd



N

SCALE

0 2,000 4,000 Feet

Legend

- Major Road
- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NAS Whiting Field Boundary

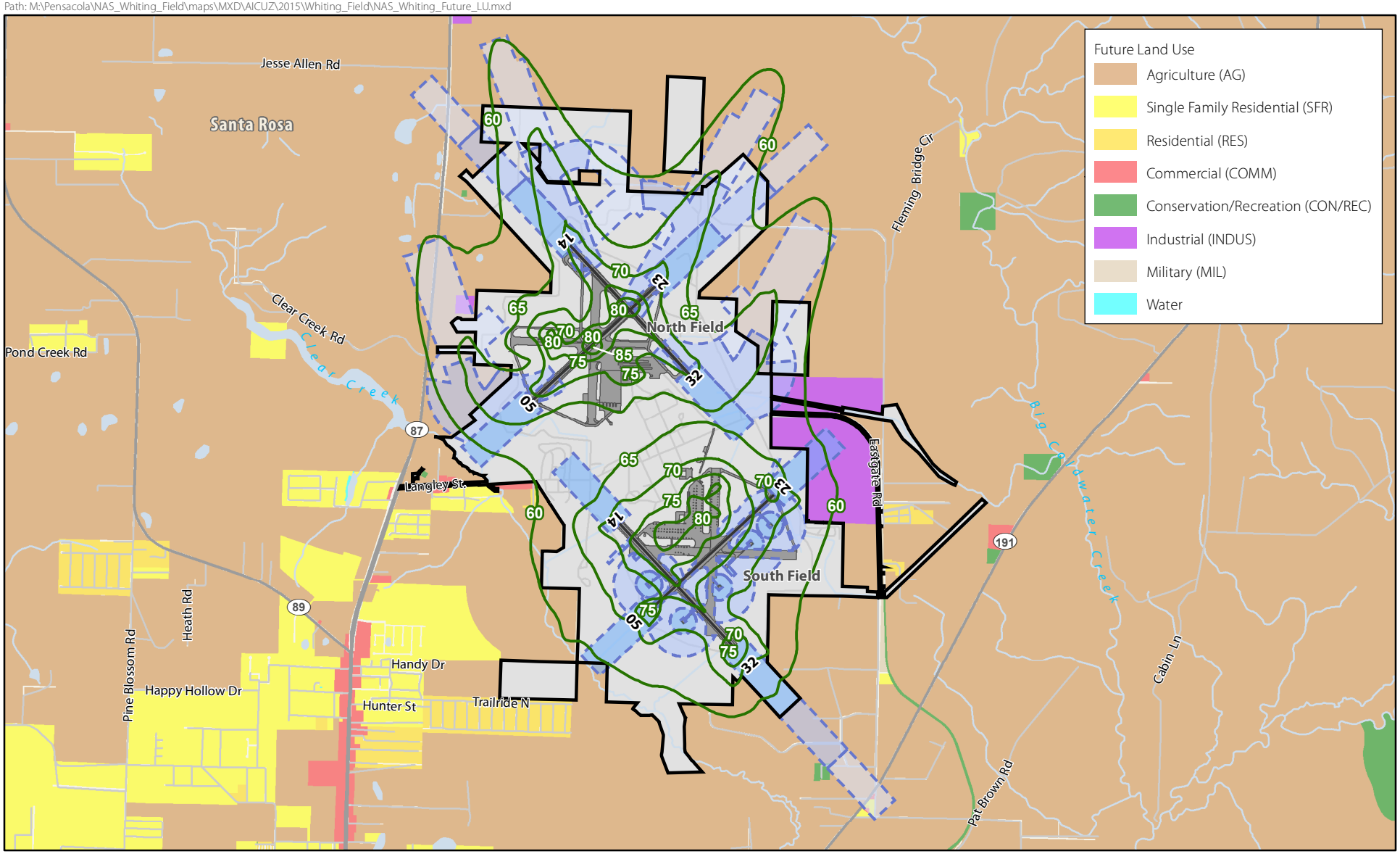
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2013;
Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.1-11
2015 Composite AICUZ Map, Existing Zoning, NAS Whiting Field,
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Future_LU.mxd



SCALE
0 2,000 4,000 Feet

Legend

- Major Road
- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NAS Whiting Field Boundary

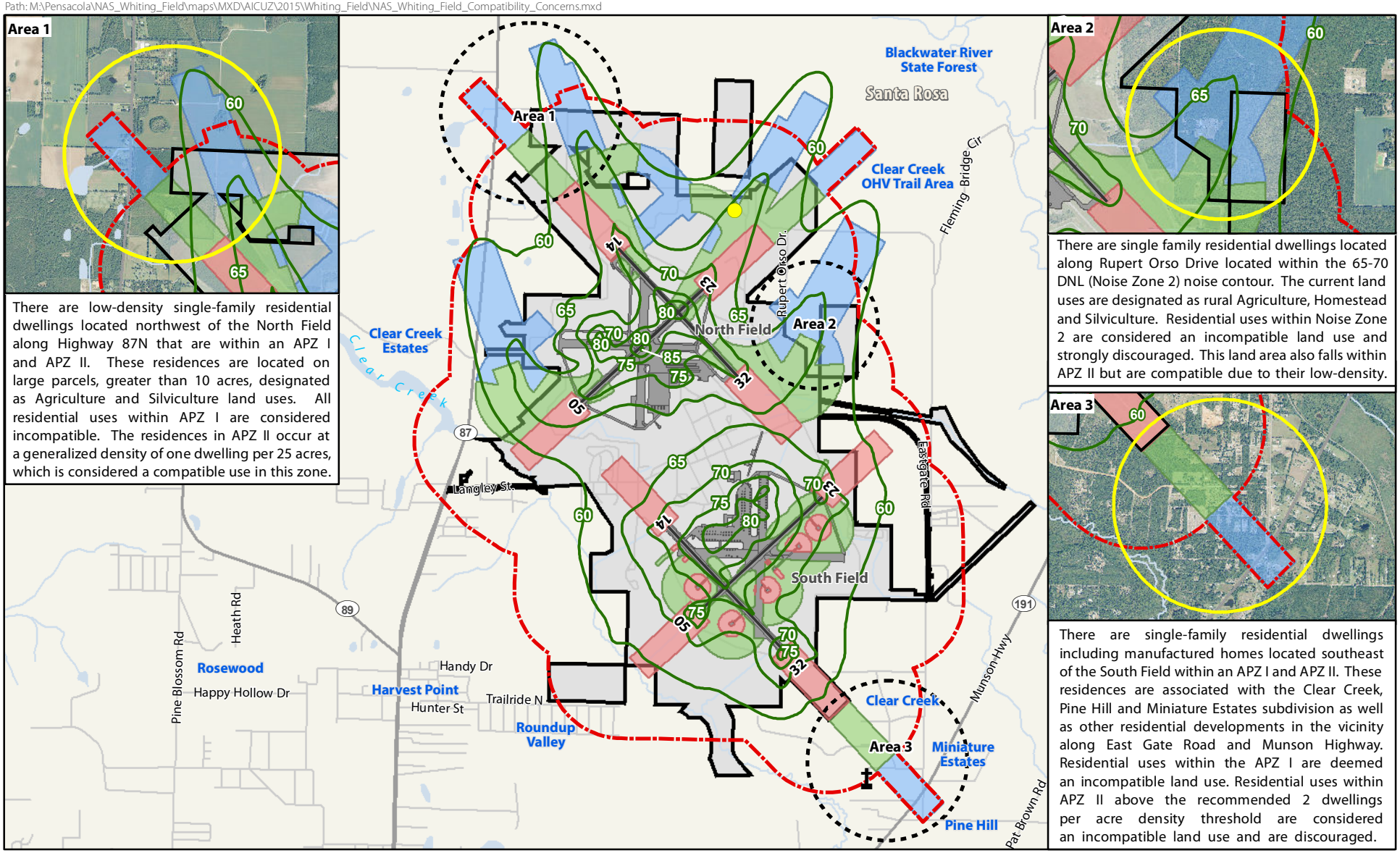
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2013;
Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.1-12
2015 Composite AICUZ Map, Future Land Use, NAS Whiting Field,
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Whiting_Field\NAS_Whiting_Field_Compatibility_Concerns.mxd



There are low-density single-family residential dwellings located northwest of the North Field along Highway 87N that are within an APZ I and APZ II. These residences are located on large parcels, greater than 10 acres, designated as Agriculture and Silviculture land uses. All residential uses within APZ I are considered incompatible. The residences in APZ II occur at a generalized density of one dwelling per 25 acres, which is considered a compatible use in this zone.

There are single family residential dwellings located along Rupert Orso Drive located within the 65-70 DNL (Noise Zone 2) noise contour. The current land uses are designated as rural Agriculture, Homestead and Silviculture. Residential uses within Noise Zone 2 are considered an incompatible land use and strongly discouraged. This land area also falls within APZ II but are compatible due to their low-density.

There are single-family residential dwellings including manufactured homes located southeast of the South Field within an APZ I and APZ II. These residences are associated with the Clear Creek, Pine Hill and Miniature Estates subdivision as well as other residential developments in the vicinity along East Gate Road and Munson Highway. Residential uses within the APZ I are deemed an incompatible land use. Residential uses within APZ II above the recommended 2 dwellings per acre density threshold are considered an incompatible land use and are discouraged.

SCALE
0 2,000 4,000 Feet

Legend

- Church
- Recreational Area
- Local Road
- Major Road
- Runway
- 2015 AICUZ Noise Contour
- Military Airport Zone
- Airfield
- NAS Whiting Field Boundary

Accident Potential Zone (2015)
- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2013;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.1-13
Compatibility Concerns - 2015 Composite Map
NAS Whiting Field
Santa Rosa County, Florida

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NOLF EVERGREEN

CONECUH COUNTY

ALABAMA

7.2 NOLF EVERGREEN COMPREHENSIVE EVALUATION

This section evaluates airfield operations, flight tracks, noise contours, imaginary surfaces, APZs, and land use specific to NOLF Evergreen (Middleton Airport). A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Evergreen Comprehensive Evaluation.]

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NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-1
RUNWAY AND FLIGHT TRACKS	
Representative Flight Tracks, NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-2
NOISE CONTOURS	
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2015 Noise Gradients, NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-4
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IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-6
ACCIDENT POTENTIAL ZONES	
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LAND USE	
2015 Composite AICUZ Footprint, USGS Land Use and Land Cover, NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-10
Compatibility Concerns – 2015 Composite Map, NOLF Evergreen, Conecuh County, Alabama	Figure 7.2-11

AIRFIELD OPERATIONS

NOLF Evergreen is a fixed-wing training airfield located in Conecuh County, Alabama (Figure 7.2-1). NOLF Evergreen has two runways, Runway 01/19 and Runway 10/28. Runway 01/19 was extended from 4,000 feet to 5,000 feet in 2008, and Runway 10/28 was extended to 5,000 feet in 2012. The runway expansions were necessary to accommodate T-6 student solo operations.

Flight operations at NOLF Evergreen have fluctuated over time, ranging from a peak of 133,500 operations in 1986 to a low of 33,030 operations in 2008. Historical operations at NOLF Evergreen are presented in detail in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs.

Existing military operations at NOLF Evergreen are dual and solo touch-and-go operations executed with T-6 JPATS aircraft. The T-6 JPATS aircraft operations at NOLF Evergreen include VFR touch-and-go's, holding patterns, and low key practice precautionary emergency landing (PEL) (i.e., circling patterns with a touch-and-go repeated during each circle of the airfield). Only daytime operations are conducted at the airfield and aircraft are not routinely parked overnight at NOLF Evergreen, nor are maintenance activities conducted at the airfield.

NOLF Evergreen is also commonly used by civilian aircraft and operations, including single-engine prop-aircraft, small twin-engine prop-aircraft, and business-size jets. Due to the limited number of operations, civilian aircraft operations are not discussed in this AICUZ Study.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis for projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The Navy forecasts that total operations at NOLF Evergreen will be approximately 104,273 annual flight operations in CY2025 (Table 7.2-1). This will represent an increase of 12 percent for annual flight operations relative to the baseline operations of 93,559 from the 1990 AICUZ. Table 7.2-1 shows the modeled distribution of these annual airfield operations by operation type.

TABLE 7.2-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF EVERGREEN

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	6,497
Overhead Break Arrival	3,248
PEL Arrival	3,248
Touch-and-Go Pattern	64,968
Low Key PEL Pattern	25,987
Delta (Hold) Pattern	325
TOTAL	**104,273**
1990 AICUZ Total	**93,559**

Source: BRRC 2015 and NAS Whiting Field 2010

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. Flight tracks provide safety, consistency, and control of an airfield. Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide. Operations are tracked according to flight track/runway utilization at each airfield to determine APZs. Figure 7.2-2 depicts the specific flight tracks associated with NOLF Evergreen.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section discusses the 2015 AICUZ noise contours for NOLF Evergreen and provides a detailed description of the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 noise contours (as presented in the AICUZ Noise Analysis at Naval Air Station Whiting Field and Navy Outlying Landing Fields, 2015). The comparison helps identify changes to noise exposure based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate noise impacts. Land use and recommendations within noise zones for this airfield are provided and discussed later in this section.

The T-6 aircraft replaced the T-34C; therefore, the only noise sources considered for the NOLF Evergreen noise model are T-6 aircraft operations. The 2015 noise contours for NOLF Evergreen are within the immediate vicinity of the airfield, with a majority of the noise contours concentrated within the installation's boundary (Figure 7.2-3). Figure 7.2-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over the surrounding land area. The 65 dB DNL contour extends off station only marginally to the northeast and southeast, and follows the touch-and-go pattern, which is the dominant operation conducted at this airfield. The outermost 60 dB DNL contour lobes follow the path of the arrival and departure tracks. The 50 and 55 dB DNL noise contours to the southeast follow one of the departure tracks. The 70 and 75 dB DNL noise contours are contained within the airfield boundary and are generally centered along the two operating runways.

The 2015 AICUZ noise contours are similar in size and location when compared to the 1990 AICUZ noise contours (Figure 7.2-5). The 2015 AICUZ noise contours show the 50 dB DNL extending slightly further off station when compared to the 1990 AICUZ noise contours. The 60 dB DNL contour also extends slightly off station. The majority of the noise is contained within the installation boundary, and the areas impacted by the 60 to 65 dB DNL contours are deemed areas of low or no impact.

The slight changes between the 1990 and 2015 noise contours are attributed to:

- ☐ Extended runways (to accommodate T-6 student solo operations);

- ☐ Changes in aircraft (1990 noise contours modeled T-34 aircraft operations and civilian operations, and 2015 contours only modeled T-6 operations);
- ☐ Changes in flight patterns (the T-6 is flown in the same general manner as the T-34C, except longer runways are required to accommodate T-6 training requirements);
- ☐ Changes in operational levels (the number of operations has slightly increased from the 1990 to the 2015 AICUZ studies); and
- ☐ Improved noise mapping techniques (discussed in Section 4.5).

As noted in Table 7.2-2, the off-station noise impact has increased by 2,803 acres from the 1990 to the 2015 noise contours.

TABLE 7.2-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF EVERGREEN

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF-STATION (ACRES)	TOTAL (ACRES)	OFF-STATION (ACRES)
50-55 dB DNL	1,209	993	2,423	2,423
55-60 dB DNL	287	63	1,166	1,152
60-65 dB DNL	0	0	389	262
65-70 dB DNL	0	0	192	22
70-75 dB DNL	0	0	117	0
>75 dB DNL	0	0	13	0
TOTAL AREA	**1,496**	**1,056**	**4,300**	**3,859**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.2-6 presents the imaginary surfaces and transition planes for NOLF Evergreen.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. The following section presents the 2015 APZs for NOLF Evergreen (Figure 7.2-7), including a detailed analysis of the areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 APZs (Figure 7.2-8). The comparison helps identify changes to APZs based on projected changes in aircraft operations and allows the targeting of land use recommendations to mitigate incompatible development.

AICUZ Instruction requires Clear Zones for all runway ends. APZ I and APZ II are required for NOLF Evergreen because flight operations for both runways at this airfield exceed 5,000 operations annually. Table 7.2-3 provides the acreages that fall within the Clear Zones and APZs for NOLF Evergreen. Approximately 912 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural and rural. A comparison of the 1990 and 2015 AICUZ Clear Zones and APZs shows a significant change in coverage, primarily associated with runway extensions, changes in flight tracks and patterns, and an increase in annual operations. These changes have resulted in multiple APZ I and APZ II areas for each end of Runway 01/19 and on one end of Runway 10/28. In addition, there is a loss of an APZ off the arrival end of Runway 28 due

to changes in T-6 runway length requirements; therefore, that flight track no longer being flown. Overall, the total off-station area impacted has increased by approximately 410 acres from 1990 AICUZ calculations.

TABLE 7.2-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF EVERGREEN

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	172	0	2	0	0	0	174
	Off-Station	138	0	108	0	236	0	482
	TOTALS	310	0	110	0		236	656
		310		110		236		
2015 AICUZ	On-Station	130	0	0.82	0	0	0	130.82
	Off-Station	146	0	408	2	358	22	936
	TOTALS	276	0	408.82	2	358	22	1066.82
		276		410.82		380		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to: U.S. Waterbodies (USGS 2012)

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Evergreen. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ footprint for NOLF Evergreen, presented on Figure 7.2-9, was used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility for this AICUZ Study were previously presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Evergreen is located in unincorporated areas of Conecuh County and the City of Evergreen, Alabama. Therefore, the land use ordinances covering the off-station property within the AICUZ footprint are within those two jurisdictions. Land use patterns and zoning in the immediate vicinity of NOLF Evergreen, along with the land use compatibility assessment and analysis conducted, are presented below.

EXISTING LAND USE

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. The land use data for areas in the vicinity of NOLF Evergreen are limited. The area to the east, within the city of Evergreen, has updated land use data, as seen on Figure 7.2-10. However, lands to the west are within the Conecuh County jurisdiction and there is no GIS data available for this area. Therefore, the classification and analysis of the surrounding land were conducted using a mixture of available data as well as land cover data, aerial photos, county online mapping systems, and individual parcel data. Figure 7.2-10 illustrates the existing land cover data surrounding NOLF Evergreen obtained from the U.S. Geological Survey (USGS). The land cover data present only broad land use data in terms of what is developed and what is the predominate agronomic land cover. Based on the best available data, the majority of land use surrounding NOLF Evergreen is rural and agricultural , and features low-intensity development, with a mix of residential, agricultural, and forest lands. The residential uses are typically single-family dwellings (including manufactured mobile homes) on large parcels (greater than 1.0 acre). The majority of the low-density residential uses are located north of the airfield along U.S. Highway 84. Based on the county parcel date, there does appear to be limited commercial and/or industrial uses surrounding NOLF Evergreen to the northeast. Overall, land use around NOLF Evergreen reveals a pattern of low-density development, as there is still a large amount of undeveloped property. From the perspective of land use compatibility, some of the residential uses surrounding NOLF Evergreen are incompatible in specific Clear Zones, APZs, and noise zones. An evaluation of specific land use compatibility is provided later in this section.

EXISTING ZONING

"Zoning" is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Due to lack of GIS data, analysis of zoning surrounding NOLF Evergreen was conducted using aerial photos, county online mapping systems, and individual parcel data. The City of Evergreen's 1979 Zoning Ordinances are the most current and identify the zoning districts utilized in the city. Zoning districts surrounding NOLF Evergreen appear to be mostly Agricultural (A-0) and Single Family Residential (R-1) designations. These are low-density (less than 2 dwellings per acre) residential zoning districts.

FUTURE LAND USE

The City of Evergreen adopted the Comprehensive Community Master Plan, Evergreen, Alabama (2009) for the physical development of the city, including areas surrounding NOLF Evergreen. The City of Evergreen has also adopted land use and zoning Ordinances establishing rules and regulations for zoning and land use around the airfield. As previously stated, current and/or future data was limited. However, based on the proposed land use map presented in the City's Master Plan, the future land use surrounding the airfield is projected as entirely industrial. Even if the development around NOLF Evergreen follows the proposed land use of industrial, the potential for compatibility issues in specific Clear Zones, APZs, and noise zones may still exist. An evaluation of specific land use compatibility concerns for NOLF Evergreen is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Evergreen's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Evergreen, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current City of Evergreen land use and parcel data and USGS land cover information for the land areas within the unincorporated areas of Conecuh County. The evaluation was performed on a case-by-case basis and at the land parcel level using the Navy's land use compatibility guidance. In addition, due to the limited GIS data, reasonable assumptions were made on land uses and zoning surrounding the airfield. Table 6-1 (see Chapter 6) provides a generalized breakdown of land use compatibility and provides the Navy's

land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

NOLF Evergreen's 2015 AICUZ noise contours that extend off the installation are primarily <60 dB DNL or 60 to 65 dB DNL, with limited areas within the 65 to 70 dB DNL noise contour extending off the installation. In addition, there are incompatible land uses and existing compatibility concerns within NOLF Evergreen's Clear Zones and APZs. These off-station areas of impact are mainly low-density rural residential areas, as described below and depicted on Figure 7.2-11.

- Area 1: Low-density residential (less than 2 dwellings per acre) areas north of the airfield along U.S. Highway 84 and Pine Tree Road are currently within the Runway 19 Clear Zone and present a compatibility concern. These dwellings include both traditional "stick-built" homes and manufactured mobile homes.

  In addition, lands within the Clear Zones of each runway end are not entirely Navy-owned. The Navy should own and maintain all the land within airfield Clear Zones to guarantee that these designated areas remain vacant and protected from incompatible development. The AICUZ instruction views any structures within a Clear Zone as an incompatible use..

- Area 2: There are residential dwellings located in an area west of the airfield. These residences are within the Runway 10 Clear Zone and APZ I and present a compatibility concern. Residential districts are incompatible within APZ I.

- Area 3: There are residential parcels located within a small area west of the airfield that includes the 65 to 70 dB DNL noise contours. The AICUZ Instruction strongly discourages residential land uses within 65+ dB DNL noise zones.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF EVERGREEN

Overall, the residences and land uses identified in this section are considered a moderate incompatibility concern. However, future development and density increases will continue to be compatibility concerns in the area around NOLF Evergreen. The Navy, the City of Evergreen, and Conecuh County should continue to focus on these encroachment concerns.

The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Evergreen. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.

FUTURE LAND USE DECISIONS

When the City of Evergreen makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones and APZs. The City of Evergreen and NAS Whiting Field should work together to establish a broader special planning area (such as military influence areas or airport overlay zones/districts) with development restrictions for areas in and outside the established APZs at NOLF Evergreen that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. The special development classification should be extended and encompass the lands under the Clear Zones and APZs, as well as areas within the 65+ dB DNL noise zones. The local government should use the flight tracks presented in Chapter 3 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

UPDATE LAND USE PLAN, ZONING ORDINANCES, AND MAPS

The City of Evergreen should update its Comprehensive Plan to reflect the 2015 AICUZ noise contours, Clear Zones, and APZs for NOLF Evergreen and OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with the City of Evergreen and Conecuh County to update their land use and zoning maps to indicate the classifications surrounding the airfield. The maps should indicate the boundary for NOLF Evergreen and include a "Military Land Use" classification for the parcels owned by the Navy. These updates will further aid city and county officials, planners, and private citizens in their decisions and policies regarding future land use and development surrounding NOLF Evergreen.

MONITOR AREAS OF POTENTIAL CONCERN

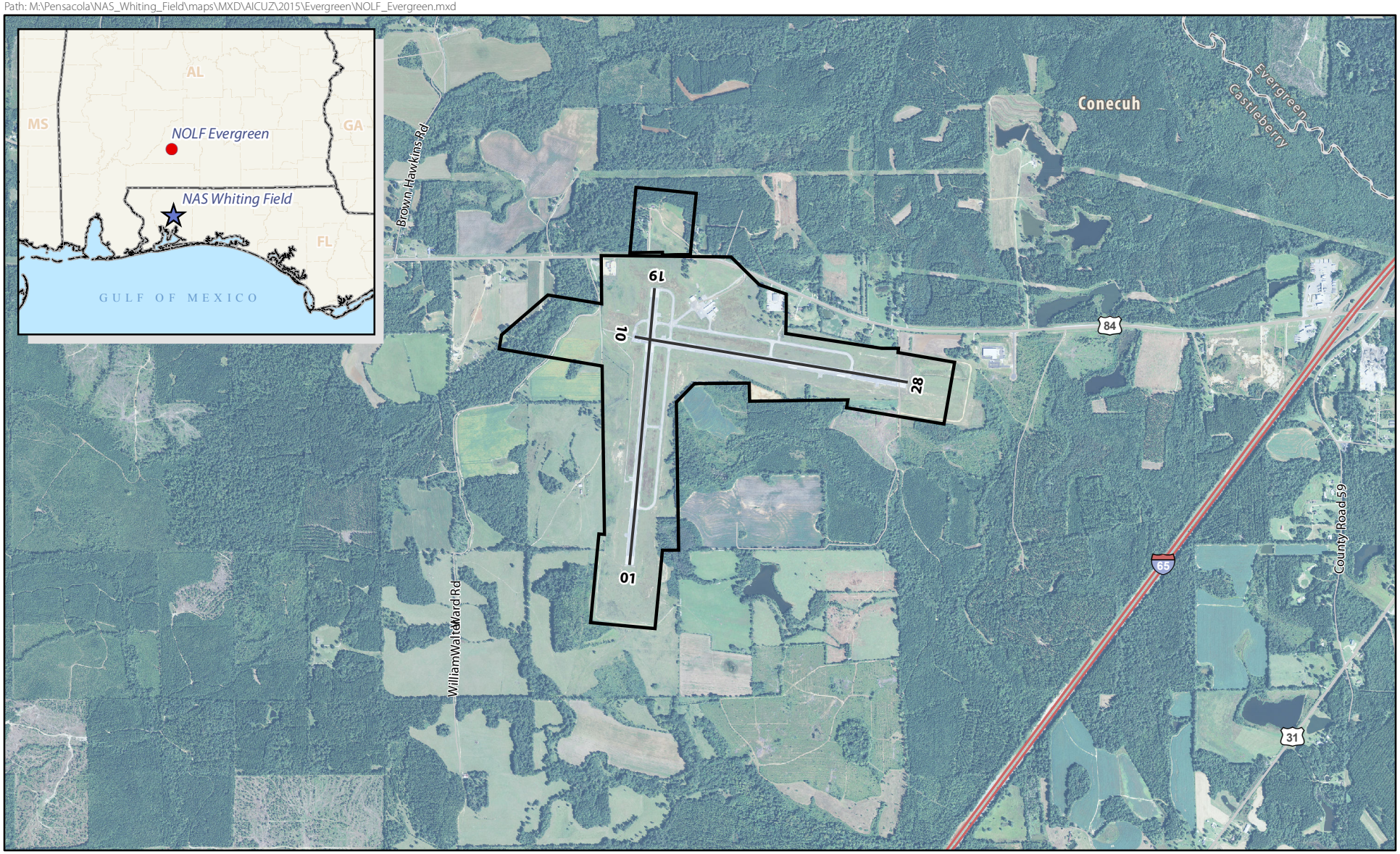
There are a few residential dwellings located within APZ II at NOLF Evergreen, but the densities are well below the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance; however, these areas should be continuously

monitored for changes to development density. These areas will become incompatible, per AICUZ criteria, if residential development continues at a higher density level (above 1-2 dwellings per acre) for the residential land uses within APZ II.

PUBLIC LAND ACQUISITION

The Navy should continue its efforts to purchase and acquire public lands in the vicinity of NOLF Evergreen as they become available. This will result in the protection of key land assets by limiting impacts from development that is considered incompatible with air station activities. Priority should continue to be placed on the lands within the Clear Zones. The Navy should own and maintain all land within airfield Clear Zones. Any obstruction or structure within the Clear Zones, whether permanent or temporary, is a threat to pilot safety and the health, safety, and welfare of the public. Although private property within a Clear Zone may be undeveloped or considered a compatible land use, the Navy cannot guarantee that the area will remain clear at all times unless the property is Navy-owned or protective easements are in place.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\NOLF_Evergreen.mxd



N

SCALE

0 0.25 0.5 Miles

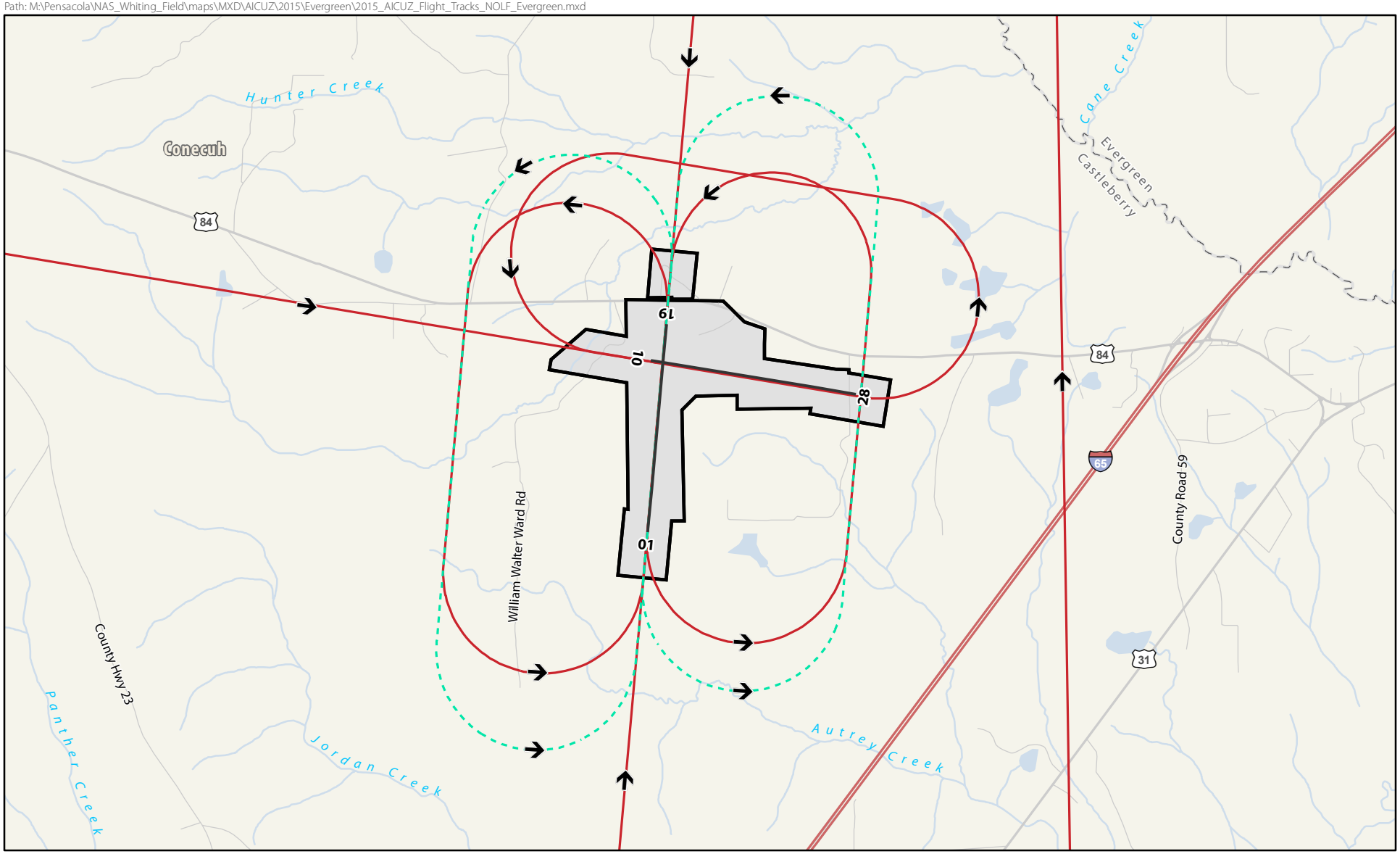
SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

- Interstate
- Major Highway
- Local Road
- Runway
- NOLF Evergreen Boundary

Figure 7.2-1
NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\2015_AICUZ_Flight_Tracks_NOLF_Evergreen.mxd



N

SCALE

0 0.25 0.5 Miles

19 10 28 01

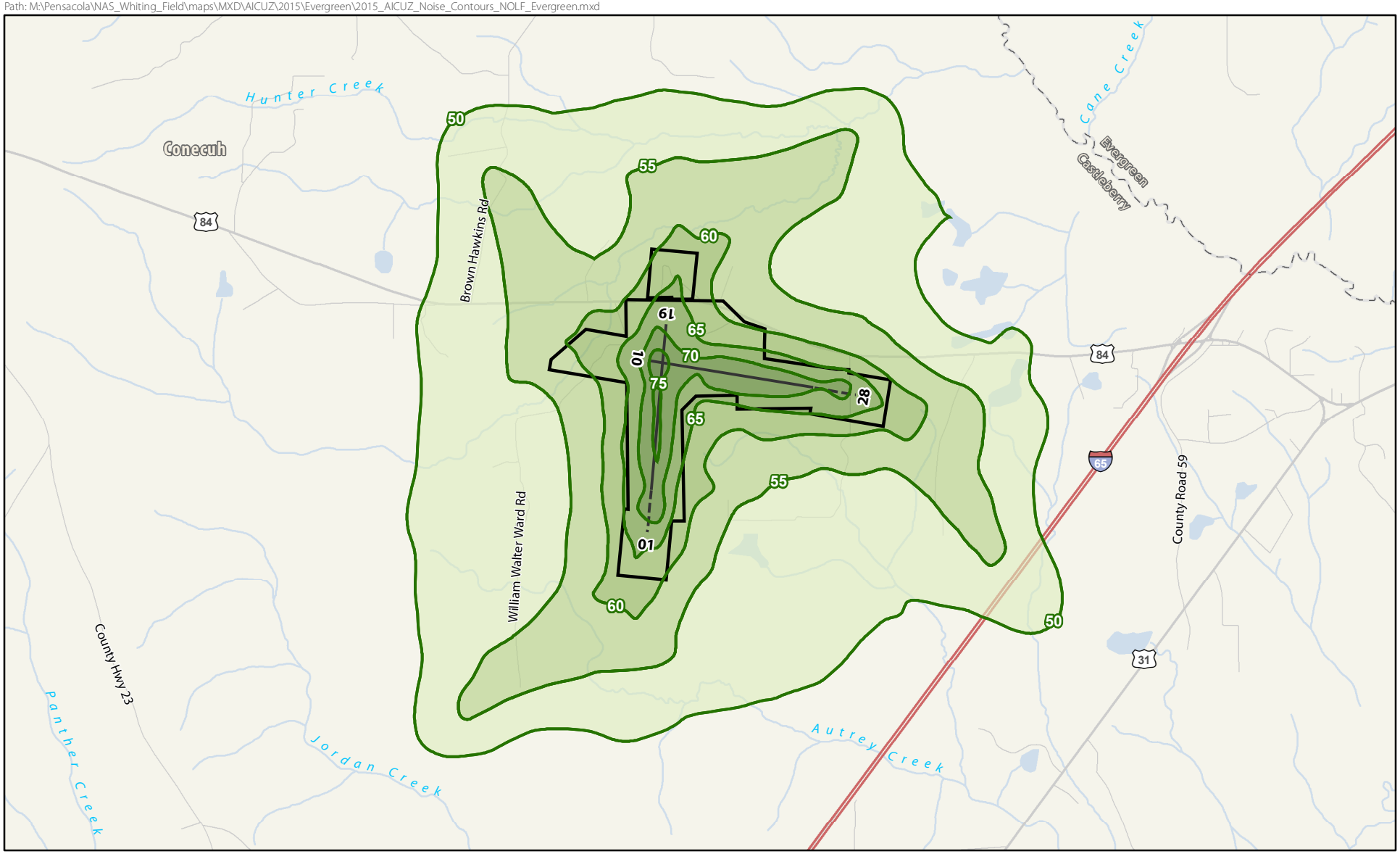
Legend

- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- Overhead Break Arrival
- Closed Pattern
- NOLF Evergreen Boundary

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.2-2
Representative Flight Tracks, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\2015_AICUZ_Noise_Contours_NOLF_Evergreen.mxd



N

SCALE

0 0.25 0.5 Miles

19 10 28 01

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Interstate
Major Highway
Local Road
Municipal Boundary
Runway
Runway Extension

Legend

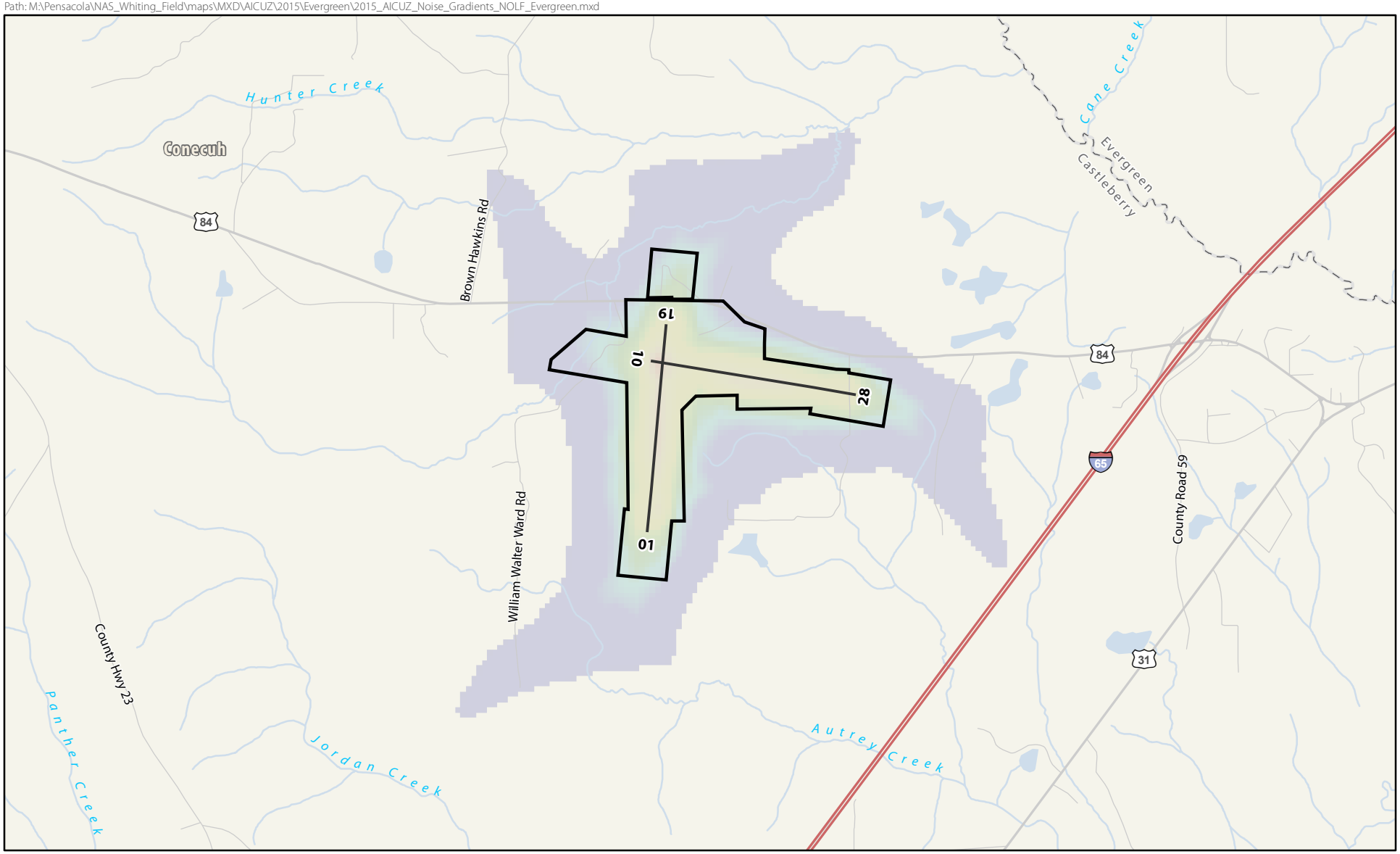
NOLF Evergreen Boundary

dB DNL Value

50 dB DNL
55 dB DNL
60 dB DNL
65 dB DNL
70 dB DNL
75 dB DNL

Figure 7.2-3
2015 AICUZ Noise Contours, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\2015_AICUZ_Noise_Gradients_NOLF_Evergreen.mxd



SCALE

0 0.25 0.5 Miles

19 10 28 01

Legend

- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- NOLF Evergreen Boundary

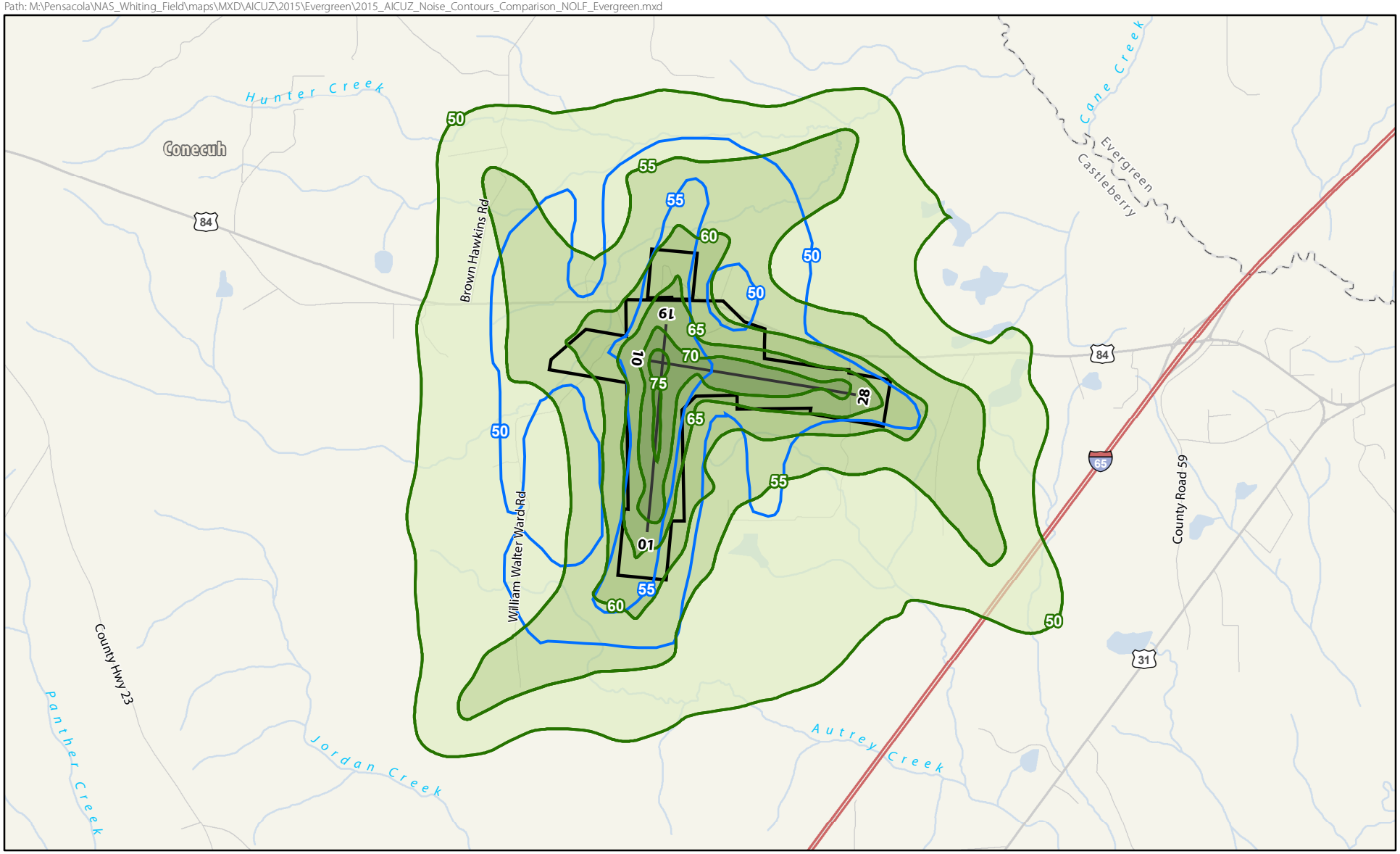
Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.2-4
2015 Noise Gradients, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\2015_AICUZ_Noise_Contours_Comparison_NOLF_Evergreen.mxd



N

SCALE

0 0.25 0.5 Miles

19 10 28 01

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

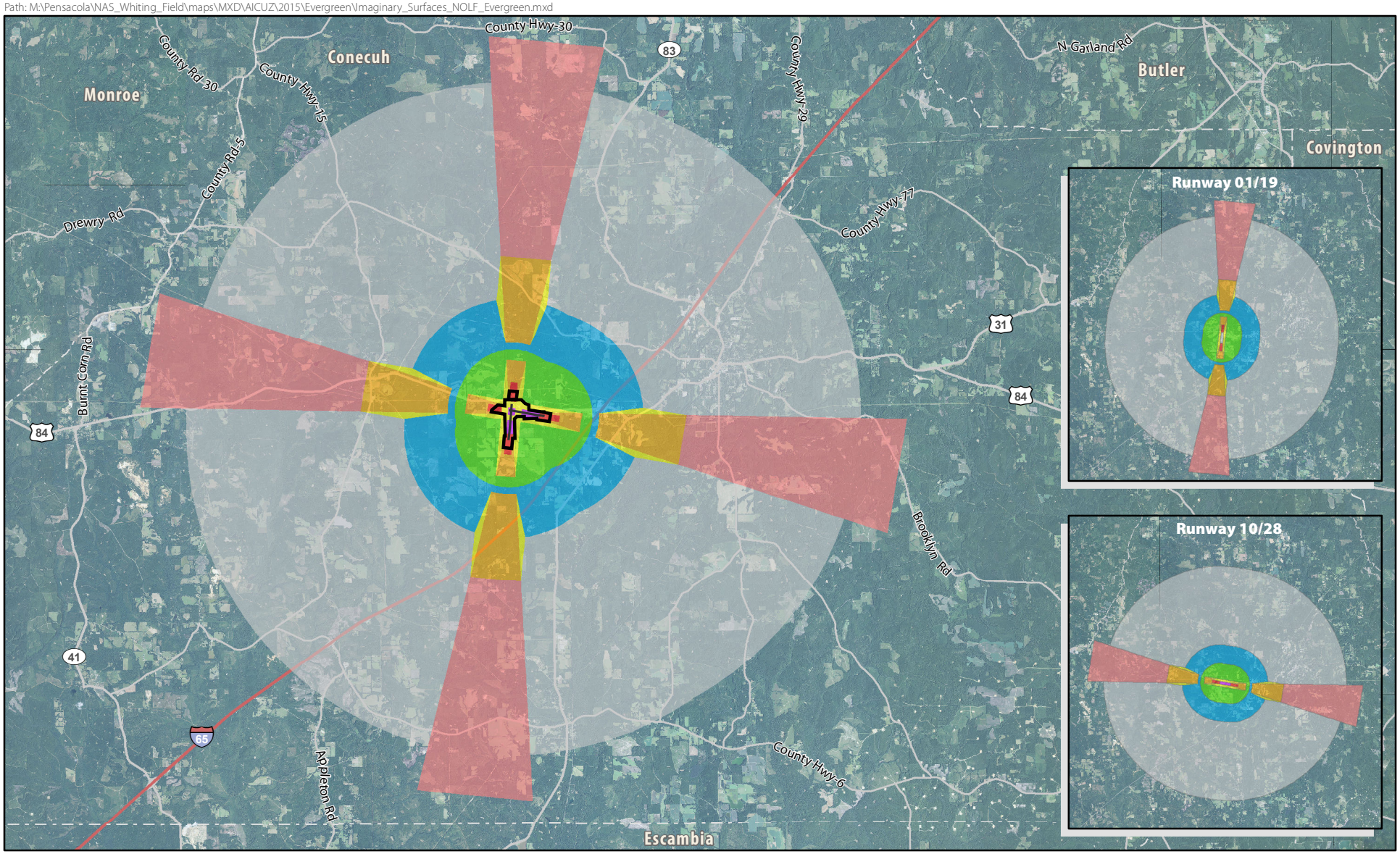
- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- NOLF Evergreen Boundary
- 1990 AICUZ Noise Contours

2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.2-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Evergreen\Imaginary_Surfaces_NOLF_Evergreen.mxd



SCALE
0 1 2 Miles

19
10
28
01

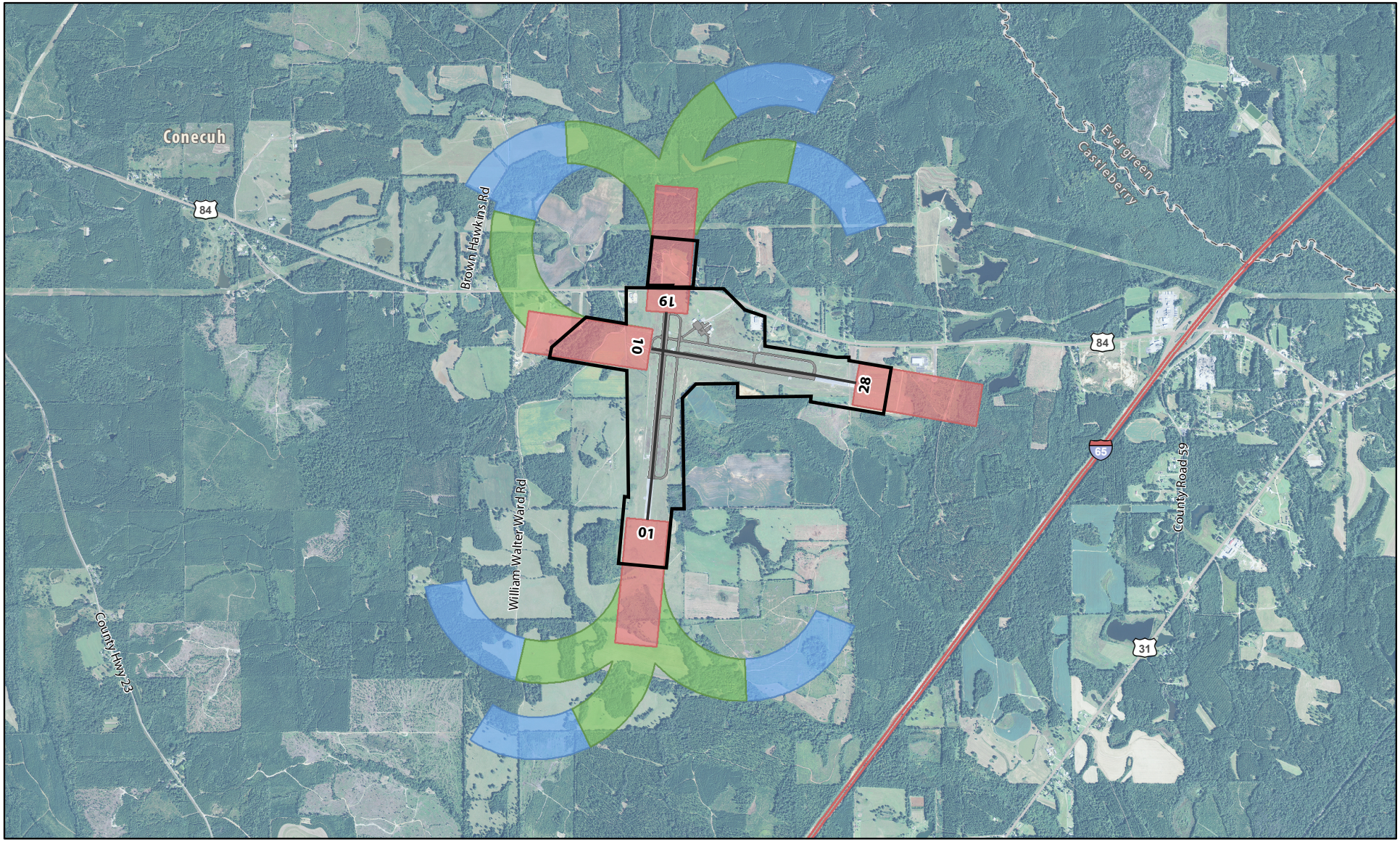
Legend

- County Boundary
- Interstate
- Major Highway
- Other Major Road
- Runway
- NOLF Evergreen Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- D: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- G: Outer Horizontal Surface
- H: Transitional Surface

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.2-6
Imaginary Surfaces, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Evergreen\2016_Dec\7_2-7_2015_AICUZ_APZs_NOLF_Evergreen.mxd



SCALE

0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- NOLF Evergreen Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.2-7
2015 AICUZ APZs, NOLF Evergreen
Conecuh County, Alabama

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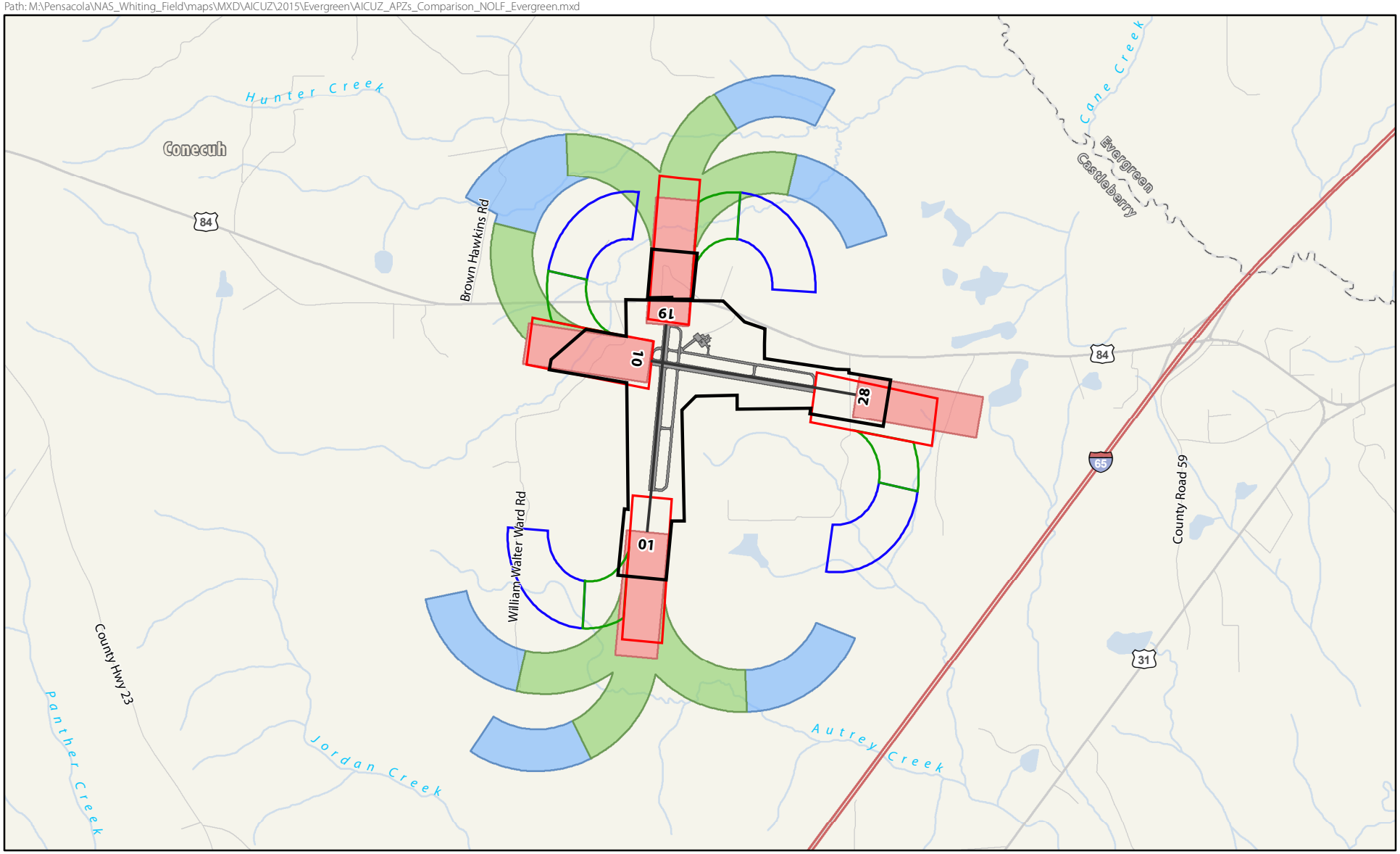

SCALE

0 0.25 0.5 Miles

19 10 28 01

Legend

- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- NOLF Evergreen Boundary
- Airfield

Accident Potential Zone (2015)	Accident Potential Zone 1990
Clear Zone	Clear Zone
APZ I	APZ I
APZ II	APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.2-8
Comparison of 1990 and 2015 AICUZ APZs, NOLF Evergreen
Conecuh County, Alabama

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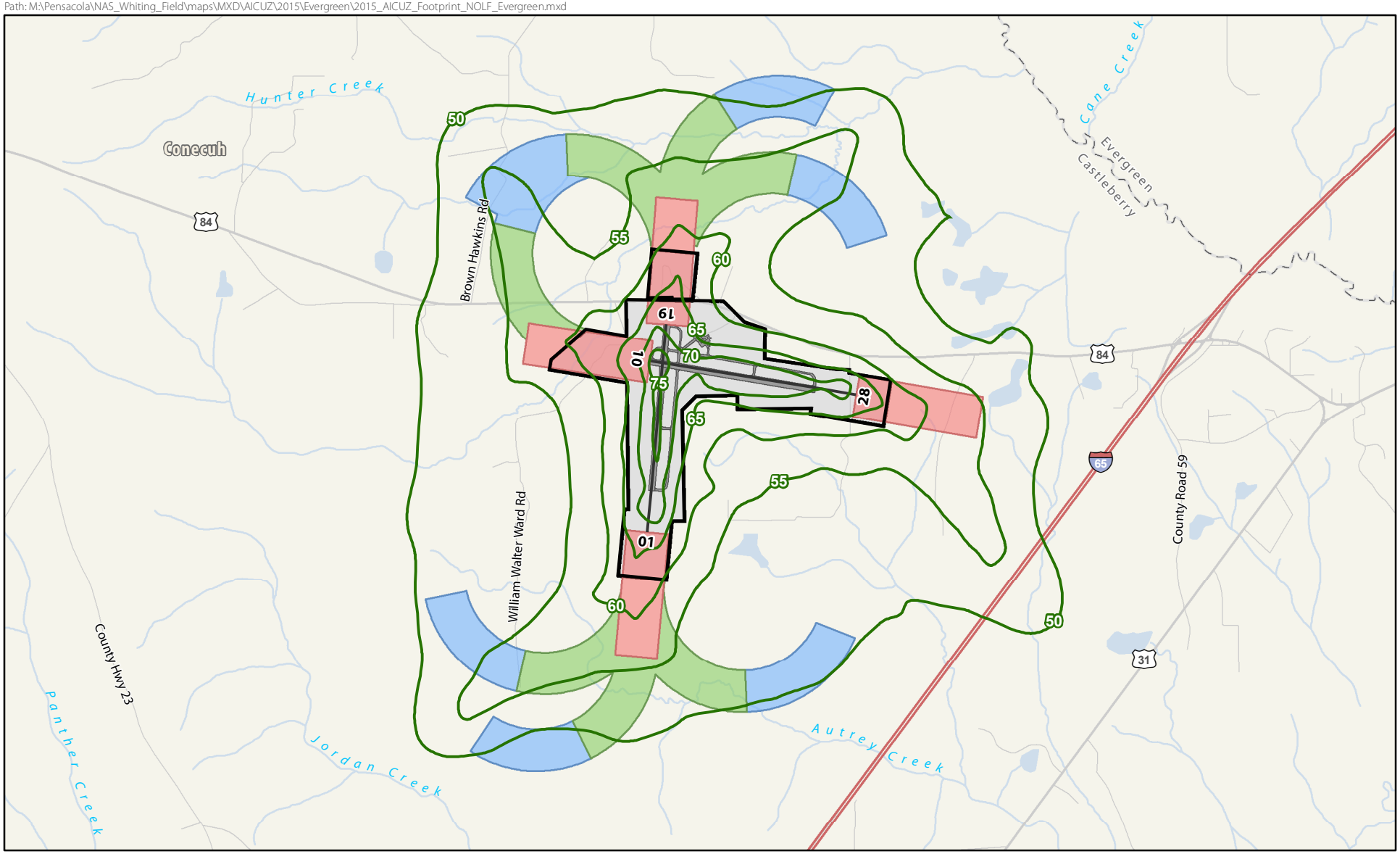


SCALE
0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

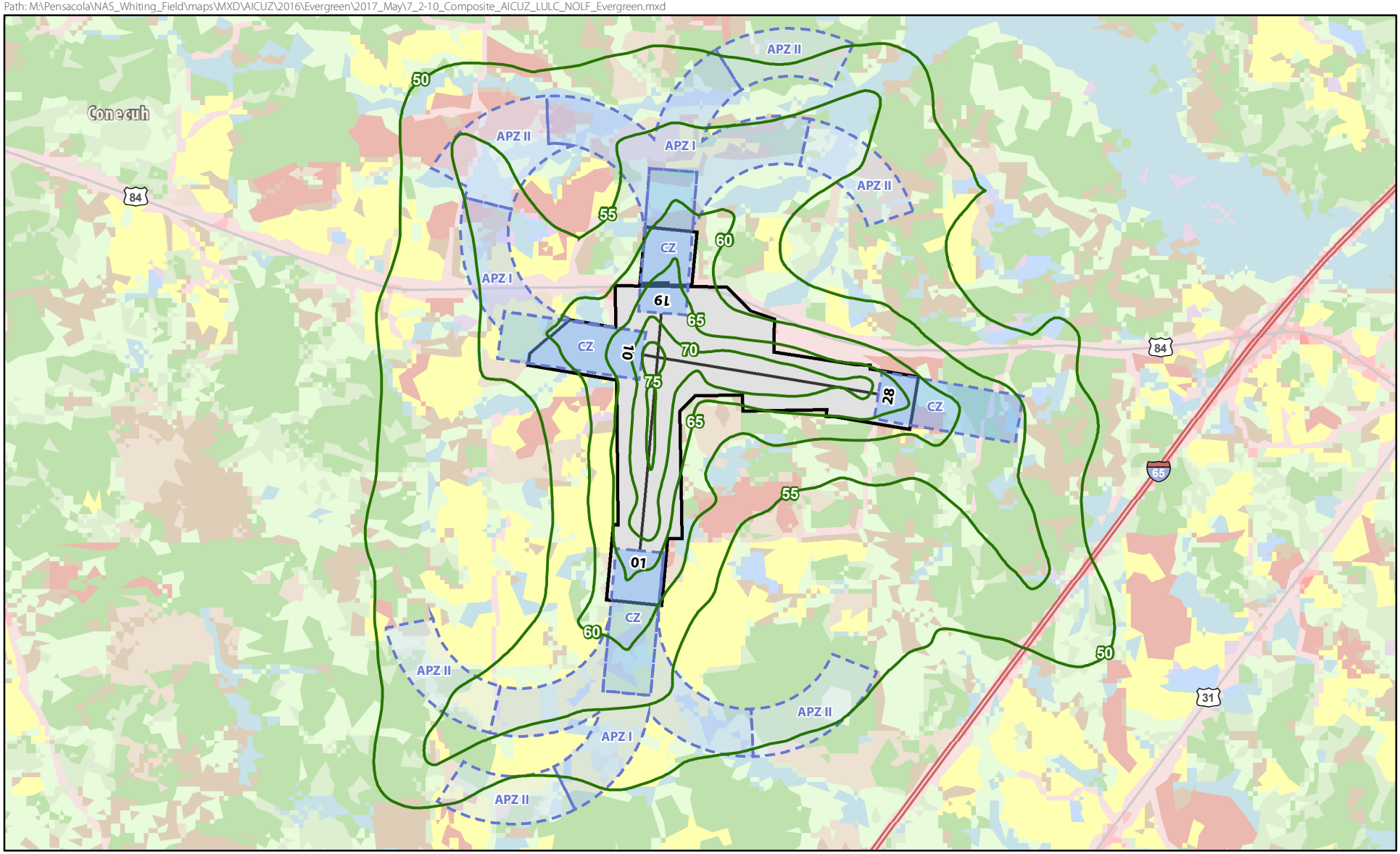
- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Evergreen Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.2-9
2015 AICUZ Footprint, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Evergreen\2017_May\7_2-10_Composite_AICUZ_LULC_NOLF_Evergreen.mxd



SCALE
0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Highway
- Runway
- 2015 AICUZ Noise Contours

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

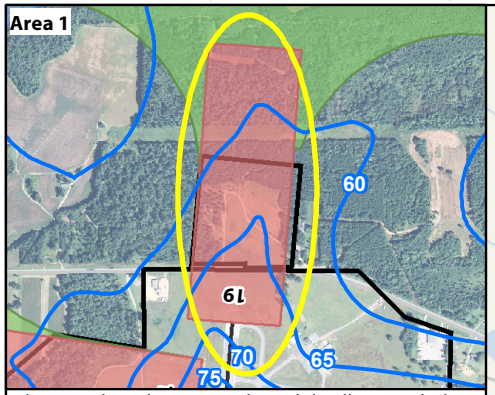
- NOLF Evergreen Boundary

Land Use Classification

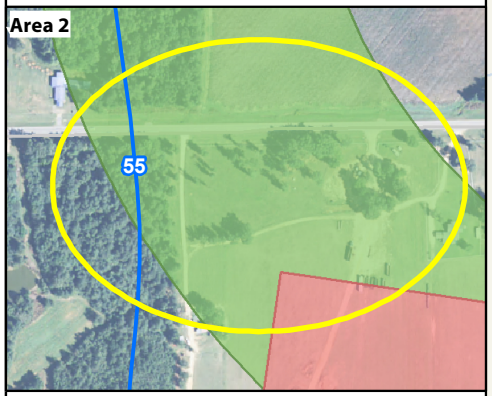
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed High Intensity
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Figure 7.2-10
2015 Composite AICUZ Footprint, USGS Land Use and Land Cover, NOLF Evergreen
Conecuh County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Evergreen\2016_Dec\7_2-11_Compatibility_Concerns_NOLF_Evergreen.mxd



There are low-density residential dwellings including manufactured homes located along U.S. Hwy 84 within a Clear Zone. Clear Zones are intended to be clear of all structures. Residential uses within a Clear Zone are an incompatible land use.



There are residential dwellings located in an area west of the airfield. These residences are within the Runway 10 Clear Zone and APZ I and present a compatibility concern. Residential districts are incompatible within APZ I.

There are residential parcels that fall within a small area west of the airfield which includes the 65 to 70 dB DNL noise contours. The AICUZ Instruction strongly discourages residential land uses within the 65+ noise zones.

N

SCALE

0 0.1 0.2 Miles

19 10 28 01

Legend

- Interstate
- Major Highway
- Local Road
- Municipal Boundary
- Runway
- 2015 AICUZ Noise Contours
- NOLF Evergreen Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.2-11
Compatibility Concerns - 2015 Composite Map, NOLF Evergreen
Conecuh County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Ecology and Environment, Inc. 2015.

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NOLF BREWTON

ESCAMBIA COUNTY

ALABAMA

7.3 NOLF BREWTON COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Brewton. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Brewton Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Brewton, Escambia County, Alabama	Figure 7.3-1
RUNWAY AND FLIGHT TRACKS	
Representative Flight Tracks, NOLF Brewton, Escambia County, Alabama	Figure 7.3-2
NOISE CONTOURS	
2015 Noise Contours, NOLF Brewton, Escambia County, Alabama	Figure 7.3-3
2015 Noise Gradients, NOLF Brewton, Escambia County, Alabama	Figure 7.3-4
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Brewton, Escambia County, Alabama	Figure 7.3-5
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Brewton, Escambia County, Alabama	Figure 7.3-6
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Brewton, Escambia County, Alabama	Figure 7.3-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Brewton, Escambia County, Alabama	Figure 7.3-8
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Brewton, Escambia County, Alabama	Figure 7.3-9
LAND USE	
2015 Composite AICUZ Footprint, USGS Land Use and Land Cover, NOLF Brewton, Escambia County, Alabama	Figure 7.3-10
Compatibility Concerns – 2015 Composite Map, NOLF Brewton, Escambia County, Alabama	Figure 7.3-11

AIRFIELD OPERATIONS

NOLF Brewton is a fixed-wing training airfield located in Escambia County, Alabama (Figure 7.2-1). NOLF Brewton, owned by the City of Brewton, has three runways; however, only two runways are operational for Navy use: Runway 06/24, which is 5,000 feet, and Runway 12/30, which was extended to 5,135 feet as a result of the 2000 EA for the replacement of T-34C aircraft with T-6B. Both runways are long enough to accommodate T-6 student solo operations.

Flight operations at NOLF Brewton have fluctuated over time, ranging from a peak of 109,299 operations in 2001 to a low of 24,230 operations in 2008. Historical operations at NOLF Brewton are presented in detail in Table 3-2, Operational Tempo Over Time for NAS Whiting Field and NOLFs.

Existing military operations at NOLF Brewton are performed by the T-6 JPATS aircraft and include VFR touch-and-go, low key practice precautionary emergency landing (PEL), and holding pattern operations. Only daytime operations are conducted at the airfield and aircraft are not routinely parked overnight at NOLF Brewton, nor are maintenance activities conducted at the airfield. NOLF Brewton is also a municipal airport and used by civilian single-engine prop-aircraft. Due to the limited number of operations, civilian aircraft operations are not discussed in this AICUZ Study.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis for projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The Navy forecasts approximately 95,836 annual flight operations at NOLF Brewton in CY2025 (Table 7.3-1). This will represent an increase of 116 percent for annual flight operations relative to the baseline operations of 44,371 from the 1990 AICUZ Study; however, this is a 20 percent increase in operations over the average of the previous five years. Figure 7.3-1 shows the modeled distribution of these annual airfield operations by operation type.

TABLE 7.3-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF BREWTON

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	5,971
Overhead Break Arrival	2,986
PEL Arrival	2,986
Touch-and-Go Pattern	59,711
Low Key PEL Pattern	23,884
Delta (Hold) Pattern	298
TOTAL	**95,836**
1990 AICUZ Total	**44,371**

Source: BRRC 2015 and NAS Whiting Field 2010

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. Flight tracks provide safety, consistency, and control of an airfield. Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide. Operations are tracked according to flight track/runway utilization at each airfield to determine APZs. Figure 7.3-2 depicts predominant arrival, departure, and pattern flight tracks at NOLF Brewton.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section discusses the 2015 AICUZ noise contours for NOLF Brewton and provides a detailed description of the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ noise contours (as presented in the AICUZ Noise Analysis at Naval Air Station Whiting Field and Navy Outlying Landing Fields, 2015). The comparison helps identify changes to noise exposure based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate noise impacts. Land use and recommendations within noise contours for NOLF Brewton are provided and discussed later in this section.

The T-6 aircraft replaced the T-34C; therefore, the only noise sources considered for NOLF Brewton in the noise model are T-6 operations. The 2015 AICUZ noise contours for NOLF Brewton are within the immediate vicinity of the airfield, with a majority of the higher noise contours concentrated within the installation boundary (Figure 7.3-3). The 70 dB DNL contour extends off station only marginally to the northwest along Runway 06/24 on land with easements. The majority of the 70 dB DNL noise contour and all of the 75 dB DNL noise contour are contained within the airfield boundary, with the 70 dB DNL generally centered along the two operating runways and the 75 dB DNL concentrated towards the end of Runway 06/24. Figure 7.3-4 provides dB DNL color gradients that illustrate how the noise originating at the airfield dissipates over NOLF Brewton's surrounding land area.

The 2015 AICUZ noise contours changed in size and location when compared to the 1990 AICUZ noise contours (Figure 7.3.5). The 1990 AICUZ Study only includes 50 and 55 dB DNL noise contours, whereas the 2015 AICUZ noise contours are higher (60 to 75 dB DNL). These higher 2015 noise contours are primarily within the airfield boundary along the runways, and the majority of the 55 dB DNL and all of the 50 dB DNL contours are now located outside of the airfield boundary.

The changes between the 1990 and 2015 noise contours are attributed to:

- ☐ The extension of Runway 12/30 (to accommodate T-6 operations);

- ☐ Changes in aircraft (the 1990 noise contours modeled T-34 aircraft operations and civilian operations, and the 2015 contours only modeled T-6 operations);
- ☐ Changes in flight patterns (the T-6 is flown in the same general manner as the T-34C, except longer runways are required to accommodate T-6 training requirements);
- ☐ Changes in operational level (the number of operations has more than doubled from the 1990 to the 2015 AICUZ studies); and
- ☐ Improved noise mapping techniques (discussed in Section 4.5).

As noted in Table 7.3-2, the off-station noise impact has increased by 3,879 acres from the 1990 to the 2015 noise contours.

TABLE 7.3-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF BREWTON

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF-STATION (ACRES)	TOTAL (ACRES)	OFF-STATION (ACRES)
50-55 dB DNL	254	43	2,305	2,292
55-60 dB DNL	51	0	1,387	1,237
60-65 dB DNL	0	0	508	324
65-70 dB DNL	0	0	214	67
70-75 dB DNL	0	0	162	1
>75 dB DNL	0	0	2	0
TOTAL AREA	**305**	**43**	**4,578**	**3,922**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.3-6 presents the imaginary surfaces and transition planes for all three runways at NOLF Brewton, with the Navy-operated runways shown as insets.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations, derived from the AICUZ Instruction (OPNAVINST 11010.36C), follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. The following section presents the 2015 APZs for NOLF Brewton (Figure 7.3-7), including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 APZs (Figure 7.3-8). The comparison helps identify changes to APZs based on projected CY2025 aircraft operations and allows the targeting of land use recommendations to mitigate incompatible development.

AICUZ Instruction requires Clear Zones for all runway ends. APZ I and APZ II are required for NOLF Brewton because flight operations for both runways at this airfield exceed 5,000 operations annually. Table 7.3-3 provides the acreages that fall within the Clear Zones and APZs for NOLF Brewton. Approximately 672 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural and rural. A comparison of the 1990 and 2015 AICUZ Clear Zones and APZs shows a significant change in coverage, primarily associated with changes in flight tracks and patterns, a significant increase in annual operations, and the extension to Runway 12/30. These changes resulted in multiple APZ I and APZ II areas

for Runway 06/24 and a loss of APZs off the end of Runway 12/30 due to changes in runway utilization. Overall, the total off-station area impacted has decreased by approximately 177 acres from 1990 AICUZ calculations.

TABLE 7.3-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF BREWTON

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	12	0	0	0	0	0	12
	Off-Station	305	0	185	0	341	18	849
	TOTALS	317	0	185	0	341	18	**861**
		317		**185**		**359**		
2015 AICUZ	On-Station	84	0	0	0	0	0	84
	Off-Station	190	0	243	2	225	12	672
	TOTALS	274	0	243	2	225	12	**756**
		274		**245**		**237**		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to U.S. Waterbodies (USGS 2012).

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Brewton. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Brewton, presented on Figure 7.3-9, was used as the basis for the land use compatibility analysis. The land use compatibility criteria used to evaluate compatibility in this AICUZ Study were presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Brewton is owned by the City of Brewton, but is located in the unincorporated area of Escambia County, Alabama, and adjacent to the small town of Riverview, neither of which have future land use or zoning implemented. Land use patterns in the immediate vicinity of the NOLF Brewton, along with the land use compatibility assessment and analysis conducted, are presented below.

EXISTING LAND USE

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. Land use surrounding NOLF Brewton has not been converted into a geographic information system (GIS) format; therefore, the classification and analysis of the surrounding land was conducted by using aerial photos, county online mapping systems, individual parcel data, and discussion with city planning officials. In addition, due to the lack of GIS data, USGS land cover data were utilized to interpret existing land uses. Figure 7.3-10 illustrates the existing land cover data surrounding NOLF Brewton obtained from the USGS. The land cover data present only broad land use in terms of what is developed and what is the predominant agronomic land cover. Based on the best available data, the land use surrounding NOLF Brewton appears to feature low-intensity development, with a mix of residential, water/wetlands, agricultural, and forest lands. The majority of land use surrounding the airfield is agricultural. However, to the northeast of NOLF Brewton is the small town of Riverview, which is comprised of low- to med-density residential uses. These residential uses are typically single-family dwellings (including manufactured mobile homes) on large parcels (greater than 1.0 acre). The majority of the low-density residential uses are located north and northeast of the airfield, along Jay Road and Evans Road. Additional low-density residential uses are located west of the airfield, along Dozier Road and CR 55. Based on the county parcel data, there does appear to be limited commercial and/or industrial uses surrounding NOLF Brewton to the east. Overall, land use around the NOLF reveals a pattern of low-density development, as there is still a significant amount of undeveloped property. From the perspective of land use compatibility, some of the residential uses surrounding NOLF Brewton are incompatible in certain Clear Zones and APZs, as well as noise zones. An evaluation of specific land use compatibility is provided later in this section.

EXISTING ZONING

"Zoning" is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. The unincorporated areas of Escambia County, Alabama, and the town of Riverview do not have established zoning regulations; However, the City of Brewton's Code of Ordinances includes a Land Use and Development Ordinance, Appendix A, and a Brewton Municipal Airport Height Zoning Ordinance, Appendix C. While the land use and development ordinance establishes zoning districts and requirements within the city limits, the planning commission is only authorized control over the subdivision of land within 5 miles of the corporate limits of the city. The Airport Airspace Zoning Map, found in Appendix C of the City of Brewton's Code of Ordinances, utilizes runway imaginary surfaces to restrict the height of new structures and vegetation within these areas, but does not regulate the types of uses around the airfield.

FUTURE LAND USE

The City of Brewton's adopted Comprehensive Plan, A Comprehensive Plan for Brewton to ExCEL 2008-2013, guides the physical development of the city, including areas surrounding NOLF Brewton. The Comprehensive Plan is a tool used by the local government to guide future development of land in a planned and effective manner. As previously stated, future land use data is not available and/or has not been converted into GIS format and, therefore, cannot be presented in this AICUZ Study. In addition, there are no future land use maps for Escambia County or the town of Riverview that classify the parcels of land surrounding the airfield. Nevertheless, based on the best available data, the projected land use patterns around NOLF Brewton are expected to follow the classifications of rural residential and agricultural development. The projected land uses within these districts have the potential to be incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Brewton is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Brewton's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Brewton, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Escambia County parcel data and USGS land cover and land use classification information. The evaluation was performed on a case-by-case basis and at the land parcel level using the Navy's land use compatibility guidance. In addition, due to the limited GIS data, reasonable assumptions were made on the land uses surrounding the airfield. For land use planning purposes, recommended land use compatibility guidelines for noise zones and APZs are shown in Table 6-1 (Chapter 6).

NOLF Brewton's 2015 AICUZ noise contours that extend off the installation are primarily 60 to 65 dB DNL, with limited areas of the 70 dB DNL noise contour extending off the installation. Residential districts are incompatible with 65+ dB DNL noise zones and present an existing compatibility concern. In addition, there are incompatible land uses and existing compatibility concerns within Clear Zones and APZs for NOLF Brewton. As illustrated on Figure 7.3-11, Clear Zones, APZs, and noise zones impact areas off the installation in all directions. Areas impacted are mainly low-density residential areas, as described below.

- Area 1: Low-density residential (less than 1-2 dwellings per acre) areas northeast of the airfield near the corner of Travis and River Road are currently in a Clear Zone and present a compatibility concern. These dwellings include both traditional "stick-built" homes and manufactured mobile homes. Portions of the 65 to 70 dB DNL noise contour extend over this residential area, as well. The AICUZ instruction views any structures in a Clear Zone as an incompatible use and discourages residential land uses within 65+ dB DNL noise zones.

- Area 2: Located west of the airfield, portions of the Greenbrier Subdivision and other residential dwellings in the area are located within a Clear Zone and/or APZ I and are currently classified as low density. These dwellings include both traditional "stick-built" homes and manufactured mobile homes. Residential districts are incompatible within Clear Zones and APZ I and should be prohibited. In addition, many of these residential parcels fall within the 65 to 70 dB DNL and 70-75 dB DNL noise contours. Residential districts are incompatible and strongly discouraged within 65+ dB DNL noise zones.

- ☐ Area 3: Located to the north of the airfield, there are low-density residential dwellings, including manufactured mobile homes, along Jay Road, within a portion of the Clear Zone and both APZ I and APZ II. In addition, there are 1-2 residential parcels located along the Conecuh River to the northeast that fall within APZ II. However based on Escambia County data, the residences within APZ II do not appear to exceed two dwellings per acre. The residential parcels located within the Clear Zone also fall within the 65 to 70 dB DNL noise contours. Residential districts are incompatible and strongly discouraged within 65+ dB DNL noise zones. Furthermore, residential districts are incompatible within Clear Zones and APZ I; however, single-family residential areas are compatible with restrictions within APZ II. The maximum density for residential structures in APZ II is 1-2 dwellings per acre.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF BREWTON

The neighborhoods and land uses identified in this section are, and continue to be, compatibility concerns in the area around NOLF Brewton. The Navy, the City of Brewton, the Town of Riverview, and Escambia County should continue to place a high priority on these encroachment concerns.

The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Brewton. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.

FUTURE LAND USE DECISIONS

When the City of Brewton makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones and APZs. The local governments surrounding NOLF Brewton and NAS Whiting Field should work together to establish broader special planning areas (such as military influence areas or airport overlay zones/districts) with development restrictions for areas in and outside the established Clear Zones and APZs at NOLF Brewton that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. The special development classification should extend out and encompass the lands under the Clear Zones and APZs, as well as areas within the 65+ dB DNL noise zones. The local government should use the

flight tracks presented on Figure 7.3-2 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

UPDATE LAND USE PLAN, ZONING ORDINANCES, AND MAPS

The City of Brewton should update its Comprehensive Plan and Code of Ordinances to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Brewton and OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with the City to develop and/or convert the land use and zoning data into GIS format, as well as update their land use and zoning maps to indicate the classifications surrounding the airfield. The maps should indicate the boundary for NOLF Brewton and include a "Military Land Use" Classification for the parcels owned by the Navy. These updates will further aid Escambia County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Brewton.

MONITOR AREAS OF POTENTIAL CONCERN

There are a few residential dwellings located within APZ II at NOLF Brewton, but the densities are well below the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance; however, these areas should be continuously monitored for changes to development and density. These areas will become incompatible, per AICUZ criteria, if residential development continues at a higher density level (above 1-2 dwellings per acre) for the residential land uses within APZ II.

PUBLIC LAND ACQUISITION

The Navy should continue its efforts to purchase and acquire public lands in the vicinity of NOLF Brewton as they become available. This will result in the protection of key land assets by limiting impacts from development that is considered incompatible with air station activities. Priority should continue to be placed on the lands within the Clear Zones.

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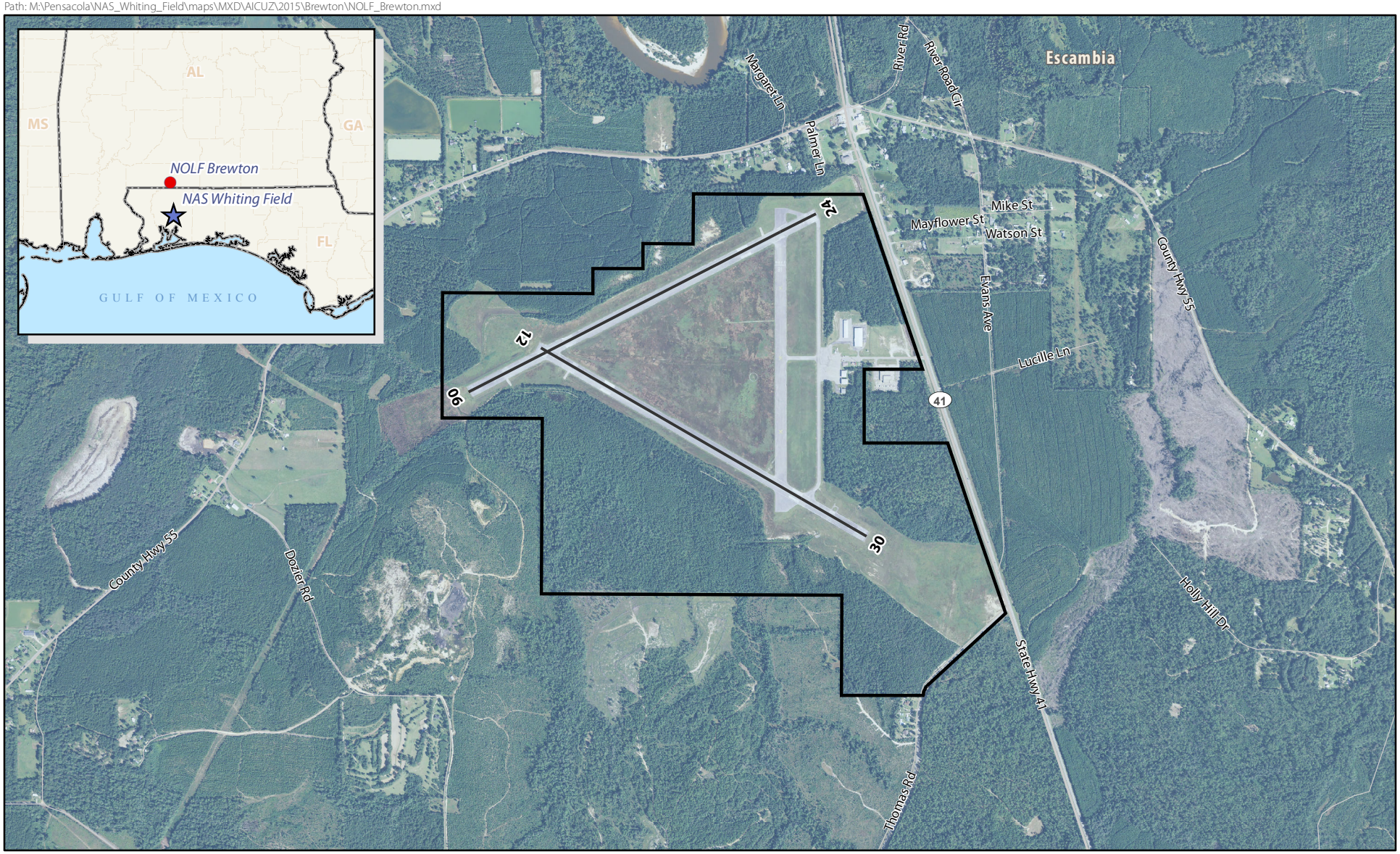


N

SCALE

0 0.1 0.2 Miles

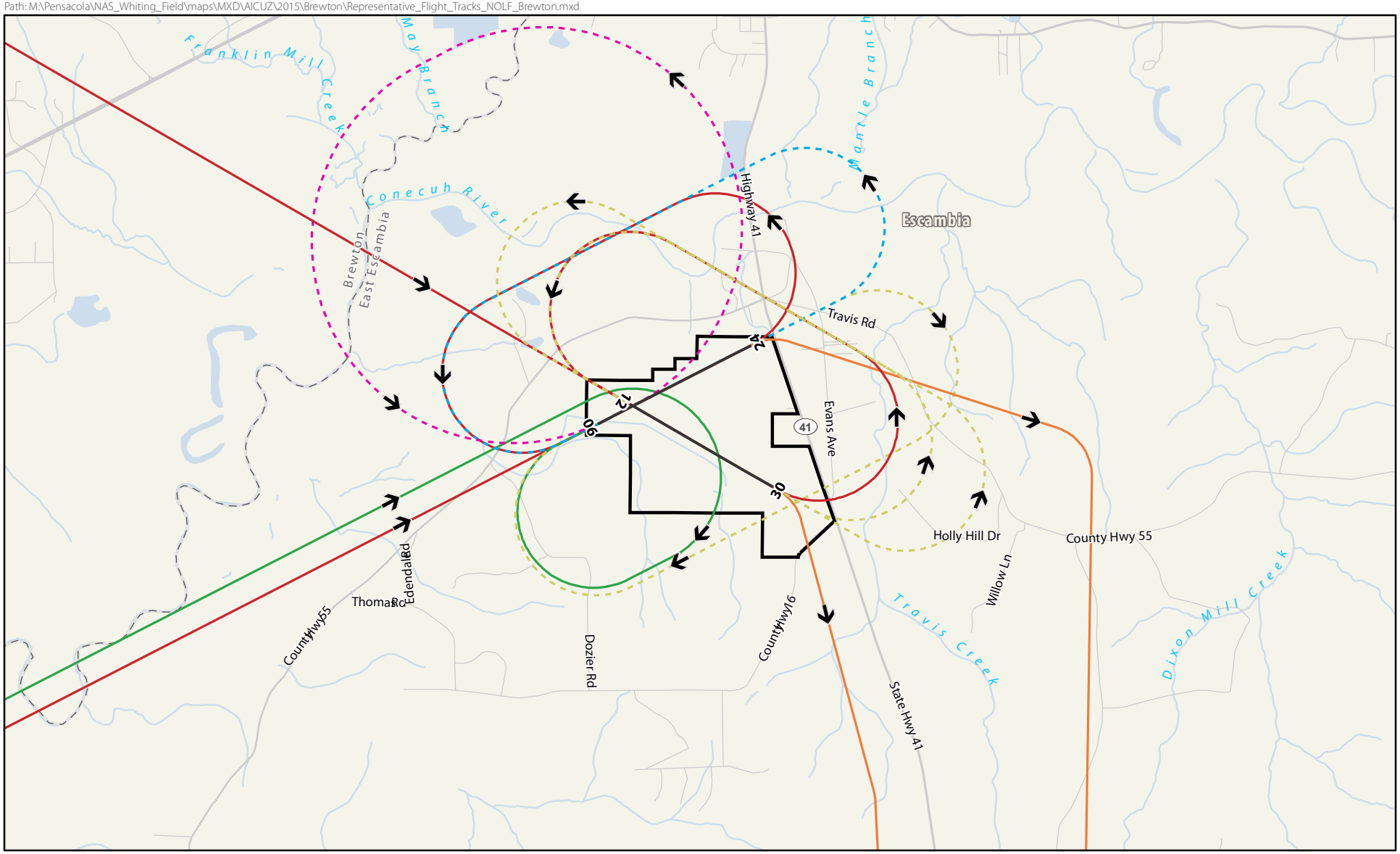
Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- NOLF Brewton Boundary

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.3-1
NOLF Brewton
Escambia County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Brewton\Representative_Flight_Tracks_NOLF_Brewton.mxd



SCALE

0 0.25 0.5 Miles

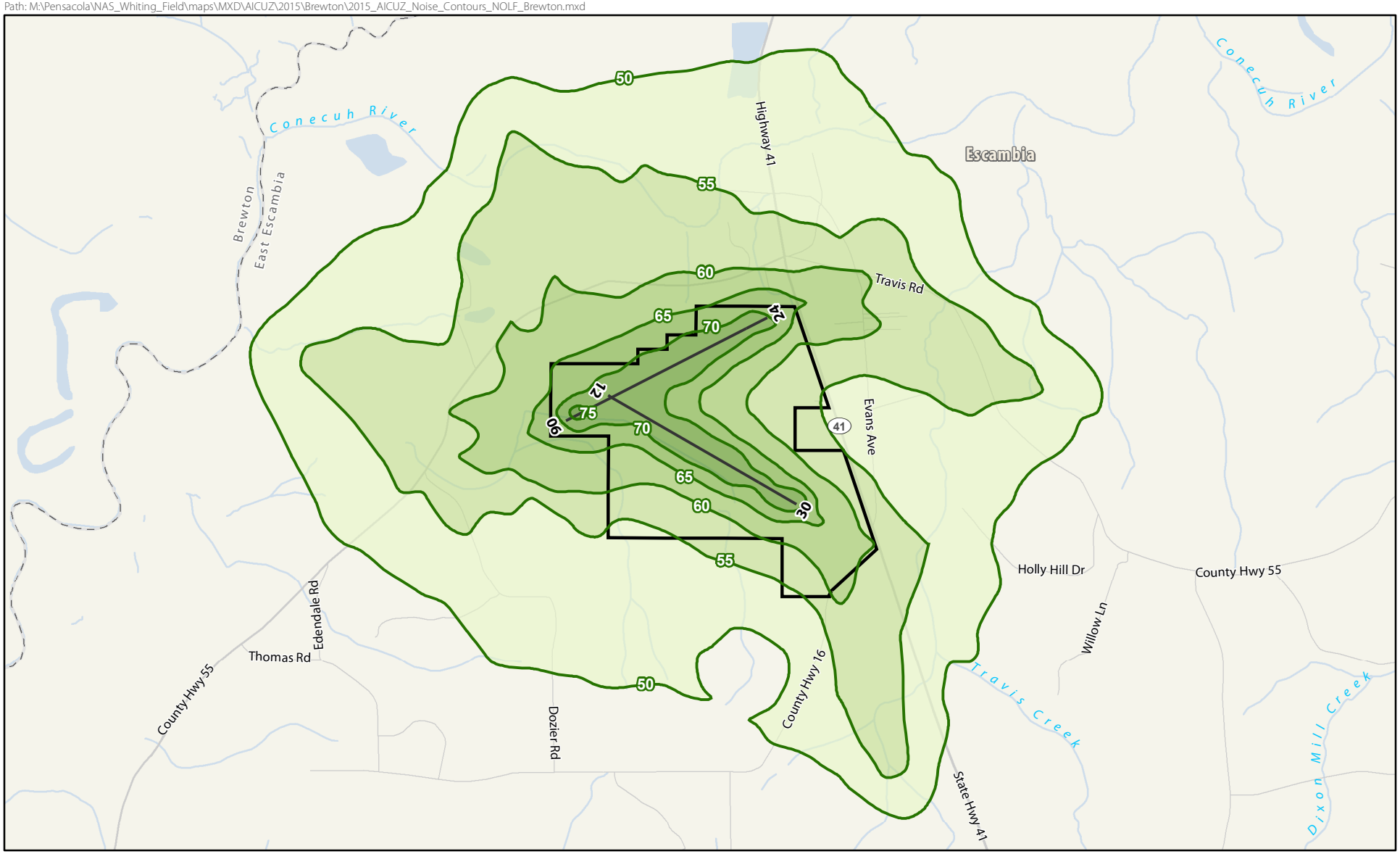
Legend

- Arrival Overhead Break
- Arrival PPEL High Key
- Departure
- Pattern PEL Low Key
- Pattern Touch and Go
- Pattern VFR Hold
- Major Highway
- Other Major Road
- Local Road
- Municipal Boundary
- Runway
- NOLF Brewton Boundary

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.3-2
Representative Flight Tracks, NOLF Brewton
Escambia County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Brewton\2015_AICUZ_Noise_Contours_NOLF_Brewton.mxd



N

SCALE

0 0.25 0.5 Miles

Legend

- Major Highway
- Other Major Road
- Local Road
- Municipal Boundary
- Runway
- NOLF Brewton Boundary

dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.3-3
2015 AICUZ Noise Contours, NOLF Brewton
Escambia County, Alabama

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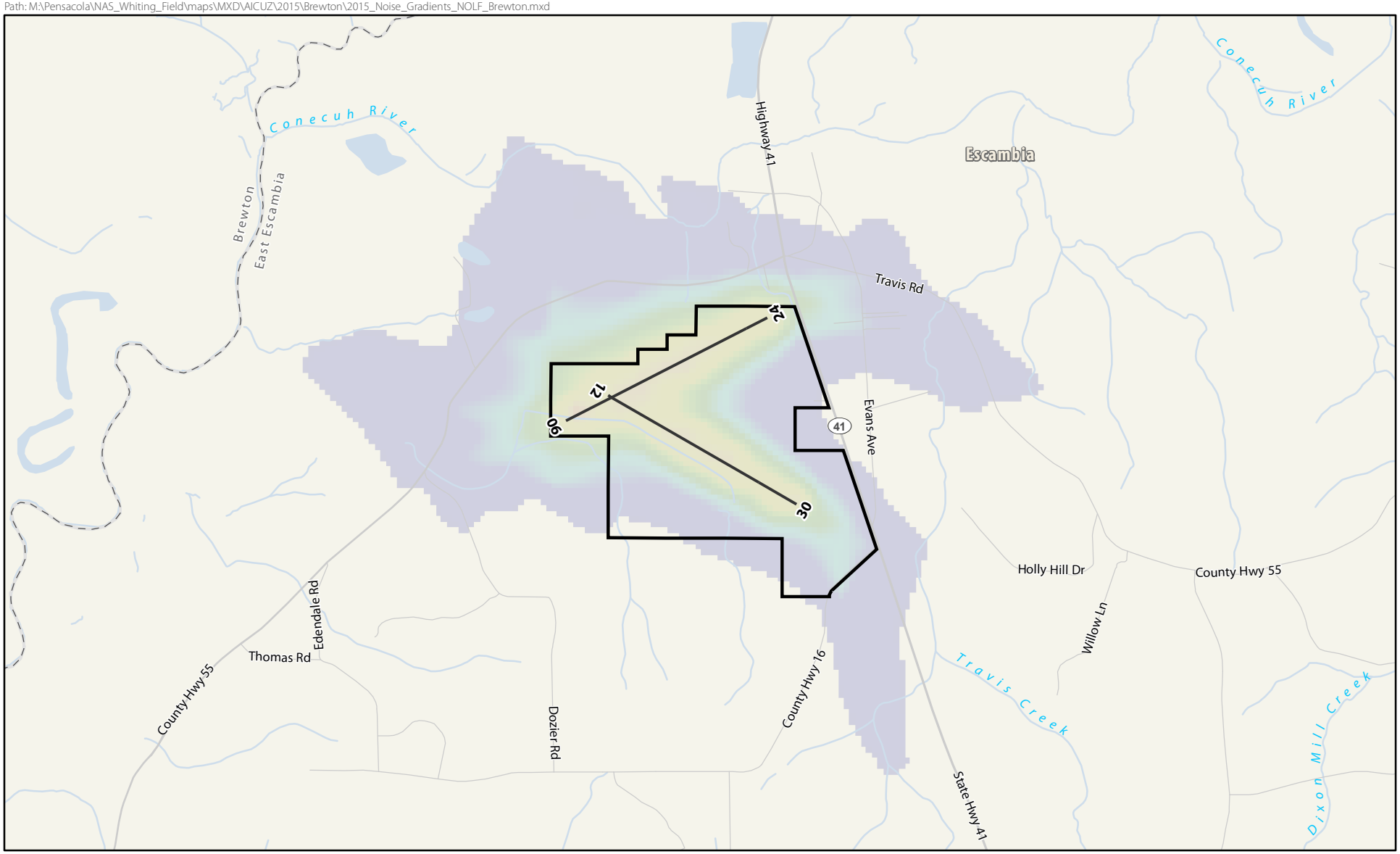

N

SCALE

0 0.25 0.5 Miles

Legend

- Major Highway
- Other Major Road
- Local Road
- Municipal Boundary
- Runway
- NOLF Brewton Boundary

Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.3-4
2015 Noise Gradients, NOLF Brewton
Escambia County, Alabama

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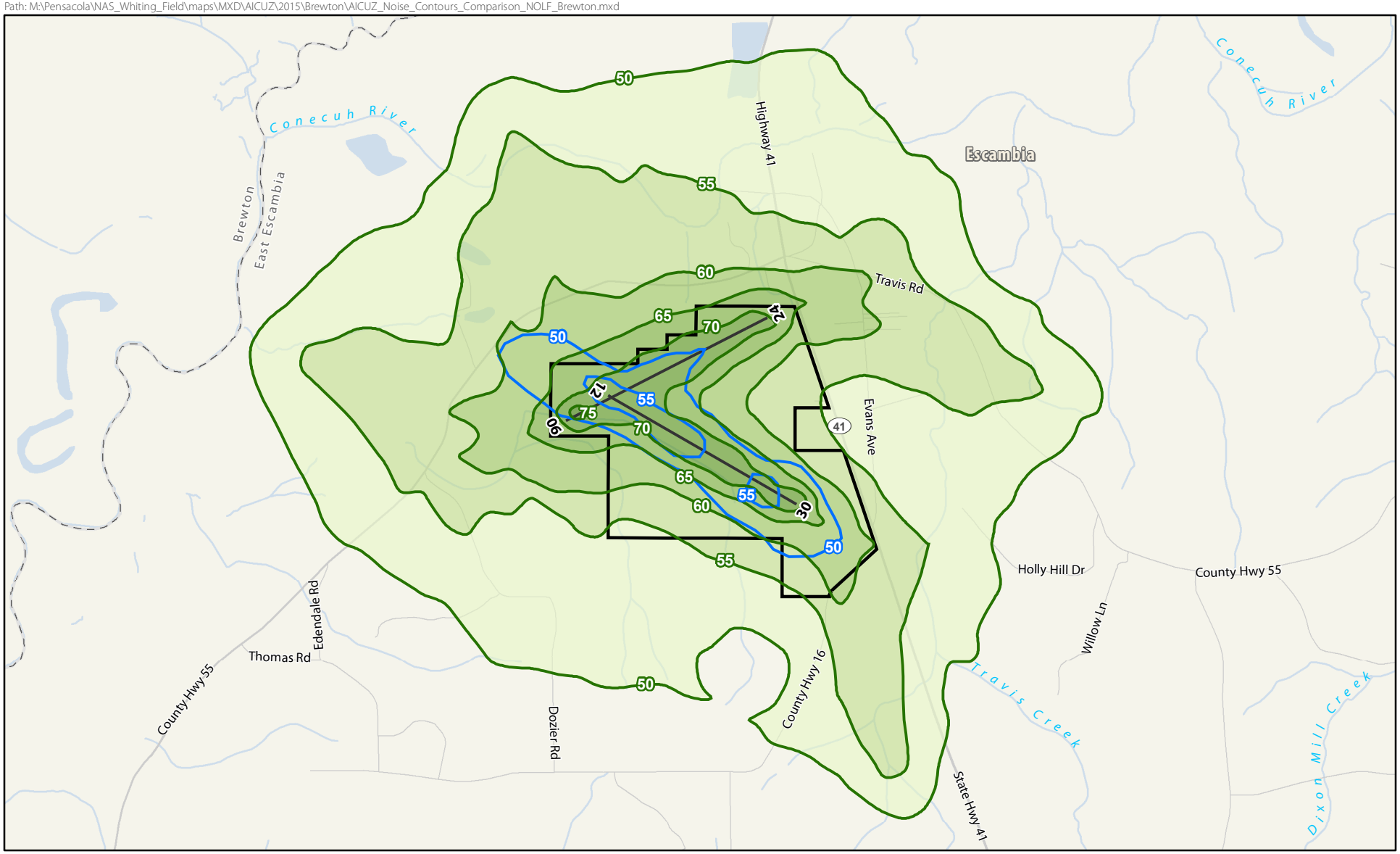

SCALE
0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Major Highway
- Other Major Road
- Local Road
- Municipal Boundary
- Runway
- NOLF Brewton Boundary
- 1990 AICUZ Noise Contours

2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.3-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Brewton
Escambia County, Alabama

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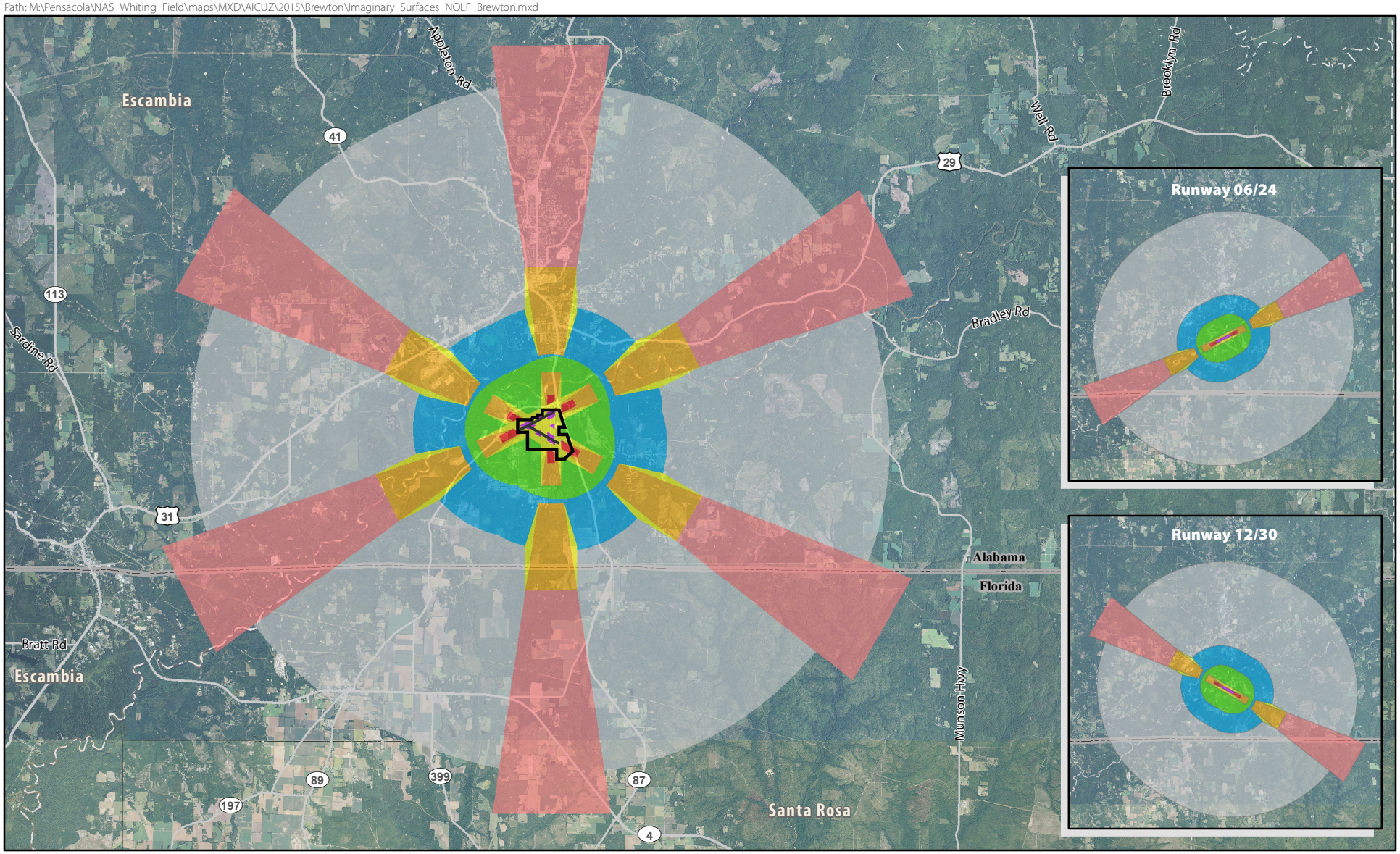
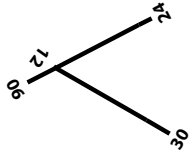


SCALE
0 1 2 Miles



SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

- State Boundary
- County Boundary
- Major Highway
- Other Major Road
- Runway
- NOLF Brewton Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- D: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- G: Outer Horizontal Surface
- H: Transitional Surface

Figure 7.3-6
Imaginary Surfaces, NOLF Brewton
Escambia County, Alabama

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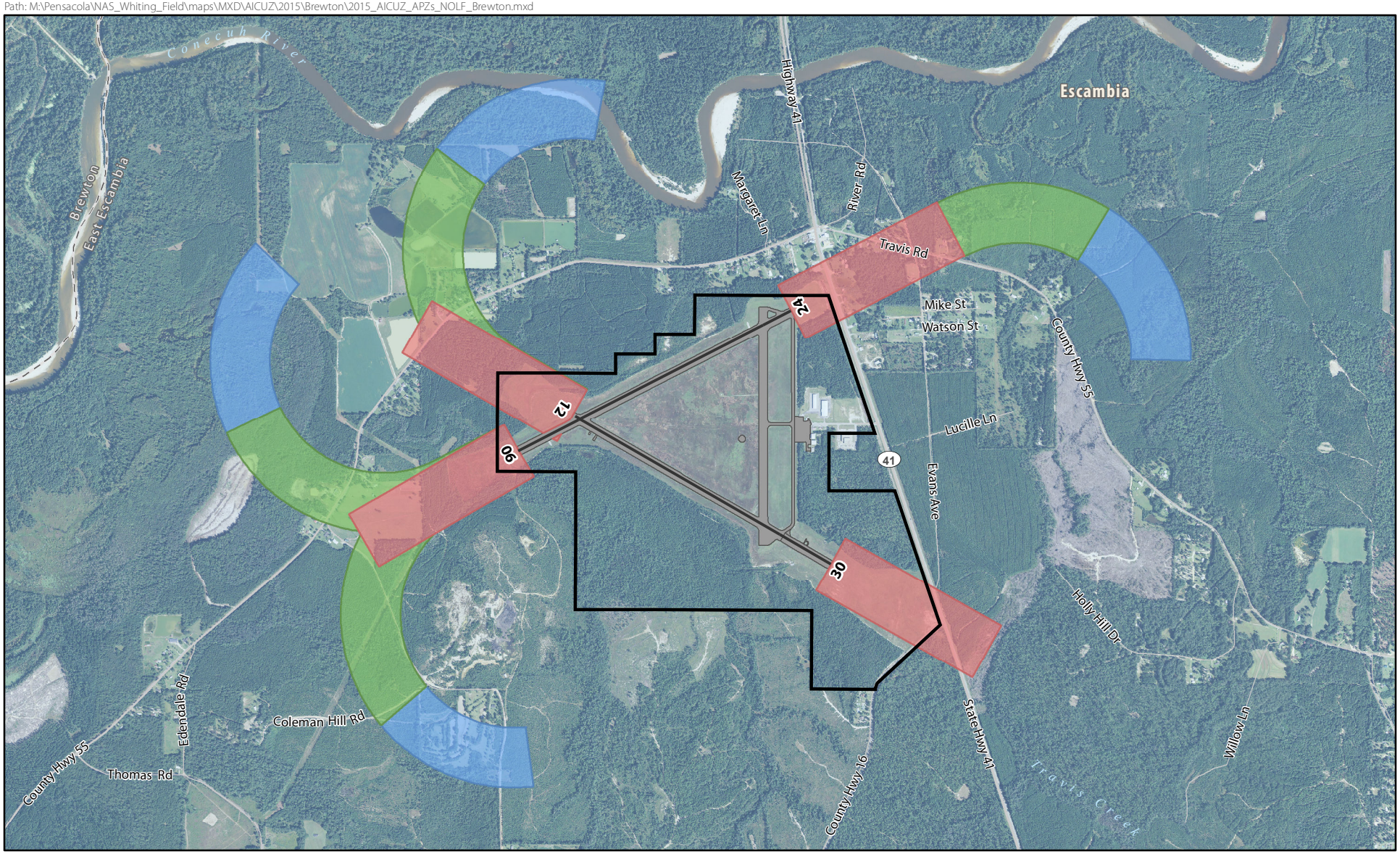
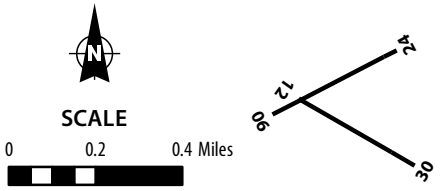




Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- NOLF Brewton Boundary
- Airfield

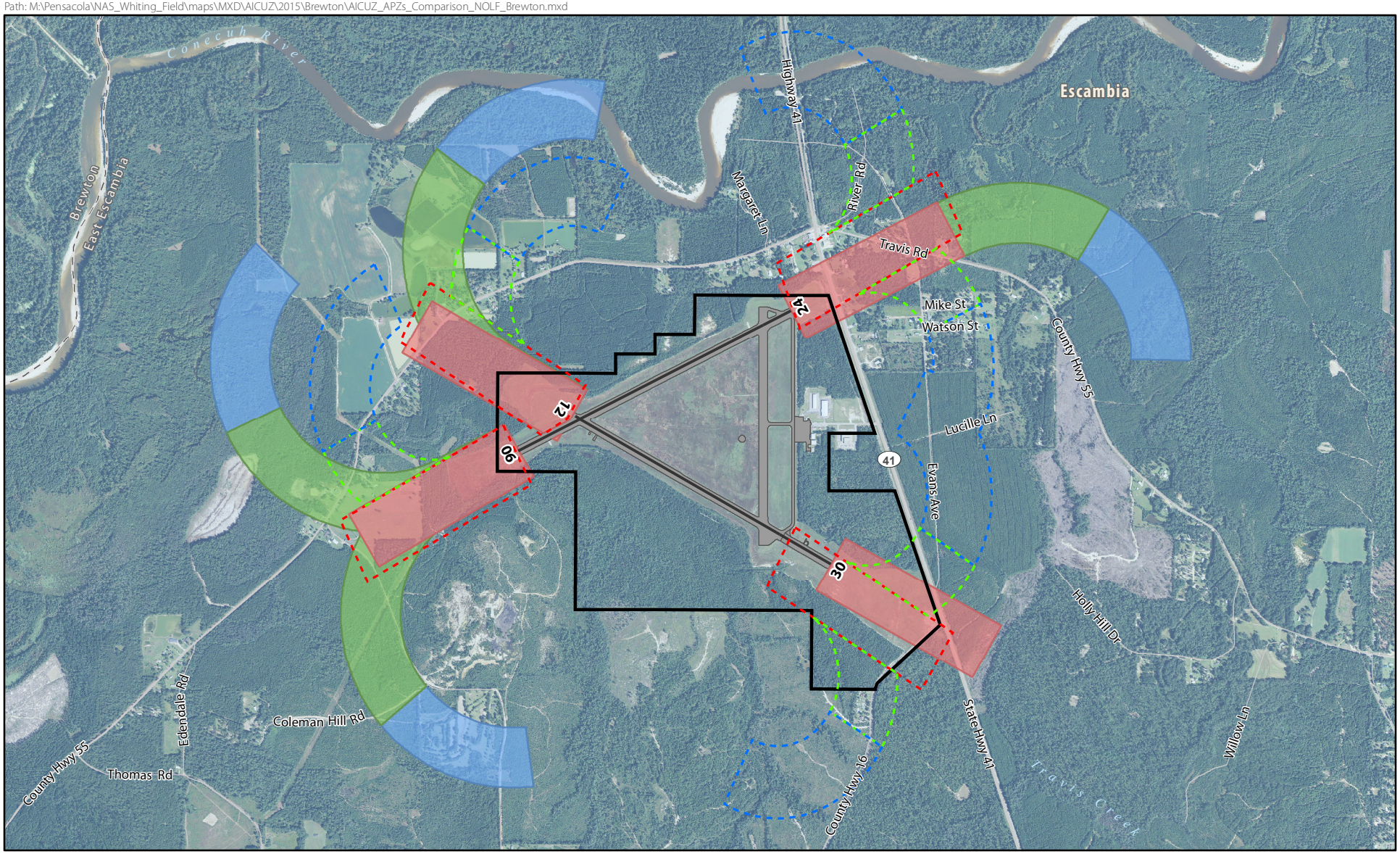
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.3-7
2015 AICUZ APZs, NOLF Brewton
Escambia County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Brewton\AICUZ_APZs_Comparison_NOLF_Brewton.mxd



N

SCALE

0 0.2 0.4 Miles

24 12 09 30

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- NOLF Brewton Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Accident Potential Zone (1990)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.3-8
Comparison of 1990 and 2015 AICUZ APZs, NOLF Brewton
Escambia County, Alabama

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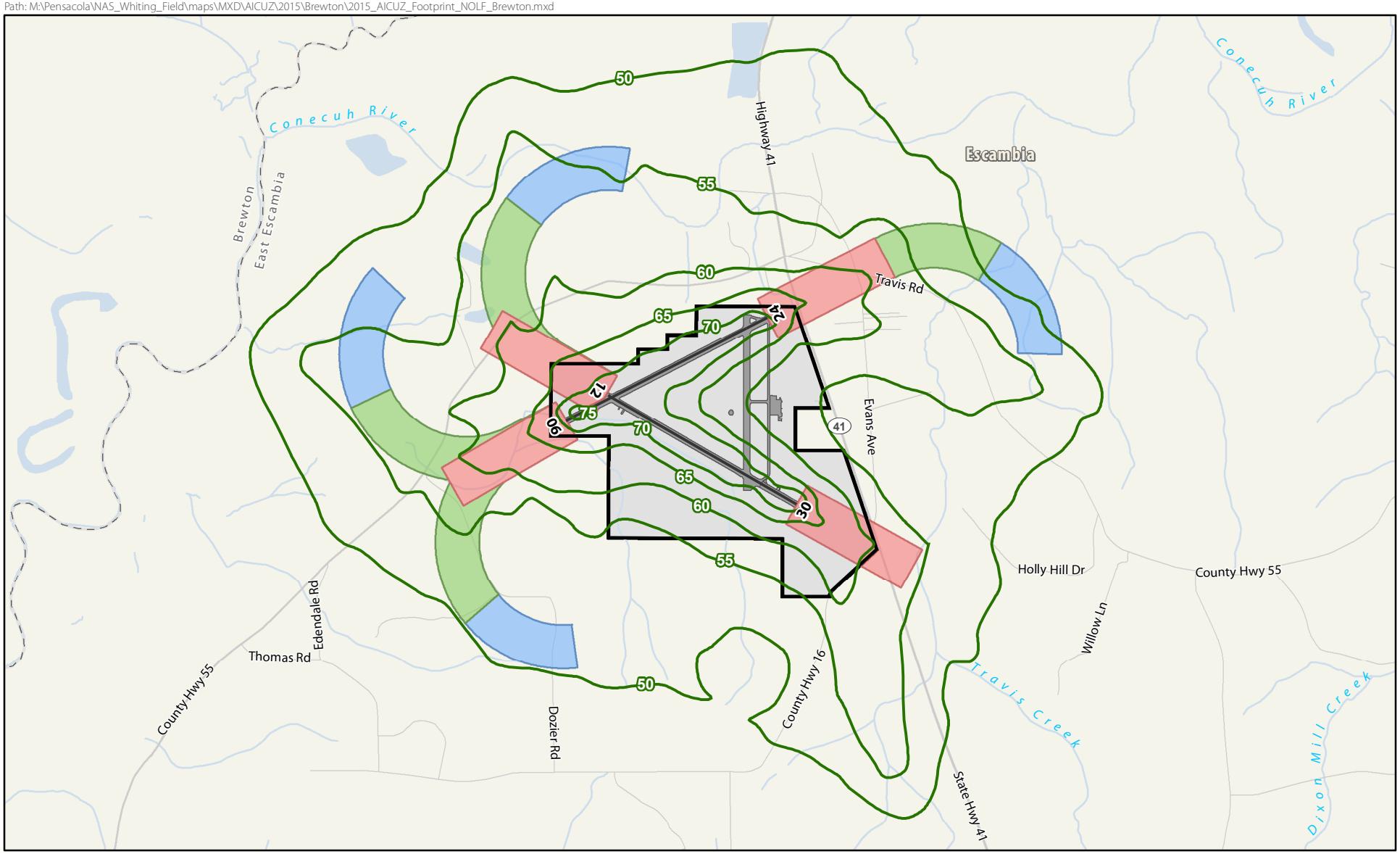


N

SCALE

0 0.25 0.5 Miles

24 12 06 30

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

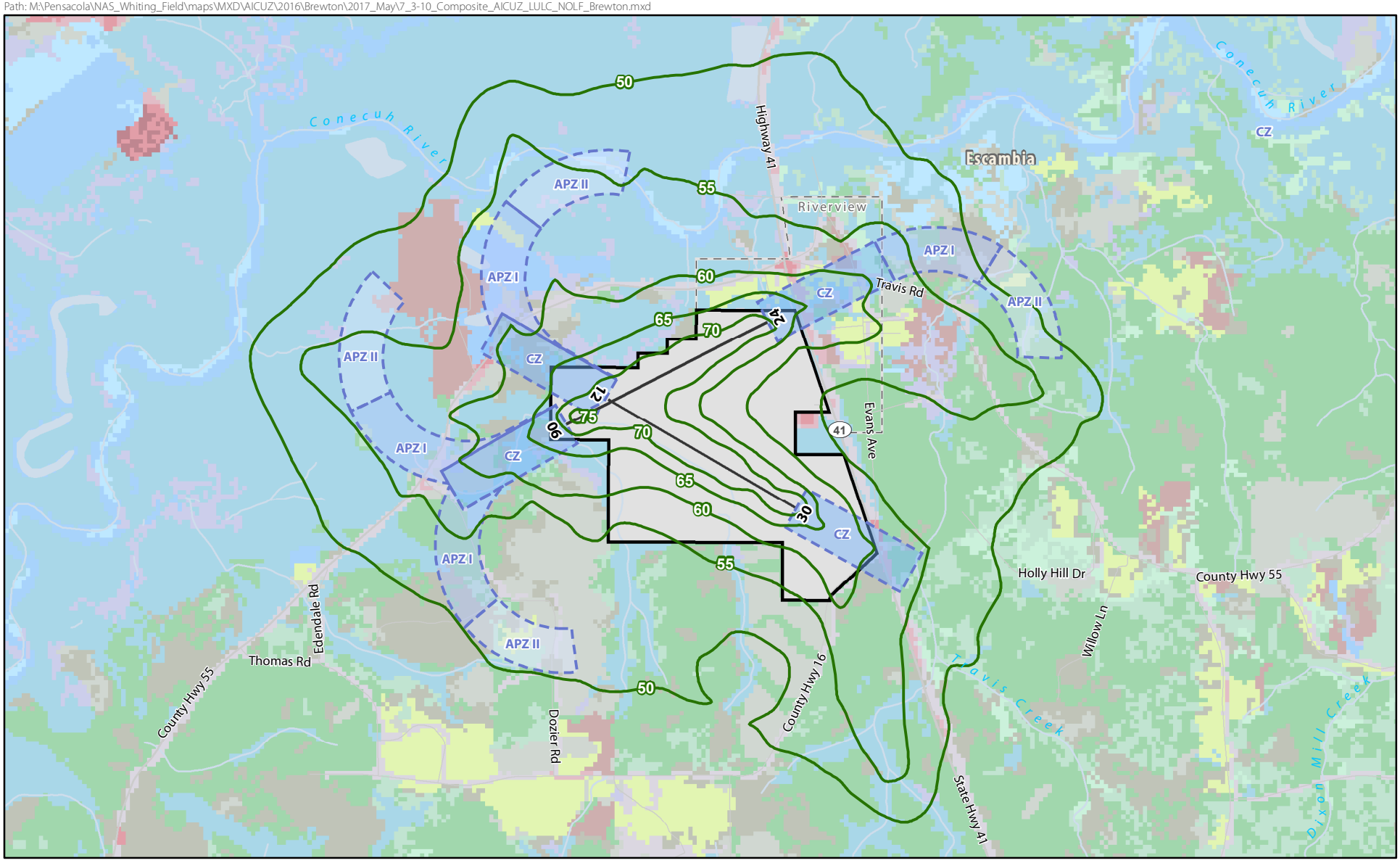
- Major Highway
- Other Major Road
- Local Road
- Municipal Boundary
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Brewton Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.3-9
2015 AICUZ Footprint, NOLF Brewton
Escambia County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Brewton\2017_May\7_3-10_Composite_AICUZ_LULC_NOLF_Brewton.mxd



SCALE
0 0.25 0.5 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Highway
- Runway
- 2015 AICUZ Noise Contours

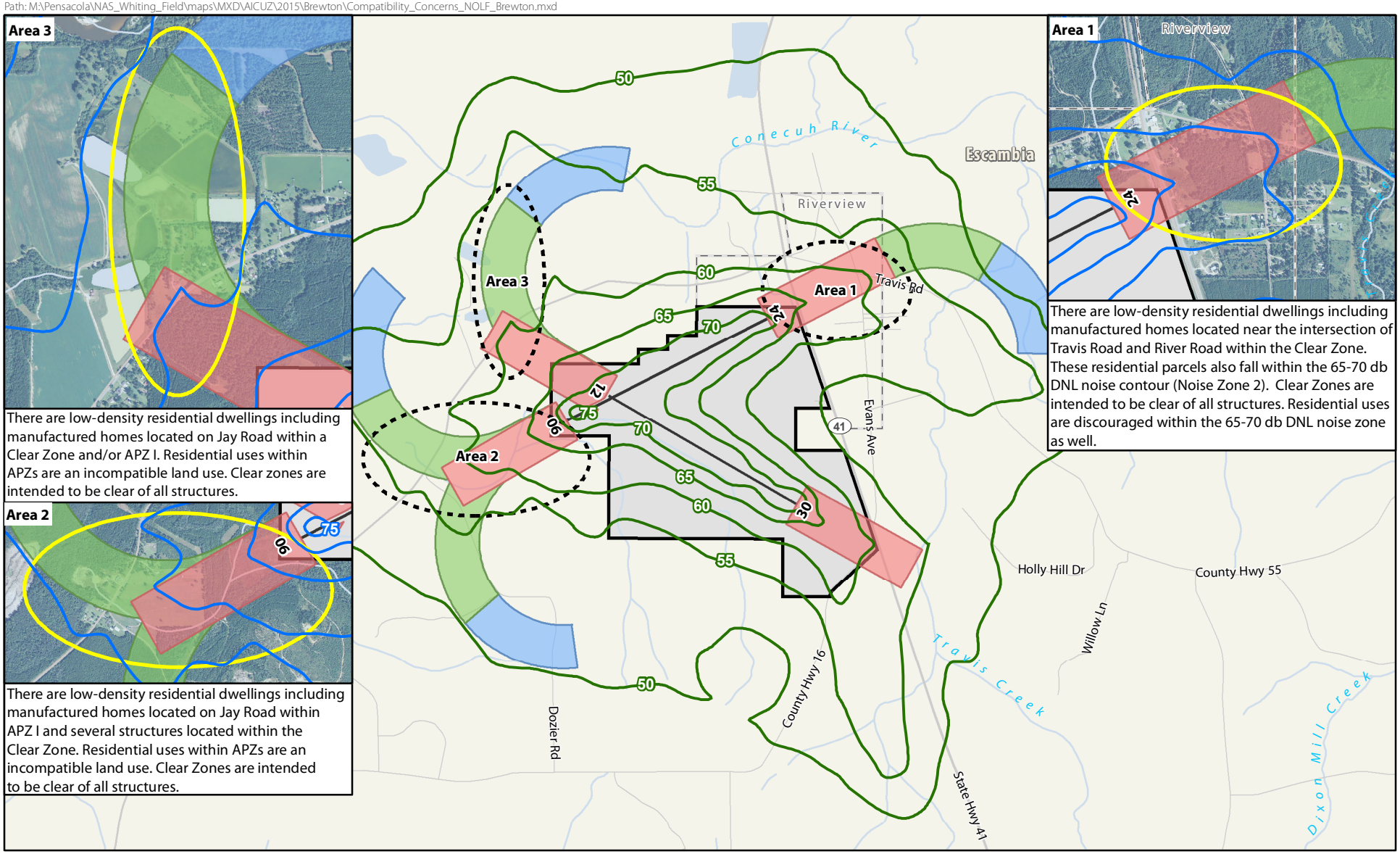
Accident Potential Zone (2015)
- Clear Zone
- APZ I
- APZ II

- NOLF Brewton Boundary

Land Use Classification
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed High Intensity
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Figure 7.3-10
2015 Composite AICUZ Footprint, USGS Land Use and Land Cover, NOLF Brewton
Escambia County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Brewton\Compatibility_Concerns_NOLF_Brewton.mxd



SCALE
0 0.25 0.5 Miles

Legend

- Major Highway
- Local Road
- Municipal Boundary
- Runway
- 2015 AICUZ Noise Contours
- NOLF Evergreen Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I
  - APZ II

Figure 7.3-11
Compatibility Concerns - 2015 Composite Map, NOLF Brewton
Escambia County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Ecology and Environment, Inc. 2015.

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NOLF SILVERHILL

BALDWIN COUNTY

ALABAMA

7.4 NOLF SILVERHILL COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Silverhill. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Silverhill Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-1
NOISE CONTOURS	
2015 AICUZ Noise Contours, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-2
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-3
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-4
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-5
ZONING AND LAND USE	
2015 AICUZ Footprint with Existing Land Use, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-6
2015 AICUZ Footprint with Existing Zoning, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-7
AIRFIELD COMPATIBILITY	
Compatibility Concerns – 2015 Composite Map, NOLF Silverhill, Baldwin County, Alabama	Figure 7.4-8

AIRFIELD OPERATIONS

NOLF Silverhill is a fixed-wing training airfield located in Baldwin County, Alabama (Figure 7.4-1). NOLF Silverhill was previously used for fixed-wing pilot training and is owned and operated by the Navy; however, the airfield is currently inactive. There are three runways at NOLF Silverhill. Runway 05/23 is 2,851 feet long, Runway 09/27 is 3,115 feet long, and Runway 16/34 is 2,799 feet long. The runways were adequate to accommodate T-34 training operations; however, the runways do not meet the operational requirements for T-6 aircraft.

NOLF Silverhill was evaluated in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011). It was determined to be one of two airfields that could be modified to accommodate T-6 operations; however, this NOLF was not selected as the preferred alternative.

For the purposes of this AICUZ Study, NOLF Silverhill's 1990 AICUZ noise contours and APZs have been used for evaluating the airfield.

NOISE CONTOURS

This section discusses the 1990 AICUZ noise contours, adopted as the 2015 AICUZ noise contours, for NOLF Silverhill (Figure 7.4-2). This section also provides a detailed description of the noise environment surrounding the airfield before it became inactive. Acreages of land areas included in these noise zones is presented in Table 7.4-1. Land use and recommendations within noise zones for this airfield are provided and discussed later in this chapter. Although this airfield is currently inactive, this information is provided as part of a strategy to preserve potential future operations there, pending the Navy's long-term decision about this property.

TABLE 7.4-1 AREAS WITHIN NOISE CONTOURS (DNL), NOLF SILVERHILL

NOISE CONTOUR	TOTAL LAND AREA 2015 AICUZ NOISE ZONES (ACRES)
50-55 dB DNL	480
55-60 dB DNL	52
60-65 dB DNL	9
65-70 dB DNL	0
>70 dB DNL	0
TOTAL AREA	**541**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path, and become less restrictive as the distance from the runway increases. Figure 7.4-3 presents the imaginary surfaces for NOLF Silverhill.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. This section presents the 1990 AICUZ APZs, adopted as the 2015 AICUZ APZs for NOLF Silverhill (Figure 7.4-4), including a detailed analysis of the areas impacted. Land use recommendations within the APZs for this airfield are provided and discussed later in this section. Although this airfield is currently inactive, this information is provided as part of a strategy to preserve potential future operations at NOLF Silverhill, pending the Navy's long-term decision about this airfield.

AICUZ Instruction requires Clear Zones for all runway ends. Before this airfield became inactive, APZ I and APZ II were required for NOLF Silverhill because flight operations for the three runways at this airfield exceeded 5,000 operations annually. Approximately 681 acres of off-station lands are impacted by the 2015 AICUZ APZs, as shown in Table 7.4-2. The majority of the land is agricultural.

Table 7.4-2 provides the acreages that fall within the Clear Zones and APZs for NOLF Silverhill.

TABLE 7.4-2 LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF SILVERHILL

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
2015 AICUZ	On-Station	158	0	4	0	0	0	162
	Off-Station	250	0	150	0	281	0	681
	TOTALS	408	0	154	0	281	0	843
		408		154		281		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to: U.S. Waterbodies (USGS 2012).

LAND USE COMPATIBILITY ANALYSIS

Maximum Densities for Each Land Use District Classification

Neighborhood: 4 du per acre.

Rural: 1 du per acre.

Conservation: 1 du per acre.

Special: site-specific policies

This section addresses land use compatibility within aircraft noise zones and APZs by examining existing and planned land uses near NOLF Silverhill. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint" (Figure 7.4-5). The land use compatibility criteria to evaluate compatibility for this AICUZ Study were presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Silverhill is located in unincorporated areas of Baldwin County, Alabama. Therefore, the land use ordinances covering the off-installation property within the AICUZ footprint are within the County's jurisdiction. Land use patterns and zoning in the immediate vicinity of NOLF Silverhill, along with the land use compatibility assessment and analysis conducted, are presented below.

EXISTING LAND USE

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. Land use surrounding NOLF Silverhill features low-intensity development, with a mix of residential, water/wetlands, and agricultural lands. Figure 7.4-6 illustrates land uses surrounding NOLF Silverhill. The vast majority of land use surrounding the airfield is agricultural. However, there are limited low- to medium-density residential uses around the airfield. The residential uses range from low-density single-family dwellings on large parcels (greater than 1.0 acre) to medium-density residential uses that exceed 2 dwellings per acre. Some of the low- to medium-density residential uses are located east of the airfield, along Raines Road and River Road, (i.e., Riverside Farm Estates subdivision). Other low- and medium-density residential uses are northwest of the airfield along CR 54 and within the Caney Creek Estates and Farmington subdivisions. Based on Baldwin County data, there does not appear to be any commercial or industrial uses directly surrounding NOLF Silverhill. Overall, existing land use around NOLF Silverhill reveals a pattern of low-density development, and there is still a moderate amount of undeveloped property. Regarding land use compatibility, some of the residential uses surrounding NOLF Silverhill are incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility is provided later in this section.

EXISTING ZONING

"Zoning: is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Figure 7.4-7 illustrates zoning surrounding NOLF Silverhill. In general, much of the land surrounding the airfield remains vacant, with the primary zoning consisting of Agricultural and Single-Family Residential zones. Agricultural zoning allows for low-density residential dwellings. Land areas south of the airfield do not have designated zoning data and, therefore, cannot be presented for analysis. Overall, existing zoning adjacent to NOLF Silverhill and the availability of open land indicates that there is the potential for growth around the NOLF Silverhill that could result in compatibility concerns.

FUTURE LAND USE

It should be noted that there is no "AICUZ" or "Military Use Area" type designation with associated land use restrictions, as seen around other airfields, but the County has considered adopting a JLUS and/or establishing a "Military Use Area" within this district. The majority of the future land use surrounding NOLF Silverhill is labeled as an Agricultural district. This category was designed to protect the essential open character of rural areas until it is timely to reclassify the land to appropriate residential, commercial, or industrial categories.

The future land use surrounding NOLF Silverhill is presented in the Baldwin County 2013 Master Plan. The future land use patterns around NOLF Silverhill included only two classifications: Agricultural and Residential Single-Family. The majority of the residential single-family zoning was located east of the airfield along River Road. Development around NOLF Silverhill is expected to follow current development trends of low-density rural residential and agricultural. The future land uses and zoning within these districts have the potential to be incompatible in certain Clear Zones and APZs. An evaluation of specific land uses compatibility concerns for NOLF Silverhill is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Silverhill's noise zones and APZs, the Navy examined both existing and future land uses and zoning near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Silverhill, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Baldwin County parcel data and land use classification information. The evaluation was performed on a case-by-case basis and at the parcel level using the Navy's land use compatibility guidance. Table 6-1 (see Chapter 6) provides the Navy's land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

NOLF Silverhill's 2015 AICUZ noise contours that extend off the installation are exclusively 55 to 60 dB DNL, which do not pose a compatibility concern with any type of land use. However, there are incompatible land uses and existing compatibility concerns within Clear Zones and APZs for NOLF Silverhill. As illustrated on Figure 7.4-8, Clear Zones and APZs impact areas

off the installation in all directions. Areas impacted are mainly agricultural, but limited numbers of low- to medium-density residential areas are located within certain Clear Zones and APZs.

- Area 1: Low-density residential (less than 1-2 dwellings per acre) areas east of the airfield along Raines Road and River Road within the Riverside Farm Estate (north side) subdivision are in a Clear Zone and present a compatibility concern. These dwellings include both traditional built homes and manufactured mobile homes. The AICUZ instruction views any structure within a Clear Zone as an incompatible use. There are additional low-density residential dwellings in this neighborhood that are within APZ I and APZ II. Residential districts are incompatible with APZ I; however, single-family residential areas are compatible with restrictions within APZ II. The maximum density for residential structures in APZ II is 1-2 dwellings per acre. These dwellings do not appear to be above that density threshold. In addition to the existing land use compatibility concerns in this area, portions of the land under these Clear Zones and APZ I that are currently zoned as Agricultural are projected to change to Residential Single-Family on the County's Future Land Use map (See Figure 7.4-8. This future land use will be incompatible with the Navy's recommendations.

- Area 2: There are low-density residential dwellings located within the APZ II areas south of the airfield within the Riverside Farm Estate (south side) subdivision and an area not identified as a named residential subdivision. These are detached single-family dwellings including both traditional built homes and manufactured mobile homes. Based on County data, the densities of these residential areas are 1 dwelling per 3 to 5 acres and are currently below the maximum density recommended for residential structures in APZ II. However, these areas could become incompatible if development continues within these areas based on the allowable densities and future land use.

- Area 3: Located northwest of the airfield, a small portion of the Clear Zone and the majority of both APZ I and APZ II are over land with existing residential land uses. There are low-density residential dwellings located along CR 54 that are within the Clear Zone. In addition, there are low- and medium-density residential dwellings within the Caney Creek Estates and Farmington subdivisions that are within APZ I and APZ II. The medium-density residences exceed 2 dwellings per acre in density. The AICUZ instruction states any structure within a Clear Zone is an incompatible use, residential

districts are incompatible with APZ I, and residential densities exceeding 1-2 dwellings per acre are not compatible in APZ II.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF SILVERHILL

The neighborhoods and land uses identified in this section are compatibility concerns in the area around NOLF Silverhill. The Navy and Baldwin County should continue to place a high priority on these encroachment concerns.

The following section presents land use planning tools and recommendations for implementing and achieving a successful AICUZ Program, specific to NOLF Silverhill. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.)

FUTURE LAND USE DECISIONS

When Baldwin County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones and APZs. The future land use immediately adjacent to the airfield has been projected as a Special Development district. However, it is important to note that this Special Development classification does not extend out and encompass the lands under the Clear Zones and APZs. Nor does this planned Special Development district restrict the type of land use and/or development in this area. The Baldwin County Planning and Zoning Commission and NAS Whiting Field should consider a long-term strategy to protect this area through the creation of a "military influence area" or "airport overlay zone/district"). These zones would present development restrictions for areas in and outside of the established APZs at NOLF Silverhill that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. The local government should use the flight tracks presented in Chapter 3 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

In addition, the future land use change from Agricultural to Single Family Residential use previously identified in Area 1 should not be implemented. To ensure compatibility and to protect the health and safety of the public, the land use should remain as an Agricultural classification and the development should be limited as such. Since residential dwellings are currently

allowed within the Agricultural land use, the densities should not be allowed to go above the Navy's recommended maximum density of 1-2 dwellings per acre.

UPDATE LAND USE PLAN AND MAPS

When Baldwin County produces long-range planning documents, they should include the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Silverhill, as well as the land use recommendations provided in OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with Baldwin County to update county land use maps to indicate the new boundary for NOLF Silverhill and include a "Military Land Use" Classification for the parcels owned by the Navy. These updates will further aid Baldwin County officials, planners, and private citizens in their decisions and policies regarding future land use and development surrounding NOLF Silverhill.

MONITOR AREAS OF POTENTIAL CONCERN

There are numerous residential dwellings located within APZ II at NOLF Silverhill, but the densities are well below the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance; however, these areas should be continuously monitored for changes to development and density. These areas will become incompatible, per the AICUZ criteria, if the residential development exceeds 1-2 dwellings per acre within APZ II.

PUBLIC LAND ACQUISITION

In light of the inactive nature of this airfield, there are no current recommendations related to the public acquisition of nearby lands. This topic should be revisited if future mission plans are identified.

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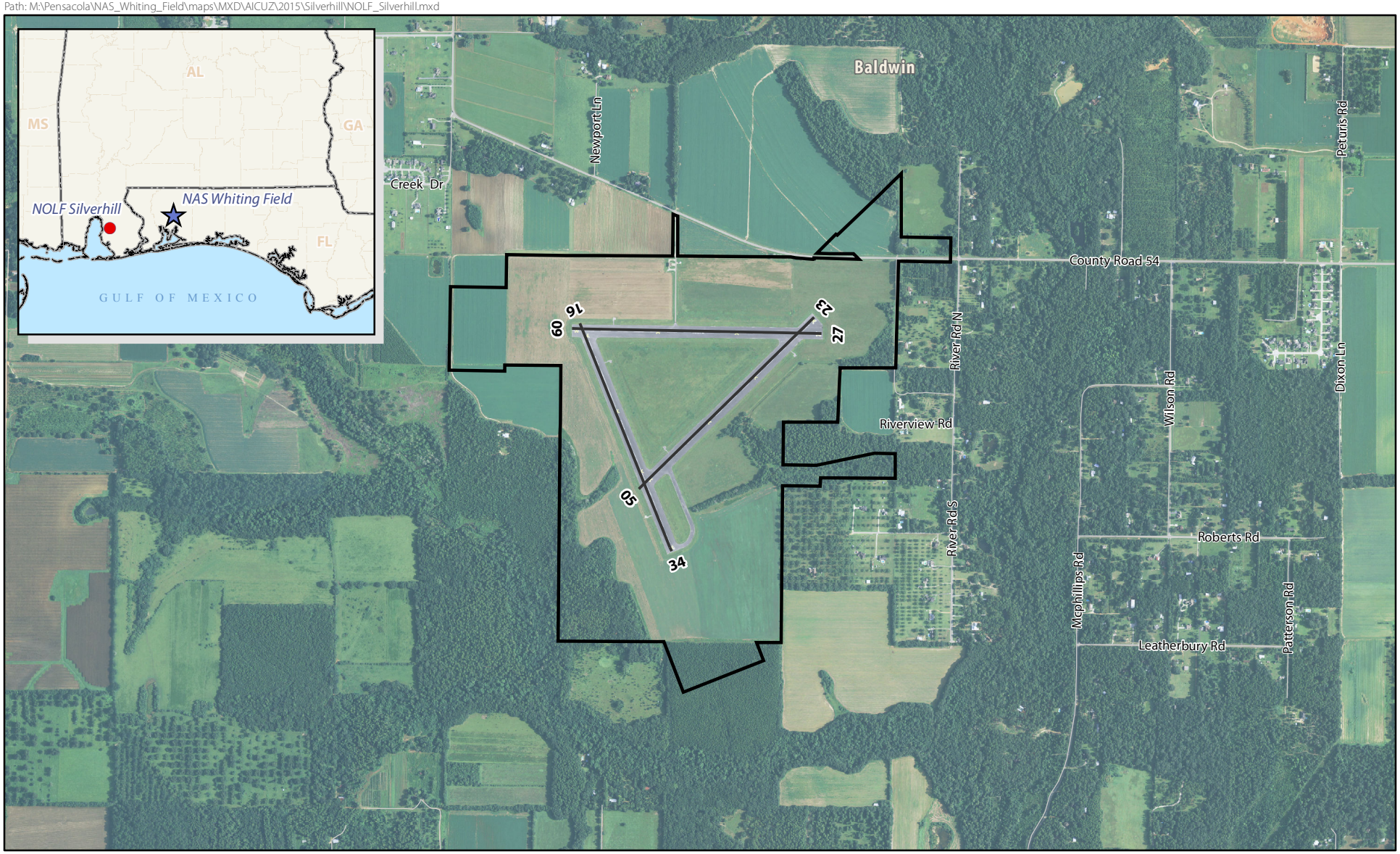

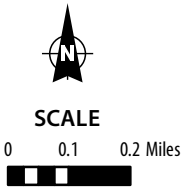

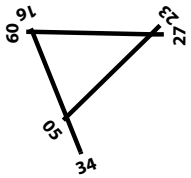

Legend

- Local Road
- Runway
- NOLF Silverhill Boundary

Figure 7.4-1
NOLF Silverhill
Baldwin County, Alabama

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

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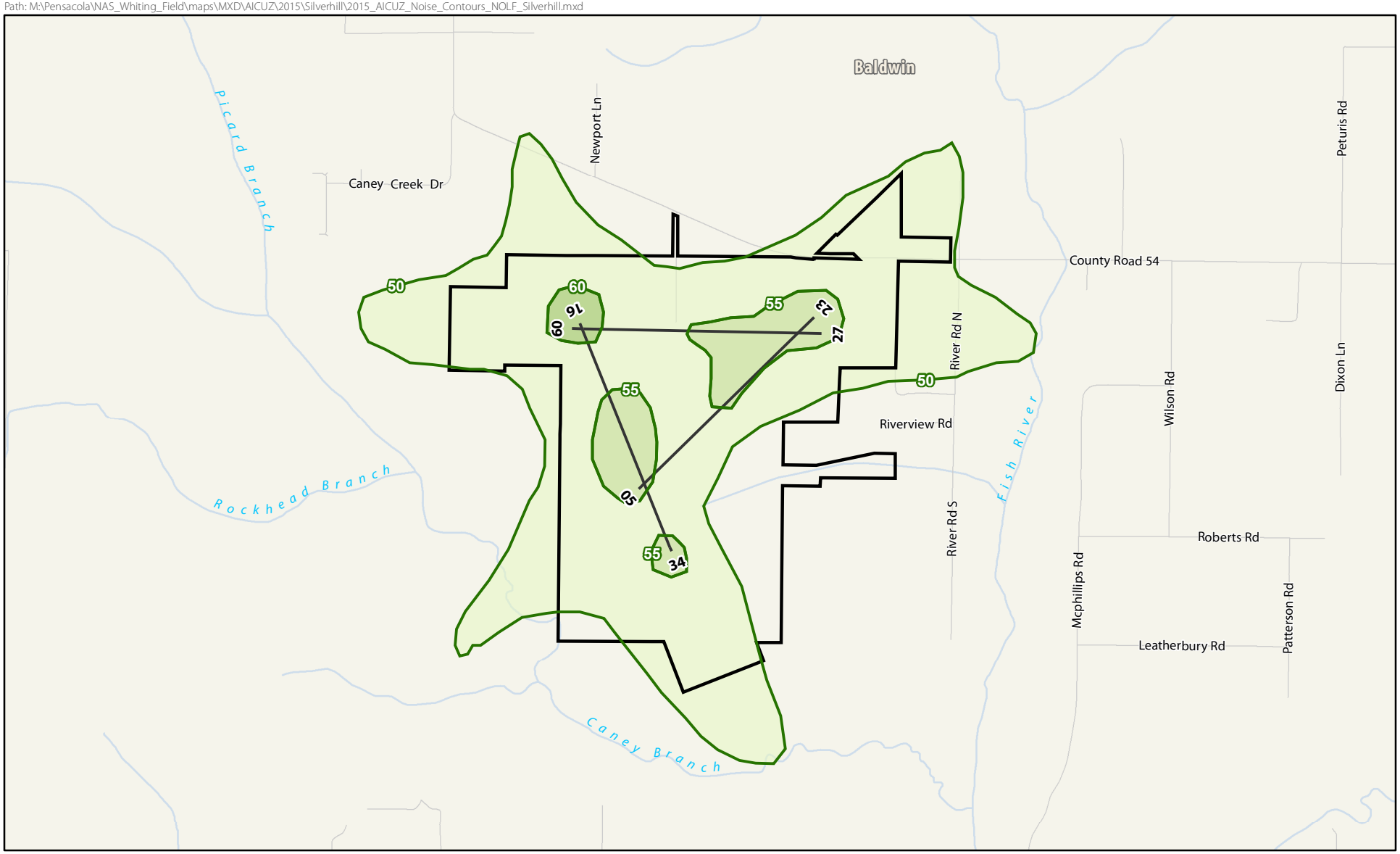

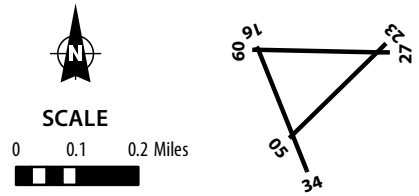

Legend

- Local Road
- Runway
- NOLF Silverhill Boundary

dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL

Figure 7.4-2
2015 AICUZ Noise Contours, NOLF Silverhill
Baldwin County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

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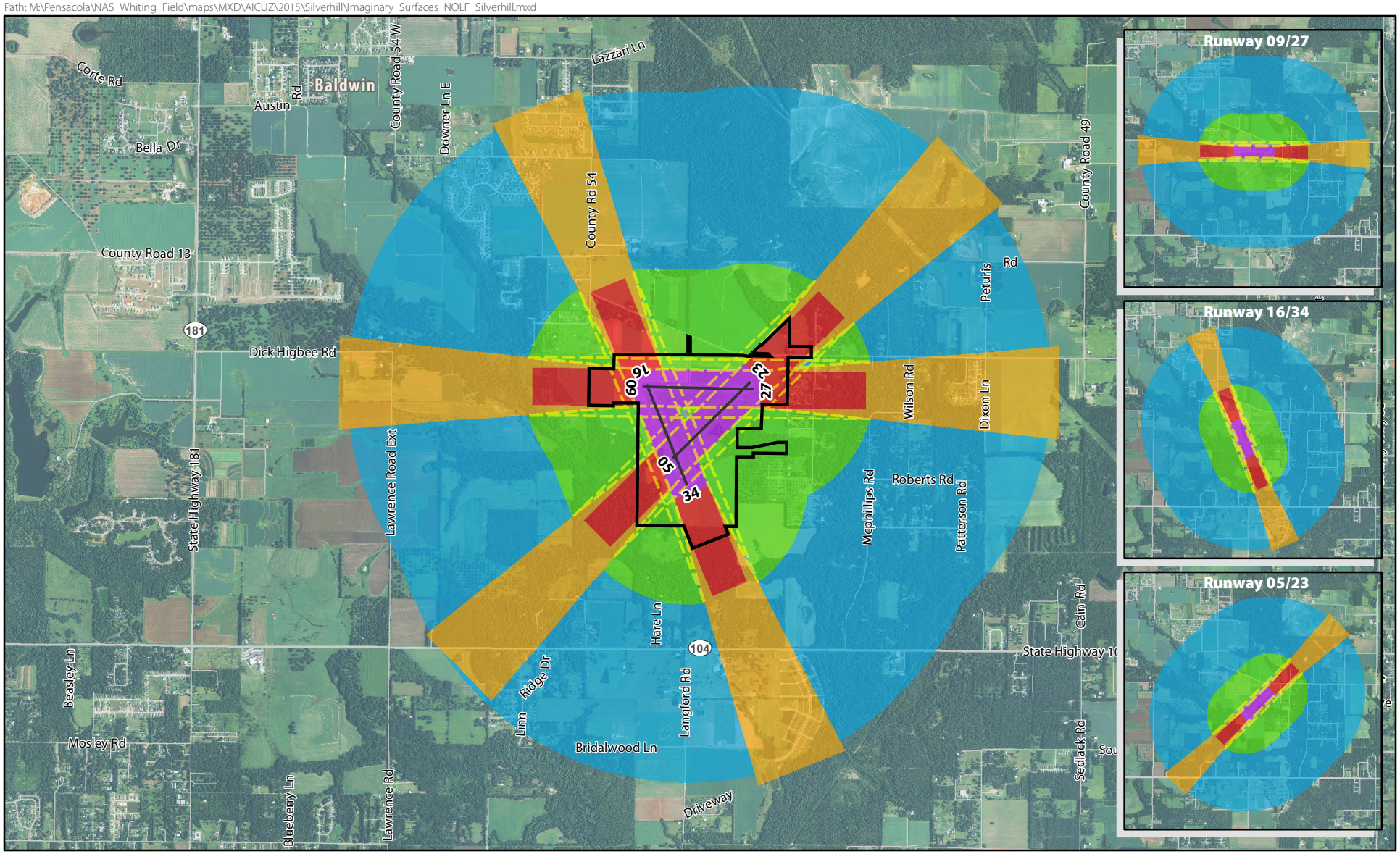

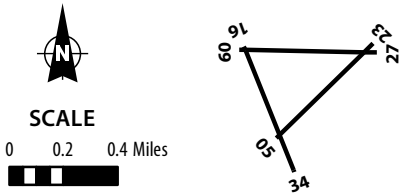

Legend

- Major Road
- Local Road
- Runway
- NOLF Silverhill Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- H: Transitional Surface

Figure 7.4-3
Imaginary Surfaces, NOLF Silverhill
Baldwin County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

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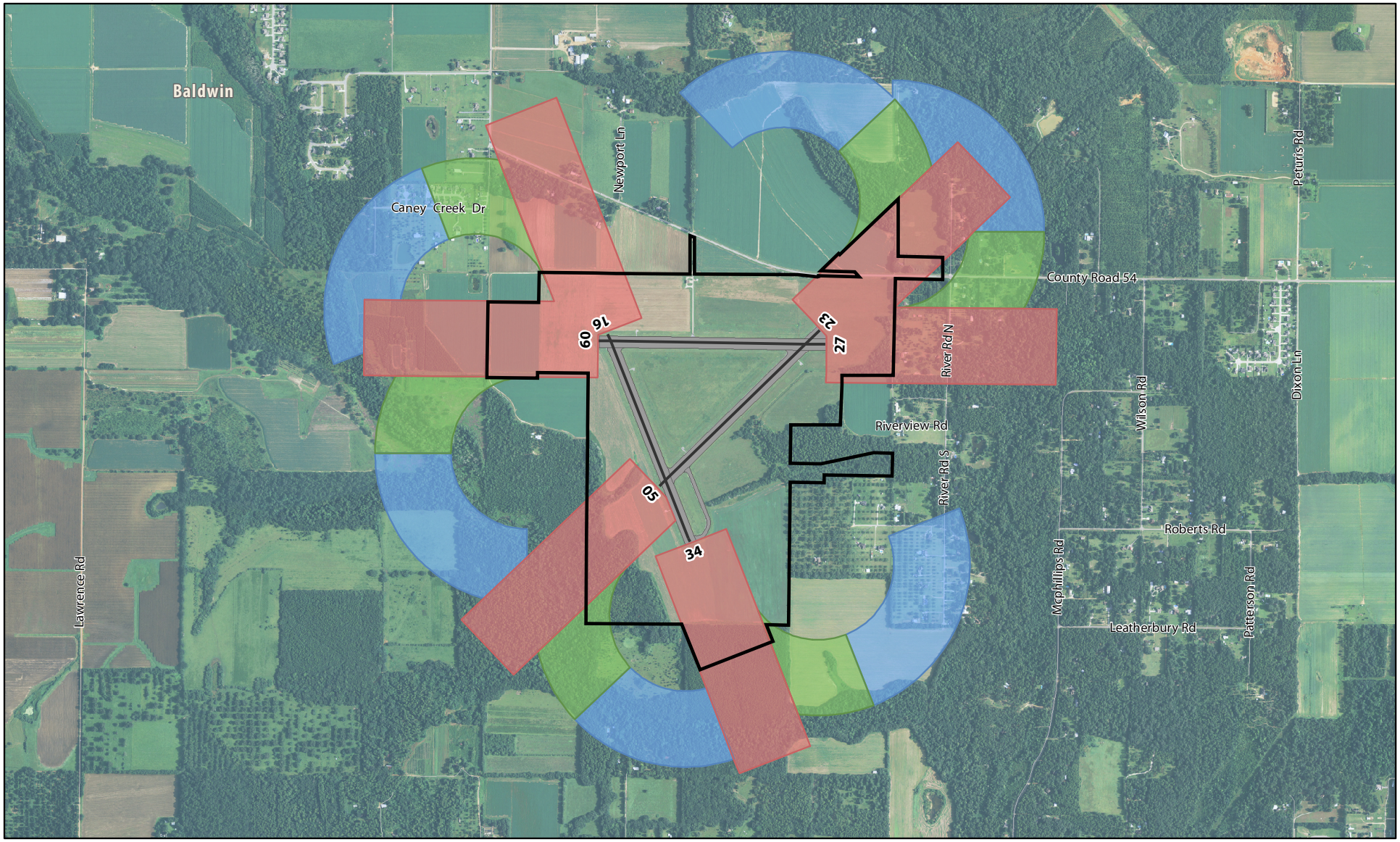

N

SCALE

0 0.1 0.2 Miles

Legend

- Local Road
- Runway
- NOLF Silverhill Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.4-4
2015 AICUZ APZs, NOLF Silverhill
Baldwin County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016; NAIP 2013.

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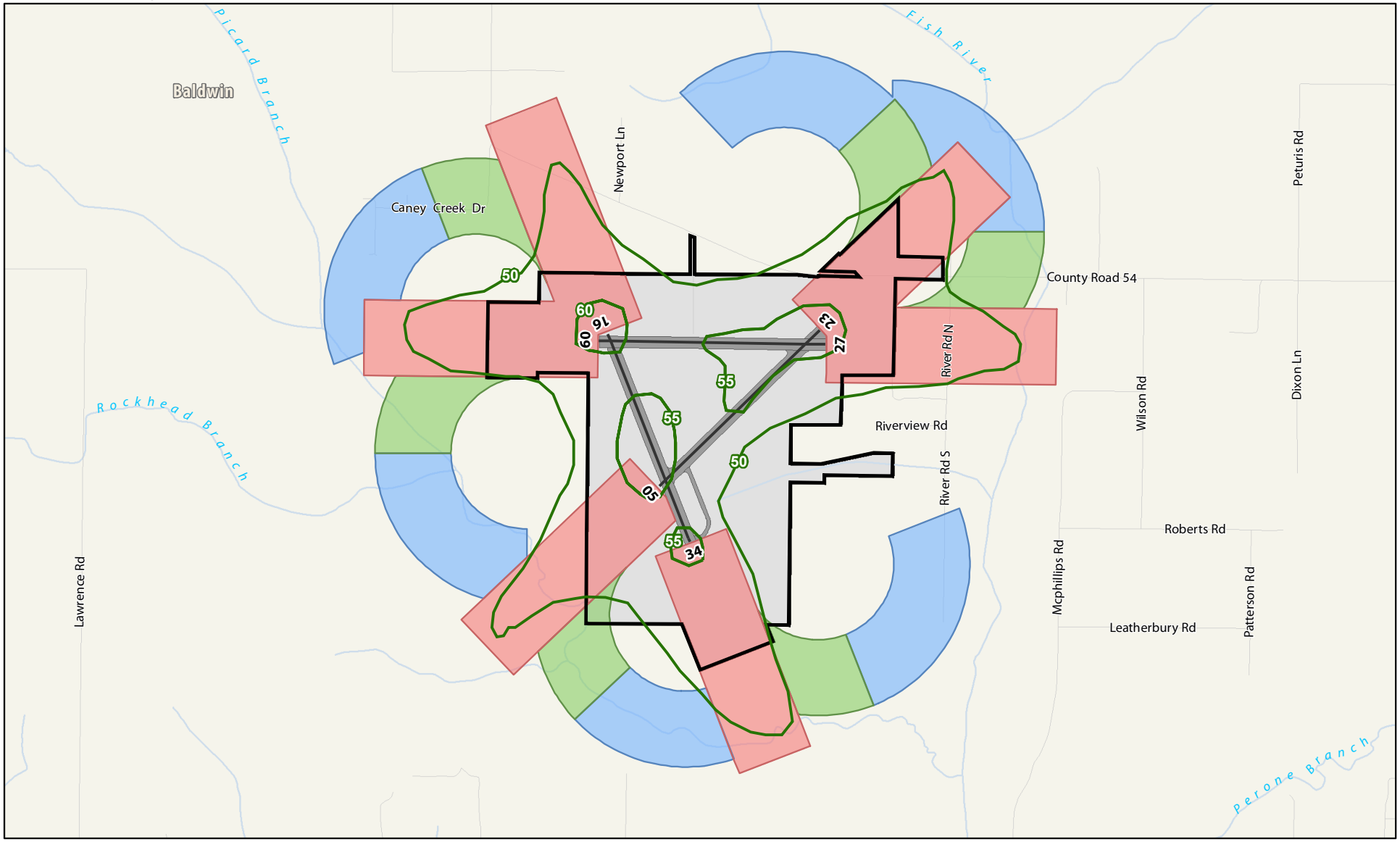


SCALE
0 0.1 0.2 Miles

Legend

- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Silverhill Boundary

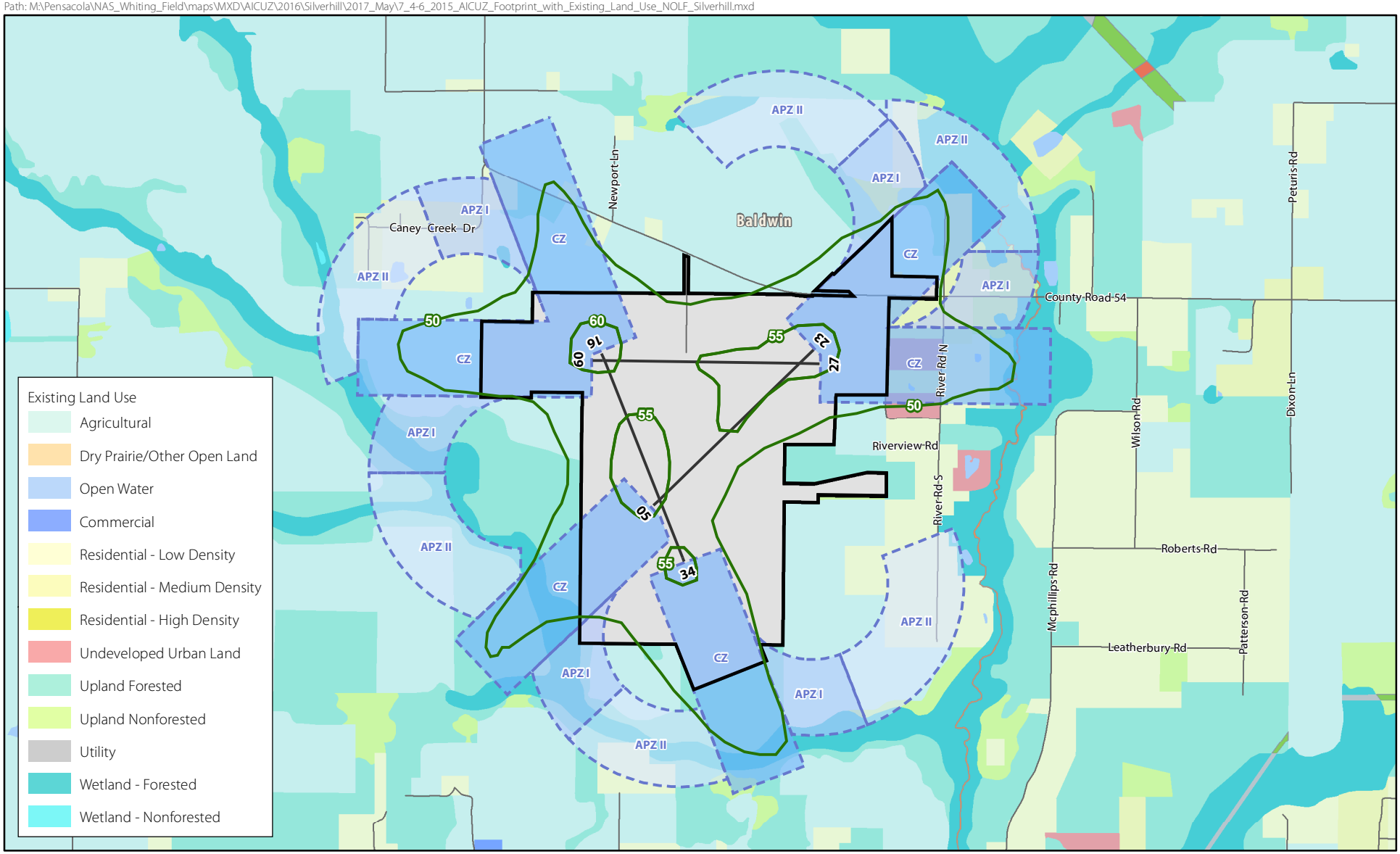
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.4-5
2015 AICUZ Footprint, NOLF Silverhill
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Silverhill\2017_May\7_4-6_2015_AICUZ_Footprint_with_Existing_Land_Use_NOLF_Silverhill.mxd



SCALE
0 0.1 0.2 Miles

Legend

- Major Highway
- Local Road
- Runway
- 2015 AICUZ Noise Contours
- NOLF Silverhill Boundary

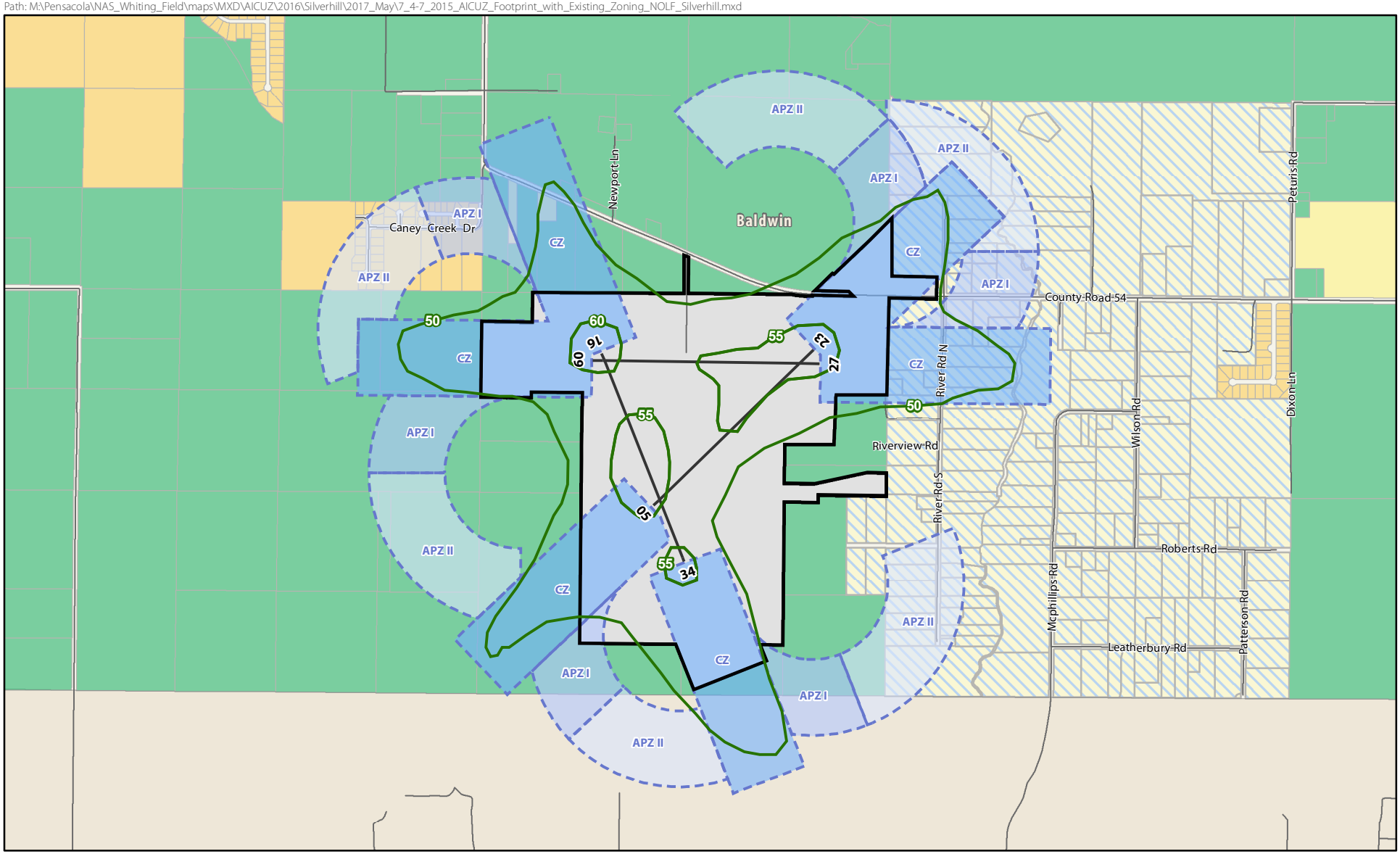
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Baldwin County 2010; Ecology and Environment, Inc. 2016.

Figure 7.4-6
2015 AICUZ Footprint with Existing Land Use, NOLF Silverhill
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Silverhill\2017_May\7_4-7_2015_AICUZ_Footprint_with_Existing_Zoning_NOLF_Silverhill.mxd



N

SCALE

0 0.1 0.2 Miles

16 09 23 27 05 34

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; USGS 2011; Baldwin County 2015; Ecology and Environment, Inc. 2016.

Legend

- Major Highway
- Local Road
- Runway
- 2015 AICUZ Noise Contours

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II
- NOLF Silverhill Boundary

Exisitng Land Use Classification

- Rural Agriculture District (RA)
- Single Family District (RSF-1)
- Single Family District (RSF-2)
- Residential Single Family Estate District (RSF-E)
- No Zoning In Place

Figure 7.4-7
2015 AICUZ Footprint with Existing Zoning, NOLF Silverhill
Baldwin County, Alabama

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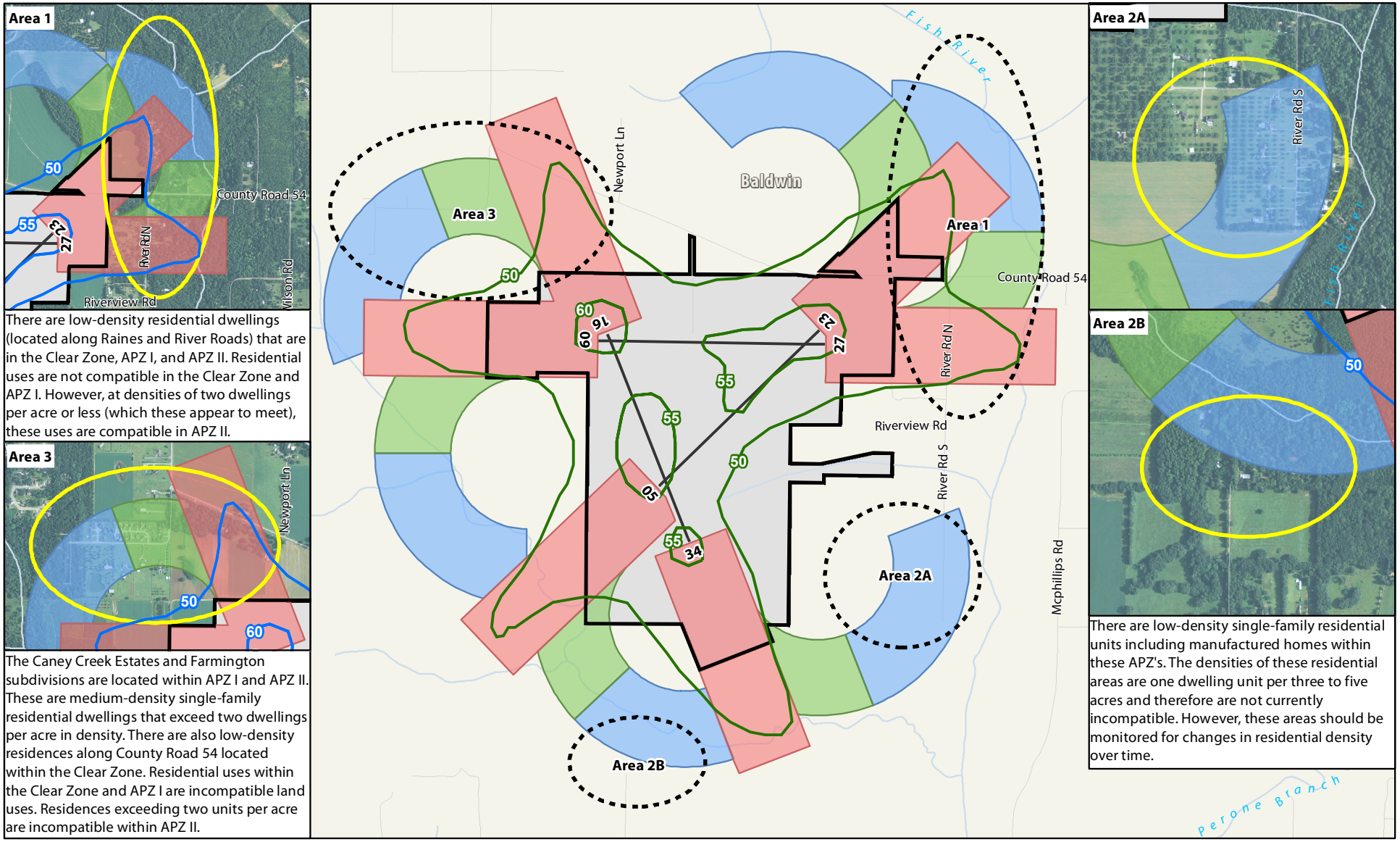

N

SCALE

0 0.1 0.2 Miles

16 09 23 27 55 50 34

Legend

- Local Road
- Municipal Boundary
- Runway
- 2015 AICUZ Noise Contours
- NOLF Silverhill Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.4-8
Compatibility Concerns - 2015 Composite Map, NOLF Silverhill
Baldwin County, Alabama

NOLF SUMMERDALE

BALDWIN COUNTY

ALABAMA

7.5 NOLF SUMMERDALE COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Summerdale. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Summerdale Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-1
NOISE CONTOURS	
2015 Noise Contours, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-2
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-3
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-4
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-5
Comparison of 1990 and 2015 AICUZ APZs, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-6
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-7
LAND USE	
2015 Composite AICUZ Footprint, Land Use, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-8
Compatibility Concerns – 2015 Composite Map, NOLF Summerdale, Baldwin County, Alabama	Figure 7.5-9

AIRFIELD OPERATIONS

NOLF Summerdale is a fixed-wing training airfield located in Baldwin County, Alabama (Figure 7.5-1). NOLF Summerdale has two runways, Runway 05/23 and Runway 11/29. Both runways were extended to 4,000 feet, with 3,000-foot Clear Zones, in 2012. The runway expansions were necessary to accommodate T-6 student dual operations. NOLF Summerdale's runways were renumbered from 04/22 and 10/28 to 05/23 and 11/29, respectively, after a recent magnetic calibration evaluation. The magnetic calibration evaluation occurred after data gathering and map preparation for this AICUZ Study; therefore, NOLF Summerdale's runway numbering for figures in this AICUZ Study align with pre-evaluation numbering.

Flight operations at NOLF Summerdale have fluctuated over time, ranging from a peak of 136,072 operations in 1981 to a low of 1,920 operations in 2000. Historical operations at NOLF Summerdale are presented in detail in Table 3-2, Operational Tempo Over Time for NAS Whiting Field and NOLFs.

Existing military operations at NOLF Summerdale are dual touch-and-go operations executed with T-6 JPATS aircraft. The T-6 JPATS aircraft operations at NOLF Summerdale include VFR touch-and–go's, holding patterns, and low key practice precautionary emergency landing (PEL) (i.e., circling patterns with a touch-and-go repeated during each circle of the airfield). Only daytime operations are conducted at the airfield and aircraft are not routinely parked overnight at NOLF Summerdale, nor are maintenance activities conducted at the airfield.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis for projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The Navy forecasts approximately 54,705 annual flight operations at NOLF Summerdale in CY2025 (Table 7.5-1). This will represent a decrease of 25 percent for annual flight operations relative to the baseline operations of 68,334 from the 1990 AICUZ. Table 7.5-1 shows the modeled distribution of these annual airfield operations by operation type.

TABLE 7.5-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF SUMMERDALE

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	521
Overhead Break Arrival	2,012
PEL Arrival	1,491
Touch-and-Go Pattern	50,681
Low Key PEL Pattern	---
Delta (Hold) Pattern	---
TOTAL	**54,705**
1990 AICUZ Total	68,334

Source: BRRC 2015; NAS Whiting Field 2010

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. Flight tracks provide safety, consistency, and control of an airfield. Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide. Operations are tracked according to flight track/runway utilization at each airfield to determine APZs.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section discusses the 2015 AICUZ noise contours for NOLF Summerdale and provides a detailed description of the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the

previous AICUZ Study (1990) and the 2015 noise contours (as presented in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January 2011). The comparison helps identify changes to noise exposure based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate noise impacts. Land use and recommendations within noise zones for this airfield are provided and discussed later in this section.

The T-6 aircraft replaced the T-34C; therefore, the only noise sources considered for the NOLF Summerdale noise model are T-6 aircraft operations. The 2015 noise contours for NOLF Summerdale are within the immediate vicinity of the airfield, with a majority of the noise contours concentrated within the installation's boundary (Figure 7.5-2. The 65, 70, and 75 dB DNL noise contours are contained within the airfield boundary and are generally centered along the two operating runways. The outermost 55 dB DNL contour lobes follow the path of the arrival and departure tracks.

The 2015 AICUZ noise contours are similar in size and location when compared to the 1990 AICUZ noise contours (Figure 7.5-3. The 2015 AICUZ noise contours show the 50-55 dB DNL extending slightly off station, similar to the 1990 AICUZ noise contours. The majority of the noise is contained within the installation boundary, and the area impacted by the 55 dB DNL contours are deemed areas of low or no impact.

The slight changes between the 1990 and 2015 noise contours are attributed to:

- ☐ Extended runways (to accommodate T-6 student dual operations);
- ☐ Changes in aircraft (the 1990 noise contours modeled T-34 aircraft operations, and the 2015 contours only modeled T-6 dual operations);
- ☐ Changes in flight patterns (the T-6 is flown in the same general manner as the T-34C, except longer runways are required to accommodate T-6 training requirements);
- ☐ Changes in operational level (the number of operations has decreased from the 1990 to the 2015 AICUZ studies); and

☐ Improved noise mapping techniques (discussed in Section 4.5).

As noted in Table 7.5-2, the higher noise impact (+65 dB DNL) has increased from the 1990 to the 2015 noise contours. However, the off-station impact is only within the lower noise zones (below 60 dB DNL), which is acceptable and considered a low to no impact.

TABLE 7.5-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF SUMMERDALE

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF-STATION (ACRES)	TOTAL (ACRES)	OFF-STATION (ACRES)
50-55 dB DNL	943	556	0	0
55-60 dB DNL	73	2	451	185
60-65 dB DNL	0	0	147	0
65-70 dB DNL	0	0	86	0
>70 dB DNL	0	0	0	0
TOTAL AREA	**1,016**	**558**	**684**	**185**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.5-4 presents the imaginary surfaces and transition planes for NOLF Summerdale.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. The following section presents the 2015 APZs for NOLF Summerdale (Figure 7.5-5), including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 APZs (Figure 7.5-6). The comparison helps identify changes to APZs based on projected changes in aircraft operations and allows the targeting of land use recommendations to mitigate incompatible development.

AICUZ Instruction requires Clear Zones for all runway ends. APZ I and APZ II are required for NOLF Summerdale because flight operations for both runways at this airfield exceed 5,000 operations annually. Table 7.5-3 provides the acreages that fall within the Clear Zones and APZs for NOLF Summerdale. Approximately 1,079 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural and rural. A comparison of the 1990 and 2015 AICUZ Clear Zones and APZs shows a significant change in coverage, primarily associated with extensions to Runways 05/23 and 11/29 and changes in flight tracks and patterns for T-6 dual operations. These changes have resulted in multiple APZ I and APZ II areas for each end of the runways. In addition, there is a loss of multiple APZs previously associated with Runway 16/34, which is no longer utilized and has been deactivated. Overall, the total off-station area impacted has increased by approximately 420 acres from 1990 AICUZ calculations, mainly due to the additional APZ I and APZ II areas.

TABLE 7.5-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF SUMMERDALE

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	201	0	13	0	0	0	214
	Off-Station	163	0	119	0	299	0	581
	TOTALS	364	0	132	0	299	0	795
		364		132		299		
2015 AICUZ	On-Station	114.50	0	0.41	0	22.51	0	137.42
	Off-Station	165.42	0	516.80	0	381.74	14.82	1,078.78
	TOTALS	279.92	0	517.21	0	404.25	14.82	1,216.20
		279.92		517.21		419.07		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to U.S. Waterbodies (USGS 2012).

Baldwin County Residential Densities

- ☐ Low Density: 1 du per 30,000 to 80,000 sq. ft. (0.68 to 1.83 acres)
- ☐ Med Density: 1 du per 7,500 to 15,000 sq. ft. (0.17 to 0.34 acres)
- ☐ High Density: 4 to 6 du per acre.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Summerdale. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Summerdale, presented on Figure 7.5-7, was used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study were presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Summerdale is located in unincorporated areas of Baldwin County, Alabama. Therefore, the land use ordinances covering the off-installation property within the AICUZ footprint are within the County's jurisdiction. Land use patterns and

zoning in the immediate vicinity of NOLF Summerdale, along with the land use compatibility assessment and analysis conducted, are presented below.

EXISTING LAND USE

Baldwin County Zoning Districts Classification

- ☐ Rural (RR)
- ☐ Rural Agricultural (RA)
- ☐ Conservation Resource (CR)
- ☐ Single Family (RSF)
- ☐ Two Family (RTF)
- ☐ Multiple Family (RMF)
- ☐ Residential Manufactured Housing (RMH)
- ☐ Business and Commercial (B1-B4)
- ☐ Recreational Vehicle Park (RV)
- ☐ Marine Recreation (MR)
- ☐ Outdoor Recreation (OR)
- ☐ Industrial (M1-M2)

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. Summerdale is primarily a farming community, with its town developing along Hwy 59 and the Baldwin Beach Express. Land use surrounding NOLF Summerdale features low-intensity development, with a mix of residential, water/wetlands, agricultural, and forest lands. Figure 7.5-8 illustrates land uses surrounding NOLF Summerdale. The vast majority of land use surrounding the airfield is agricultural and rural. However, there are some low- to medium-density residential uses in proximity to the airfield. The residential uses range from low-density single-family dwellings on large parcels (greater than 1.0 acre) to medium- to high-density residential use in the form of manufactured home parks. Some of the low-density residential uses are located east of the airfield, across Lassitter Farm Road (i.e., Lassitter Family, Kelmer, and Dairy Orchard Farms subdivisions). The only medium- to high-density residential uses surrounding NOLF Summerdale is a manufactured home park and other manufactured homes located to the west. Based on Baldwin County data, there does not appear to be any commercial or industrial uses surrounding NOLF Summerdale. Overall, land use around NOLF Summerdale reveals a pattern of low-density development, and there is still a moderate amount of undeveloped property. From the perspective of land use compatibility, some of the residential uses surrounding NOLF Summerdale are incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility is provided later in this section.

ZONING

"Zoning" is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Per the County's Master Plan, there are 18 zoning district designations within Baldwin County. The characteristics of the zoning districts are similar to the existing land use patterns. In general, much of the land surrounding the airfield remains vacant, with

the primary zoning consisting of Rural, Agricultural, and Single -Family Residential zones. Agricultural zoning allows for low-density residential dwellings within that classification. Overall, existing zoning adjacent to NOLF Summerdale and the availability of open land indicates that there is the potential for growth around the NOLF Summerdale, which could result in further compatibility concerns.

FUTURE LAND USE

Baldwin County's Master Plan (2013) outlines future land use within the county. In general, Master Plans (a.k.a. Comprehensive Plans) are tools used by local governments to guide future development of land in a planned and effective manner. The future land use patterns around NOLF Summerdale include four classifications, or "districts": Residential, Agricultural, Conservation, and Special Development. Other districts in the county included Commercial and Industrial. The majority of the future land use surrounding NOLF Summerdale is labeled as Agricultural District. Per the County's Master Plan, the Agricultural District designation is designed to protect agricultural activities and the rural character of the county, while providing for some development activities. Uses allowed in this district include very low-density residential development, agricultural, forestry, and farming activities, recreation uses, limited general commercial, and limited institutional. The majority of the remaining land uses around the airfield are identified as Residential District to the south and east. Development around NOLF Summerdale is expected to follow current development trends of rural residential and agricultural. The anticipated land uses within these future districts have the potential to be incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Summerdale is presented below.

Maximum Densities for Each Land Use District Classification

- Residential: 4 du per acre.
- Rural: 1 du per acre.
- Conservation: 1 du per acre.
- Special: site-specific policies

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Summerdale's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Summerdale, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Baldwin County parcel data and land use classification information. The evaluation was performed on a case-by-case basis and at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 (see Chapter 6) provides a generalized breakdown of land use

compatibility provides the Navy's land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

NOLF Summerdale's 2015 AICUZ noise contours that extend off the installation are exclusively 55 to 60 dB DNL, which do not pose a compatibility concern with any type of land use. However, there are incompatible land uses and existing compatibility concerns within Clear Zones and APZs for NOLF Summerdale. As illustrated on Figure 7.5-5, Clear Zones and APZs impact areas off the installation in all directions. These impacted areas are mainly a mix of low-density (less than 1-2 dwellings per acre) and medium- to high-density (up to 4-6 dwellings per acre) residential areas, as described below.

- Area 1: Low-density residential (less than 1-2 dwellings per acre) areas northeast of the airfield along County Road (CR) - 38 and Lassitter Farm Road are currently in within APZ I and APZ II and present a compatibility concern. These dwellings include both traditional "stick-built" homes and manufactured mobile homes. There are additional low-density residential dwellings further east along CR-38 associated with the Lassitter Family Subdivision and Emmaus Motor Coach and RV Park within APZ I and APZ II. Residential districts are incompatible with APZ I; however, single-family residential areas are compatible, with restrictions, within APZ II. The maximum density for residential structures in APZ II is 1-2 dwellings per acre. It should be noted that the Navy has addressed compatibility concerns associated with residential structures within the Runway 04 Clear Zone by purchasing property easements for the impacted parcels to protect the health and safety of the community.

- Area 2: The Clear Zone to the east of the airfield encompasses a small area of a low-density residential district within the Kelmer Subdivision and surrounding area. These are detached single-family dwellings with densities that are less than 1-2 dwellings per acre. Any structures in a Clear Zone are an incompatible land use, especially residential dwellings. This eastern 10 Clear Zone has two APZ I areas, one turning north and the other turning south, both of which extend over low-density residential dwellings along Harden Lane/CR-36. This land use does not meet the AICUZ criteria and, thus, is deemed incompatible and strongly discouraged in APZ I. Current compatibility issues within this Clear Zone have also been analyzed in the 2011 Environmental Assessment for Providing T-6 JPATS Solo Capability at NOLFs NAS Whiting Field (referred to as the "2011 Runway Extension EA").

- ☐ Area 3: Located directly south of the airfield, a portion of the Clear Zone and the majority of both APZ I and APZ II are over land (Greenwood area) currently classified as Agricultural land use. However, based on Baldwin County data, the future land use for this area could change to a Residential District. The maximum density for a Residential District classification is 4 dwellings per acre. The AICUZ Instruction states any structures within a Clear Zone are an incompatible use; residential districts are incompatible with APZ I; and that residential densities exceeding 1-2 dwellings per acre are not compatible in APZ II. Therefore, this potential change in land use would be incompatible within Clear Zones and both APZ I and APZ II if Baldwin County proceeds with future plans to reclassify the area and allow residential development.

- ☐ Area 4: Low-density residential and medium- to high-density residential areas west and southwest of the airfield along CR-38, Harms Road, and Dubose Road present compatibility concerns. Portions of the Greenwood Meadows Subdivision (single-family dwellings) are within a Clear Zone and APZ I. This subdivision is classified as low-density residential and is incompatible with the Navy's land use compatibility recommendations for Clear Zones and APZ I. Directly south of the airfield, under APZ I and APZ II, are multiple residences along Baldwin Beach Expressway (CR-83) and others associated with a manufactured home park with densities of 4-6 dwellings per acre. Residential land uses of this density are incompatible with both APZs. Current compatibility issues may exist within the Runway 22Clear Zone, but the Navy has taken, and continues to take, actions to address compatibility concern associated with residential structures (i.e., acquiring of land). The 2011 Runway Extension EA provides further analysis and mitigation measures.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF SUMMERDALE

The neighborhoods and land uses identified in this section are, and continue to be, compatibility concerns in the area around NOLF Summerdale. The Navy and Baldwin County should continue to place a high priority on these encroachment concerns.

The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Summerdale. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.

FUTURE LAND USE DECISIONS

When Baldwin County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for noise zones, Clear Zones and APZs. The future land use for the land immediately adjacent to the airfield is projected as a Special Development district. However, it is important to note that this Special Development classification does not extend out and encompass the lands under the Clear Zones and APZs or restrict the type of land use and/or development in this area. The Baldwin County Planning and Zoning Commission and NAS Whiting Field should work together to establish broader special planning areas (such as military influence areas or airport overlay zones/districts) with development restrictions for areas in and outside the established APZ at NOLF Summerdale that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. The local government should use the flight tracks presented in Chapter 3 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

In addition, the future land use change previously identified in Area 3 should not be implemented. To ensure compatibility and to protect the health and safety of the public, the land use should remain as an Agricultural classification and the development should be limited as such. Since residential dwellings are currently allowed within the Agricultural land use, the densities should not be allowed to go above the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance.

UPDATE LAND USE PLAN AND MAPS

Baldwin County should update its 2013 Master Plan to reflect the 2015 AICUZ noise contours, Clear Zones, and APZs for NOLF Summerdale and OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with Baldwin County to update county land use maps to indicate the new boundary for NOLF Summerdale and include a "Military Land Use" classification for the parcels owned by the Navy. These updates will further aid Baldwin County officials, planners, and private citizens in their decisions and policies regarding future land use and development surrounding NOLF Summerdale.

MONITOR AREAS OF POTENTIAL CONCERN

There are numerous residential dwellings located within APZ II at NOLF Summerdale, but the densities are well below the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance; however, these areas should be continuously monitored for changes to development and density. These areas will become incompatible, per AICUZ criteria, if residential development continues at a higher density level (above 1-2 dwellings per acre) for the residential land uses within APZ II.

PUBLIC LAND ACQUISITION

The Navy should continue its efforts to purchase and acquire public lands in the vicinity of NOLF Summerdale as they become available. This will result in the protection of key land assets by limiting impacts from development that is considered incompatible with air station activities. Priority should continue to be placed on the lands and structures within the Clear Zones.

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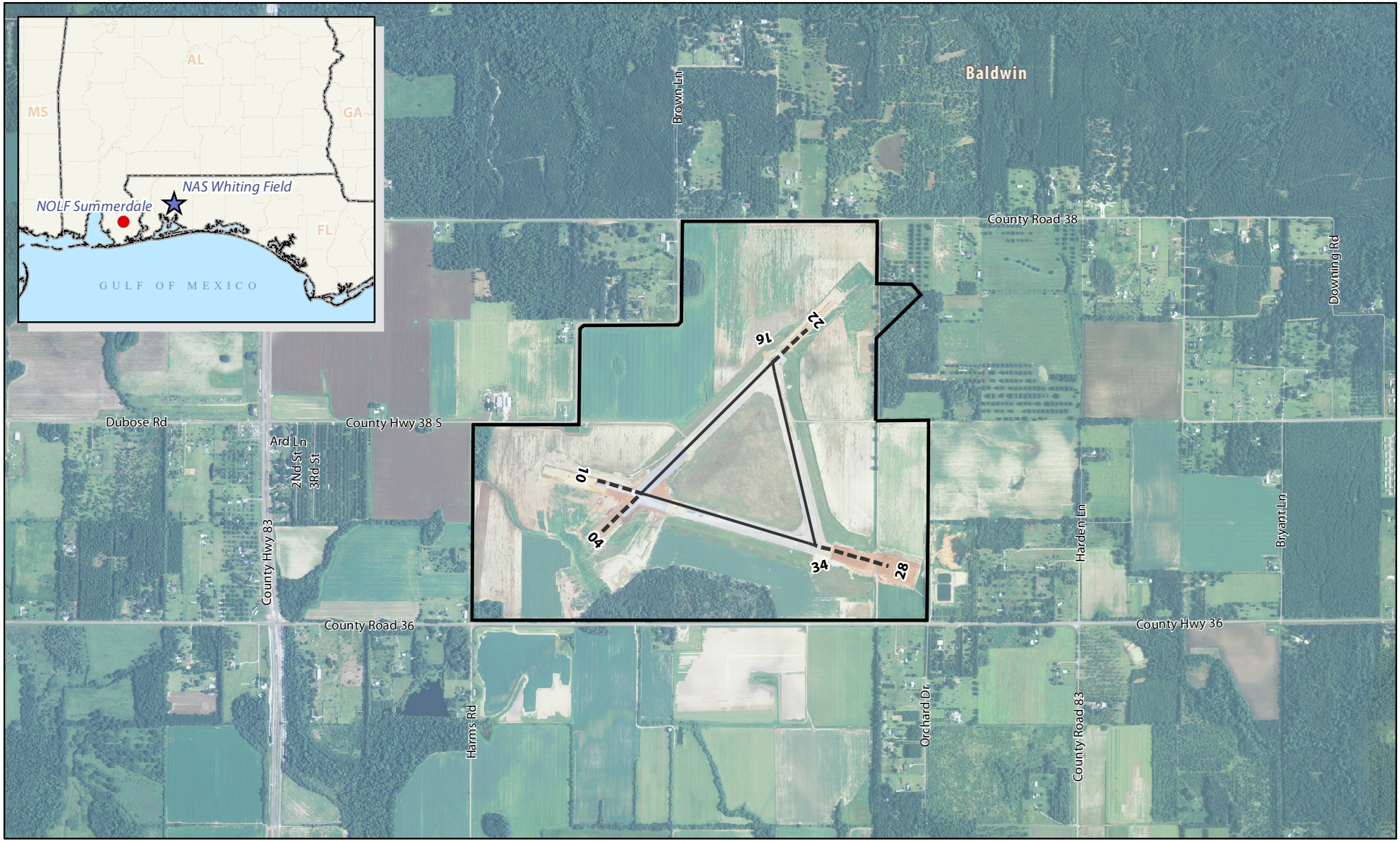

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.5-1
NOLF Summerdale
Baldwin County, Alabama

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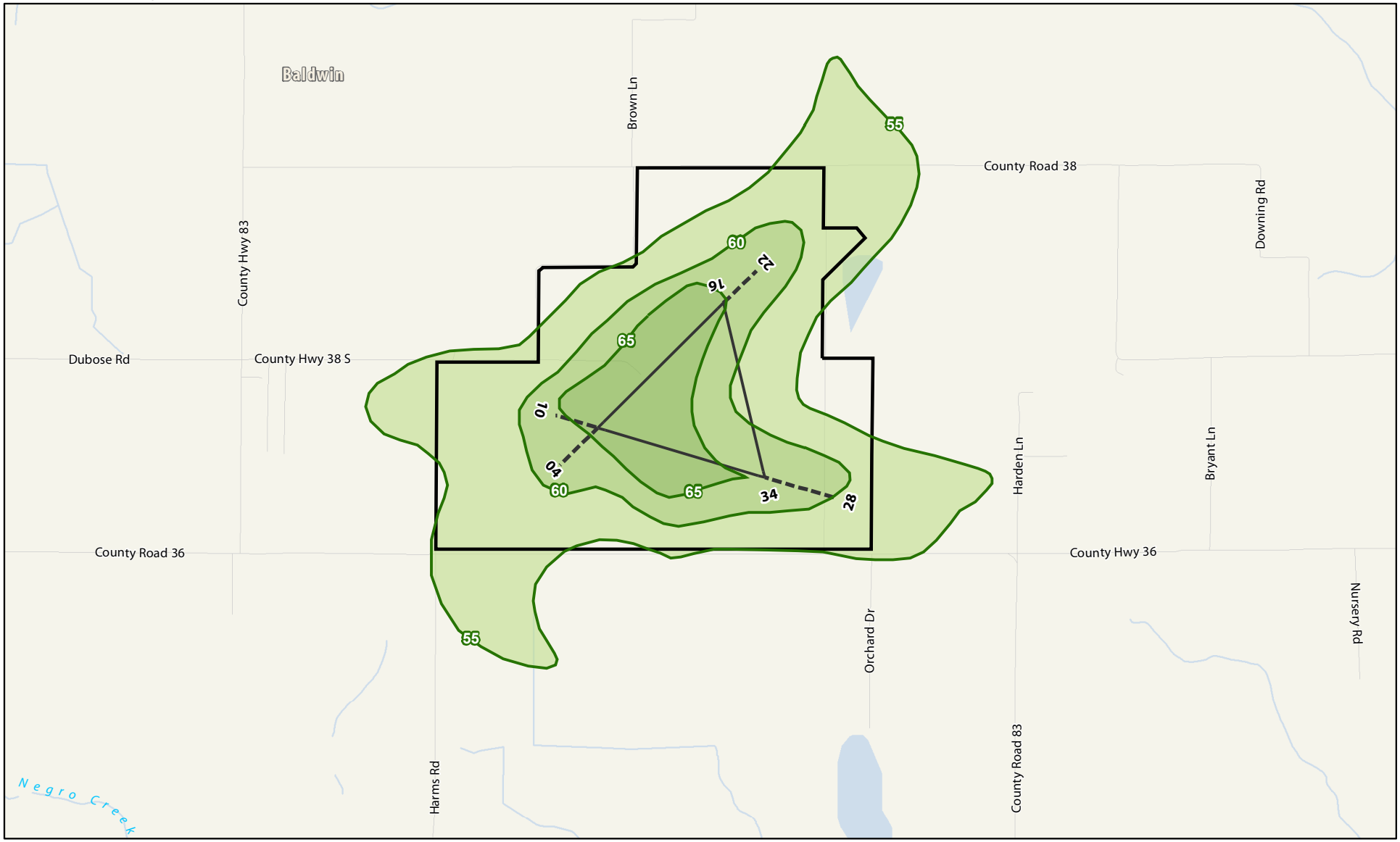

SCALE
0 0.1 0.2 Miles

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- NOLF Summerdale Boundary

dB DNL Value
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL

Figure 7.5-2
2015 AICUZ Noise Contours, NOLF Summerdale
Baldwin County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

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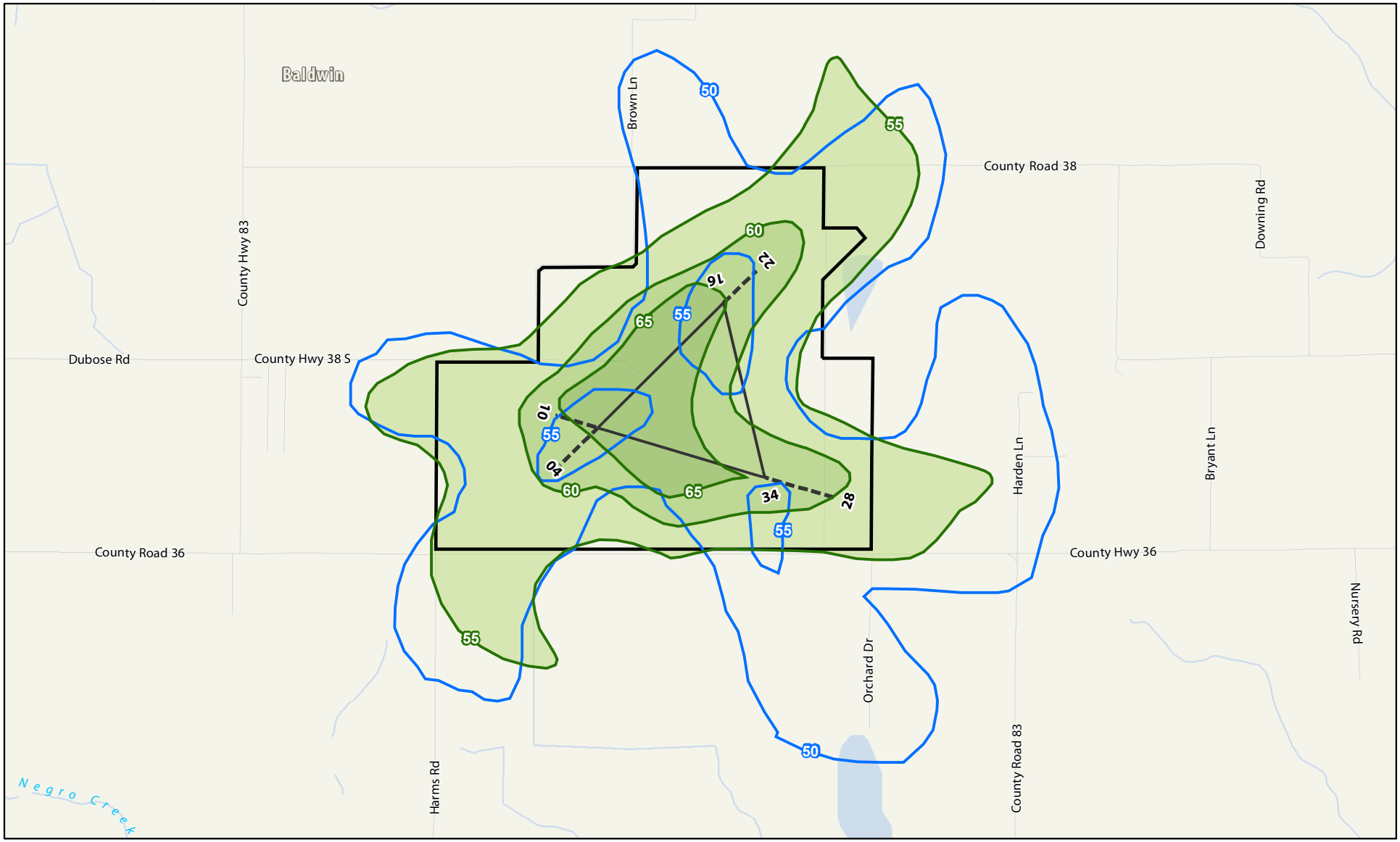

N

SCALE

0 0.1 0.2 Miles

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- NOLF Summerdale Boundary
- 1990 AICUZ Noise Contours
- 2015 AICUZ Noise Contours
  - 55 dB DNL
  - 60 dB DNL
  - 65 dB DNL

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.5-3
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Summerdale
Baldwin County, Alabama

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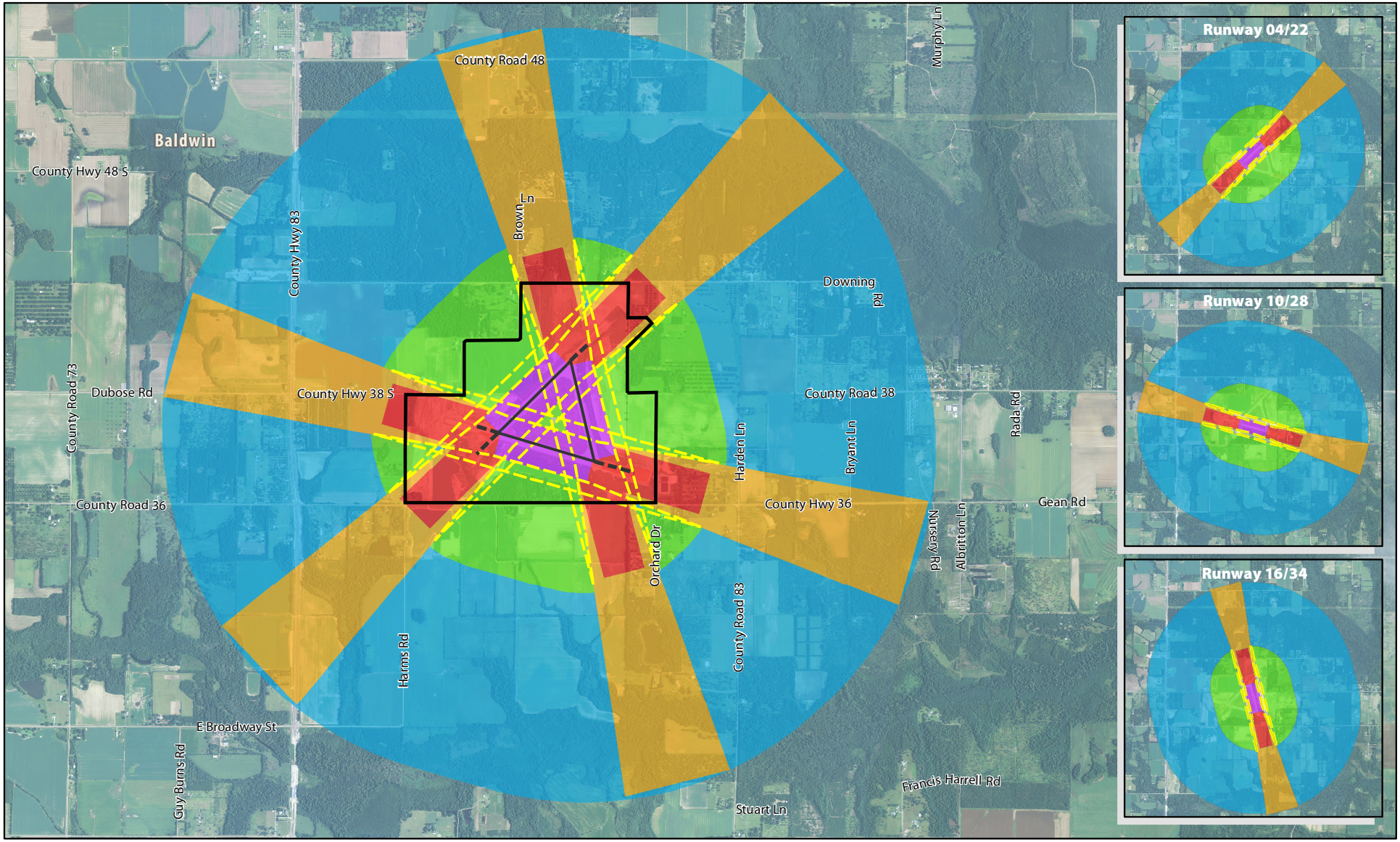

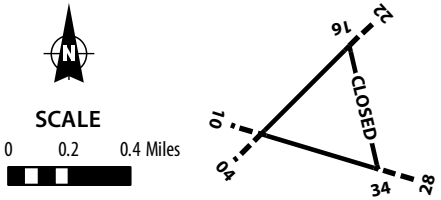

Local Road

Runway

Runway Extensions based on T-6 EA, January 2011

NOLF Summerdale Boundary

Legend

A: Primary Surface

B: Clear Zone Surface

C: Approach-Departure Clearance Surface

E: Inner Horizontal Surface

F: Conical Surface

H: Transitional Surface

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.5-4
Imaginary Surfaces, NOLF Summerdale
Baldwin County, Alabama

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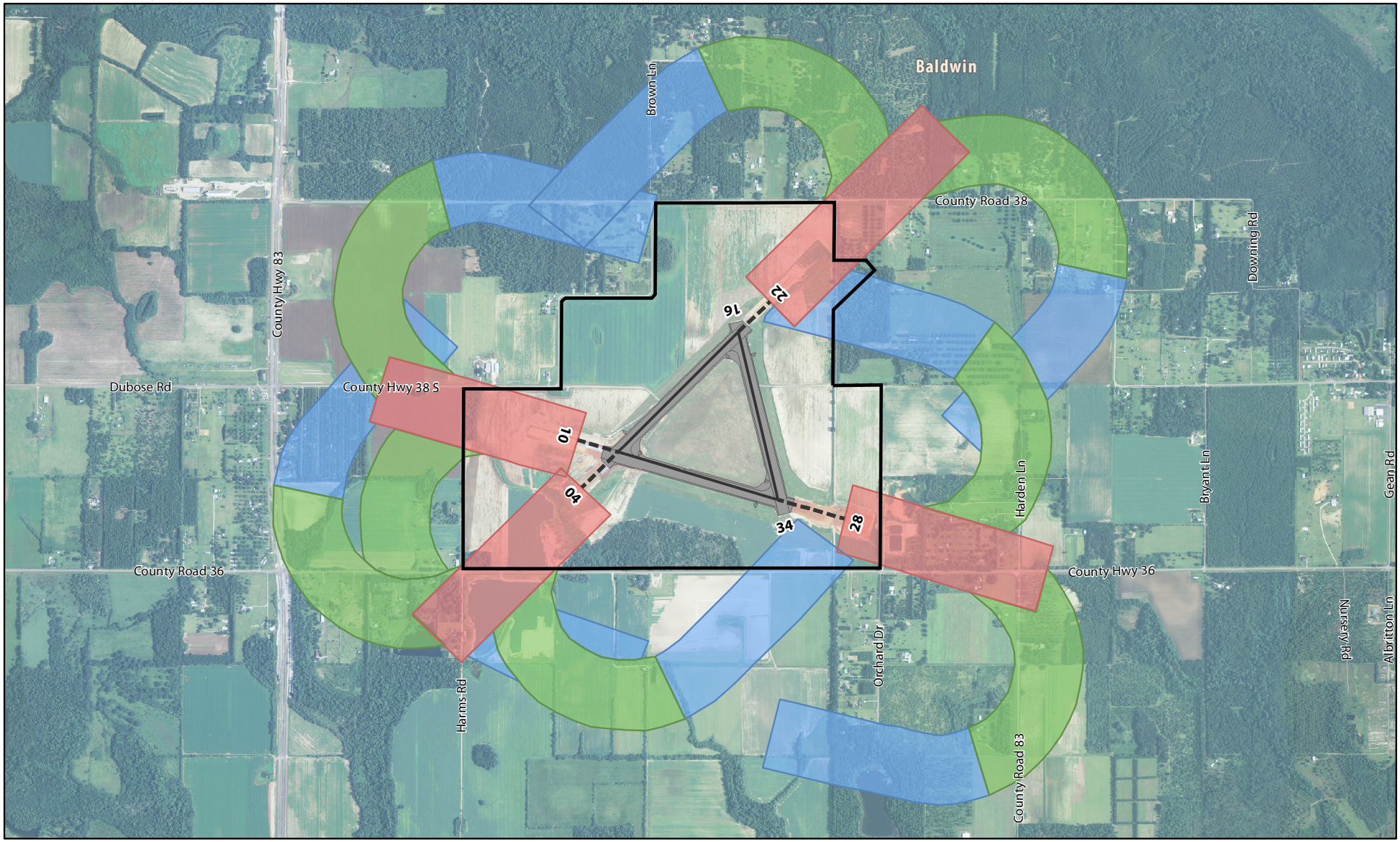

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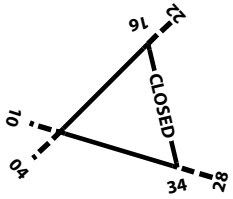
SCALE

0 0.1 0.2 Miles



Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- NOLF Summerdale Boundary
- Airfield
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I
  - APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.5-5
2015 AICUZ APZs, NOLF Summerdale
Baldwin County, Alabama

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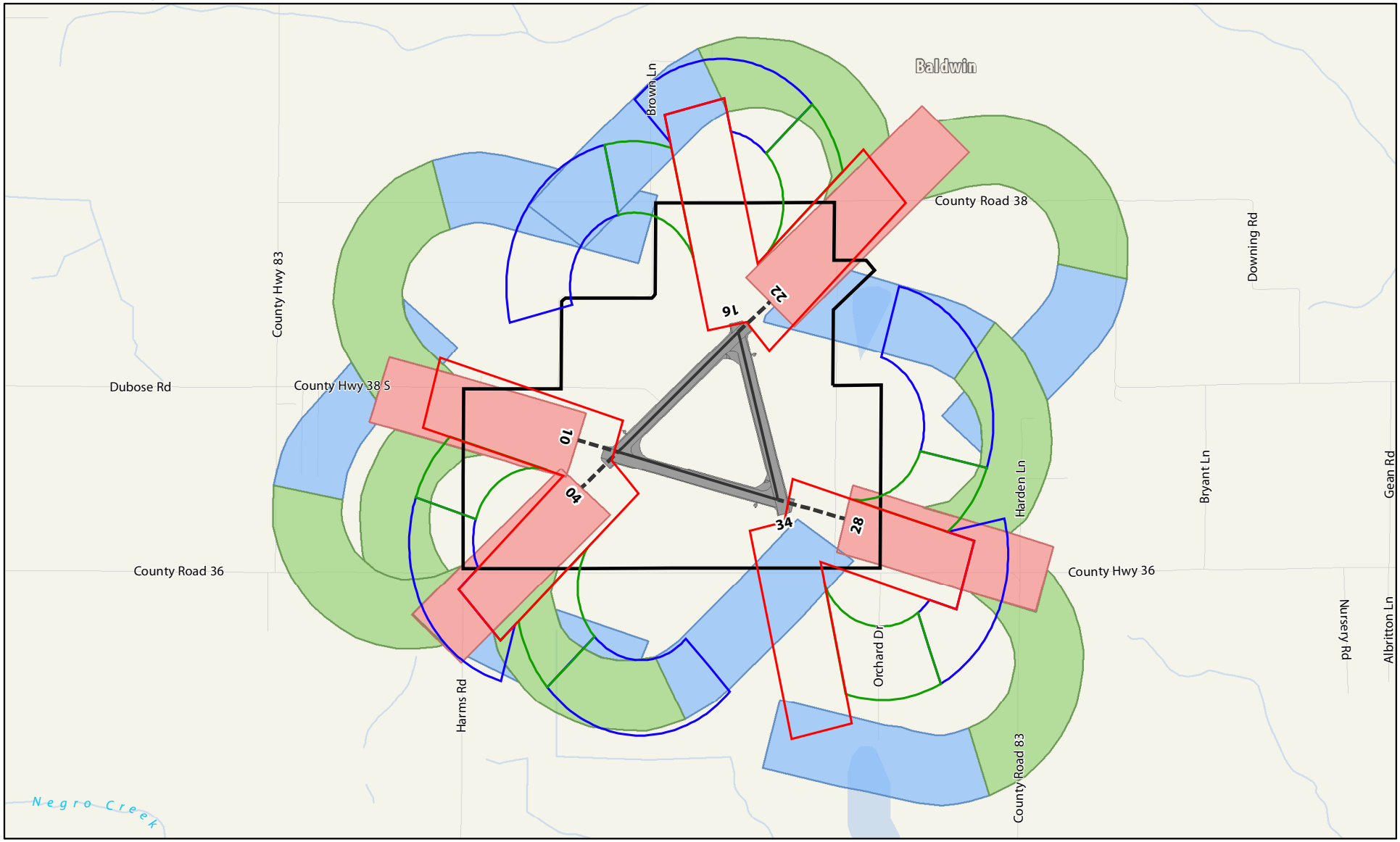

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SCALE

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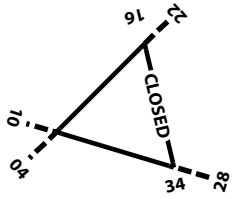

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- NOLF Summerdale Boundary
- Airfield

Accident Potential Zone (2015)	Accident Potential Zone (1990)
Clear Zone	Clear Zone
APZ I	APZ I
APZ II	APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.5-6
Comparison of 1990 and 2015 AICUZ APZs, NOLF Summerdale
Baldwin County, Alabama

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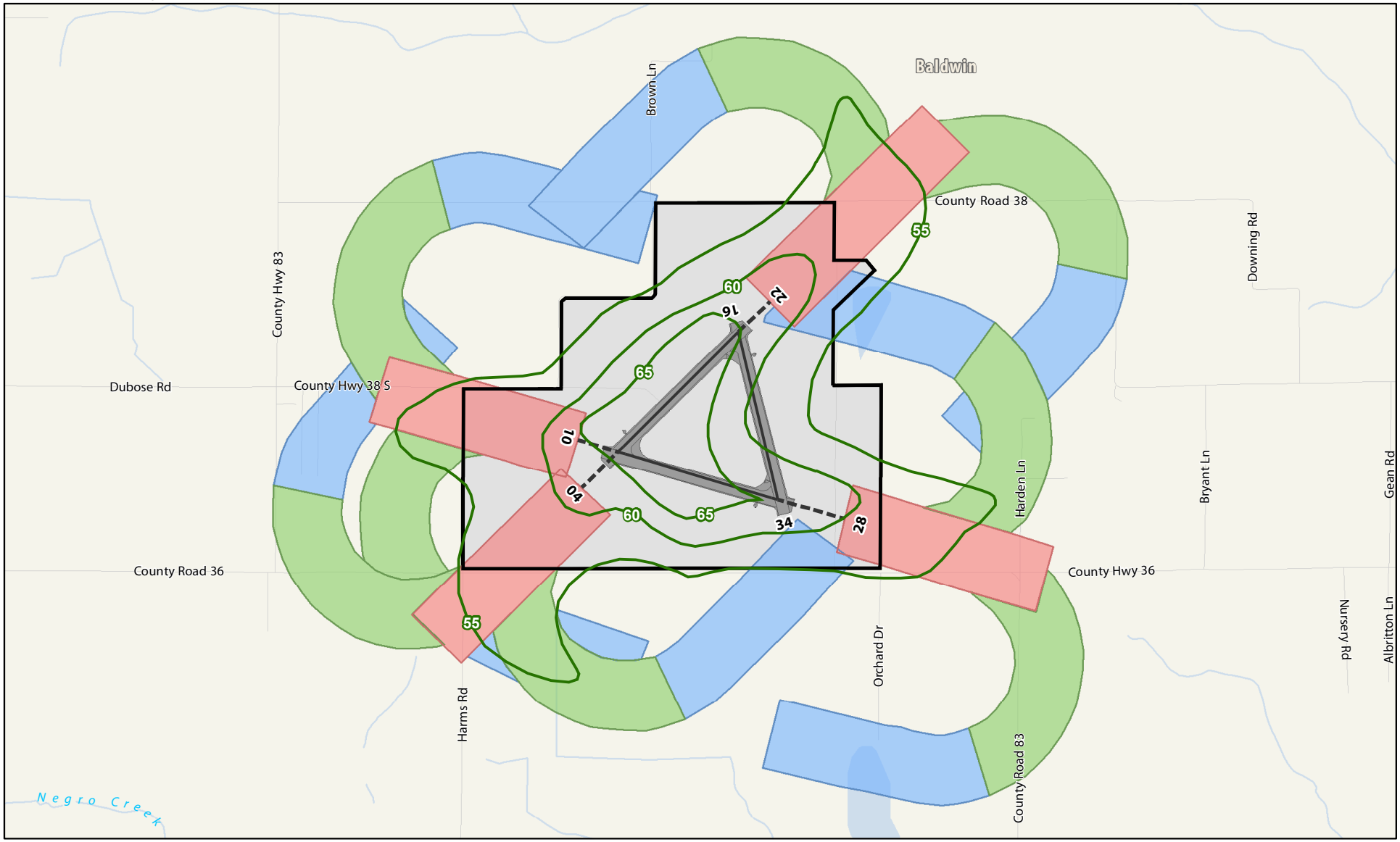


SCALE
0 0.1 0.2 Miles

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Summerdale Boundary

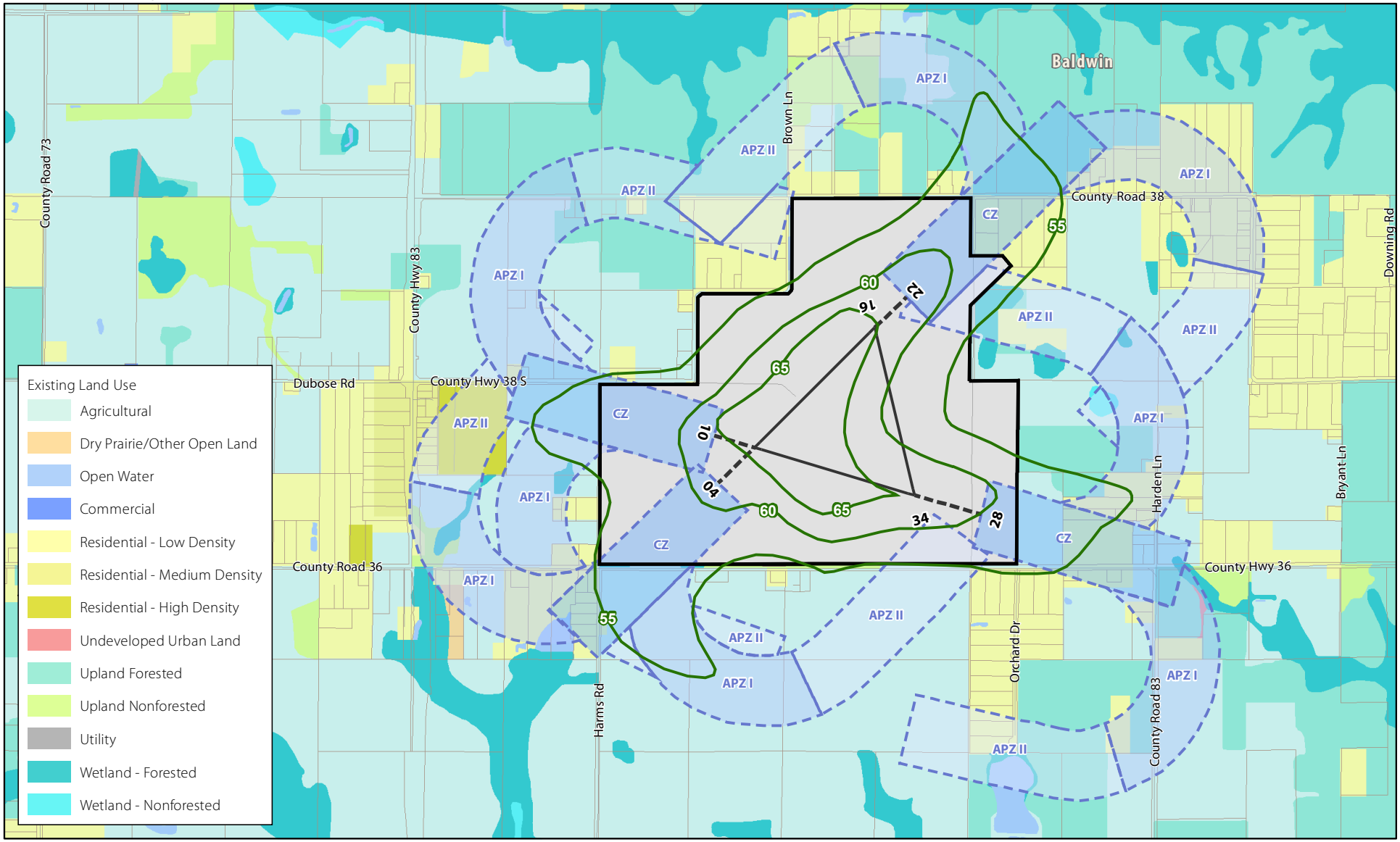
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.5-7
2015 AICUZ Footprint, NOLF Summerdale
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Summerdale\2016_Dec\7_5-8_2015_Composite_AICUZ_Footprint_LU_NOLF_Summerdale.mxd



N

SCALE

0 0.1 0.2 Miles

16 22 CLOSED 70 34 28

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Baldwin County 2010; Ecology and Environment, Inc. 2015.

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- 2015 AICUZ Noise Contours
- Parcel Boundary
- NOLF Summerdale Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.5-8
2015 Composite AICUZ Footprint, Land Use, NOLF Summerdale
Baldwin County, Alabama

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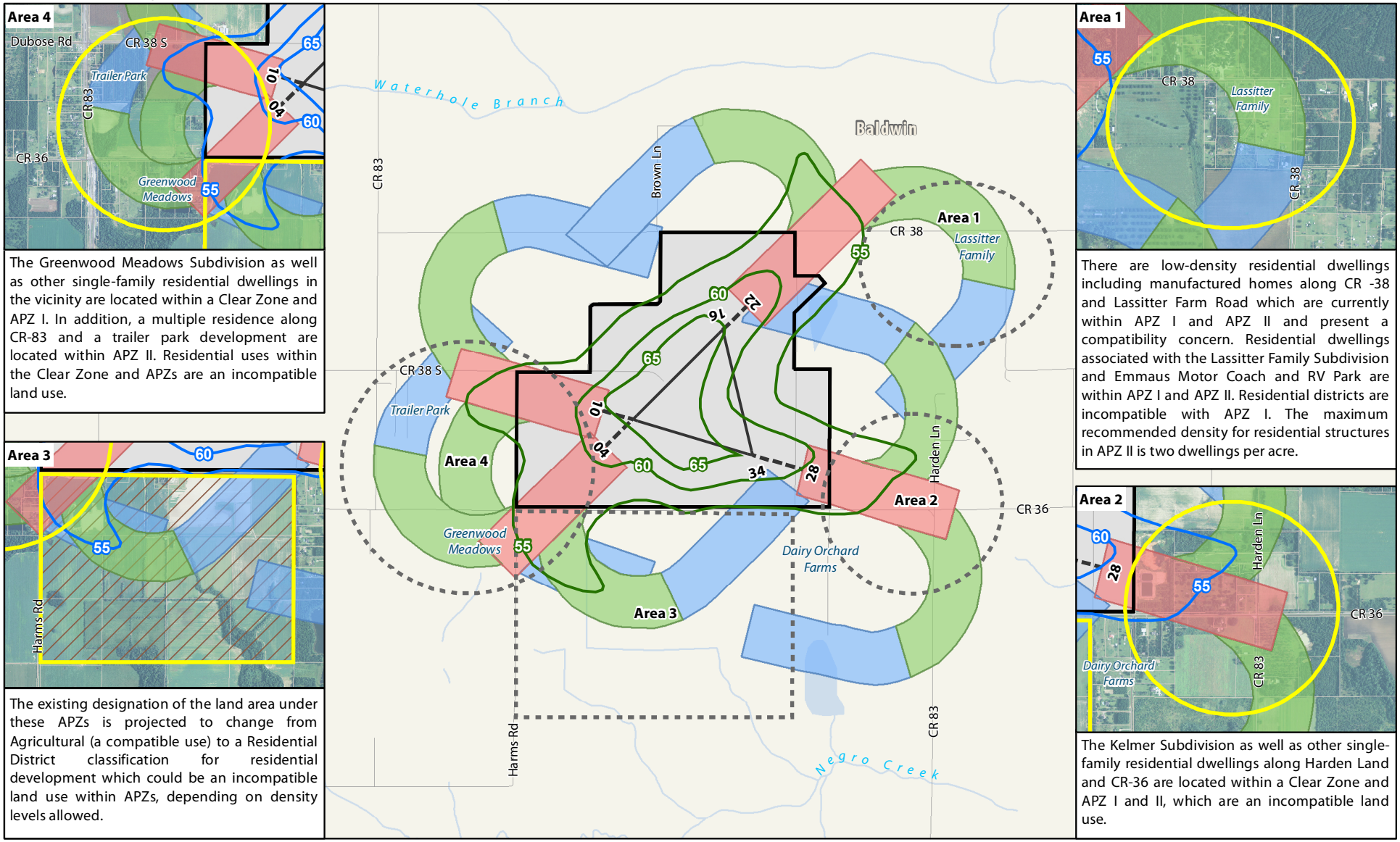

The Greenwood Meadows Subdivision as well as other single-family residential dwellings in the vicinity are located within a Clear Zone and APZ I. In addition, a multiple residence along CR-83 and a trailer park development are located within APZ II. Residential uses within the Clear Zone and APZs are an incompatible land use.

There are low-density residential dwellings including manufactured homes along CR -38 and Lassitter Farm Road which are currently within APZ I and APZ II and present a compatibility concern. Residential dwellings associated with the Lassitter Family Subdivision and Emmaus Motor Coach and RV Park are within APZ I and APZ II. Residential districts are incompatible with APZ I. The maximum recommended density for residential structures in APZ II is two dwellings per acre.

The existing designation of the land area under these APZs is projected to change from Agricultural (a compatible use) to a Residential District classification for residential development which could be an incompatible land use within APZs, depending on density levels allowed.

The Kelmer Subdivision as well as other single-family residential dwellings along Harden Land and CR-36 are located within a Clear Zone and APZ I and II, which are an incompatible land use.

SCALE
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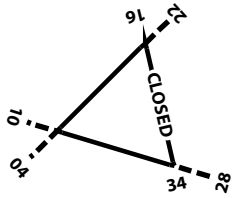

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Local Road
- Runway
- Runway Extensions based on T-6 EA, January 2011
- 2015 AICUZ Noise Contours
- NOLF Summerdale Boundary
- Parcel Boundary
- Potential Land Use Change from Agricultural to Residential District

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.5-9
Compatibility Concerns - 2015 Composite Map, NOLF Summerdale
Baldwin County, Alabama

NOLF BARIN

BALDWIN COUNTY

ALABAMA

7.6 NOLF BARIN COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Barin. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Barin Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Barin, Baldwin County, Alabama	Figure 7.6-1
NOISE CONTOURS	
2015 Noise Contours, NOLF Barin, Baldwin County, Alabama	Figure 7.6-2
Comparison of 1990 and 2015 Noise Contours, NOLF Barin, Baldwin County, Alabama	Figure 7.6-3
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Barin, Baldwin County, Alabama	Figure 7.6-4
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Barin, Baldwin County, Alabama	Figure 7.6-5
Comparison of 1990 and 2015 AICUZ APZs, NOLF Barin, Baldwin County, Alabama	Figure 7.6-6
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Barin, Baldwin County, Alabama	Figure 7.6-7
LAND USE	
2015 AICUZ Footprint with Existing Land Use, NOLF Barin, Baldwin County, Alabama	Figure 7.6-8
Compatibility Concerns - 2015 Composite Map, NOLF Barin, Baldwin County, Alabama	Figure 7.6-9

AIRFIELD OPERATIONS

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis for projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The number of annual fixed wing operations projected (CY2015) for NOLF Barin is 66,862 (Baldwin Co EA Date) (Table 7.6-1). The baseline flight operations inventory used for comparison in this AICUZ was from the 1990 noise contours and totaled 15,222 operations. The predominant operation conducted is touch-and-go pattern work (62,162). Table 7.2-2 shows the modeled distribution of these annual airfield operations by operation type.

TABLE 7.6-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF BARIN

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	521
Overhead Break Arrival	2,350
PEL Arrival	1,828
Touch-and-Go Pattern	62,163
TOTAL	**66,862**
1990 AICUZ Total	**15,222**

Source: BRRC 2015; NAS Whiting Field 2010

NOLF Barin is one of four NOLFs located in Baldwin County, Alabama. As previously discussed in Section 2 of this AICUZ Study and in the *Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January 2011*, NOLF Barin has two runways, both of which were extended from 4,000 feet to 5,000 feet to accommodate T-6 solo operations. AICUZ studies present prospective operations so as to be used as a planning tool for the installation and surrounding communities. As such, this AICUZ Study projects aircraft operations out to CY2015. Therefore all components of the proposed action identified in the *Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January 2011* were incorporated

into this AICUZ Study as the prospective operations. The proposed action as it relates to NOLF Barin and adopted by this AICUZ includes:

- ☐ Both runways (09/27 and 15/33) were extended to 5,000 feet to accommodate T-6 solo operations;
- ☐ Existing runway lighting would be expanded to include the additional runway lengths;
- ☐ Civilian structures, including residences, located within the runway extensions and clear zones would be removed, and roads would be relocated outside the clear zones;
- ☐ Doc McDuffie Road, located west of NOLF Barin, would be relocated;
- ☐ 1.2 acres of private property would be purchased for the road ROW; and
- ☐ Approximately 40 acres of private land would be acquired for runway extensions and clear zones.

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. Flight tracks provide safety, consistency, and control of an airfield. Flight tracks are graphically represented as single lines, but how closely an aircraft flies to the specified track can vary due to aircraft performance, pilot technique, and weather conditions, such that the actual flight track could be considered a band or corridor varying from a few hundred feet to several miles wide. Operations are tracked according to flight track/runway utilization at each airfield to determine APZs.

Used exclusively for fixed-wing operations, NOLF Barin can accommodate T-6 operations. The T-6 aircraft requires runways that are a minimum of 4,000 feet long to accommodate dual operations (student and instructor pilots) and a minimum of 5,000 feet to accommodate solo operations (student pilot). Runways 09/27 and 15/33 were extended to 5,000 feet and are

150 feet wide (Figure 7.6-1). The runways are classified as Class A runways and primarily used for T-6 solo operations. As a NOLF, no aircraft are stationed at NOLF Barin or are parked overnight.

2015 NOISE CONTOURS

This section illustrates the 2015 AICUZ noise contours for NOLF Barin (Figure 7.6-2) and provides a detailed description of the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 noise contours (as presented in the *Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January 2011*) (Figure 7.6-3). The comparison helps identify changes to noise exposure based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate noise impacts. Land use and recommendations within noise zones for this airfield are provided and discussed later on in this section.

The 2015 AICUZ noise contours are similar in size and location when compared to the 1990 AICUZ noise contours (Figure 7.6-3). The 2015 AICUZ noise contours show the 50 dB DNL extending slightly further off station when compared to the 1990 AICUZ noise contours. The 60 to 70 dB DNL contours remain completely within the station boundary.

The slight changes between the 1990 and 2015 noise contours are attributed to:

- ☐ Extended runways (to accommodate T-6 student solo operations);
- ☐ Changes in aircraft (1990 noise contours modeled T-34 aircraft operations, and 2015 contours only modeled T-6 operations);
- ☐ Changes in flight patterns (the T-6 is flown in the same general manner as the T-34C, except longer runways are required to accommodate T-6 training requirements);
- ☐ Changes in operational levels (the number of operations has increased from the 1990 to the 2015 AICUZ studies); and

☐ Improved noise mapping techniques (discussed in Section 4.5).

As noted in Table 7.6-2, the off-station noise impact has decreased by about 12 acres from the 1990 to the 2015 noise contours.

TABLE 7.6-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF BARIN

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF-STATION (ACRES)	TOTAL (ACRES)	OFF-STATION (ACRES)
50-55 dB DNL	70	0	0	0
55-60 dB DNL	696	211	527	199
60-65 dB DNL	0	0	189	0.9
65-70 dB DNL	0	0	110	0
>70 dB DNL	0	0	26	0
TOTAL AREA	**766**	**211**	**852**	**199.9**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.6-4 presents the imaginary surfaces and transition planes for NOLF Barin.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. The following section presents the 2015 APZs for NOLF Barin (Figure 7.6-5) including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 APZs (as presented in the *Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida January 2011*) (Figure 7.6-6). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and allows the targeting of land use recommendations to mitigate incompatible development. Land use and recommendations within the APZs for this airfield are provided and discussed later on in this section.

AICUZ Instruction requires Clear Zones for all runway ends. APZ I and APZ II are required for NOLF Barin because flight operations for both runways at this airfield exceed 5,000 operations annually. Table 7.6-3 provides the acreages that fall within the Clear Zones and APZs for NOLF Barin. Approximately 886 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is residential and agricultural. A comparison of the 1990 and 2015 AICUZ Clear Zones and APZs shows a significant change in coverage, primarily associated with runway extensions, changes in flight tracks and patterns, and an increase in annual operations. These changes have resulted in multiple APZ I and APZ II areas for each end of all runways (Figure 7.6-6). Overall, the total off-station area impacted has increased by approximately 463 acres from 1990 AICUZ calculations.

TABLE 7.6-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF BARIN

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	119	0	0	0	133	0	252
	Off-Station	151	0	88	0	184	0	423
	TOTALS	270	0	88	0	317	0	675
		270		88		317		
2015 AICUZ	On-Station	235.93	0	3.13	0	56.34	0	295.4
	Off-Station	45.41	0	516.68	0	324.22	0	886.31
	TOTALS	281.34	0	519.81	0	380.56	0	1,181.71
		281.34		519.81		380.56		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to: U.S. Waterbodies (USGS 2012)

Baldwin County Residential Densities

Low Density: 1 du per 30,000 to 80,000 sq. ft. (0.68 to 1.83 acres)

Med Density: 1 du per 7,500 to 15,000 sq. ft. (0.17 to 0.34 acres)

High Density: 4 to 6 du per acre.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Barin. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Barin, presented on Figure 7.6-7, was used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility for this AICUZ Study were previously presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include developed land, agricultural areas, open water, and forested areas. Patterns of land use arise naturally in communities through customs and practices, and regulations and designations from local government. Land use surrounding NOLF Barin features low to medium-intensity development, a mix of residential, commercial, agricultural lands, forested lands, and disturbed land. Figure 7.6-8 illustrates land uses surrounding NOLF Barin. A majority of the developed area around NOLF Barin, includes low to med-density residential with scattered commercial uses, which are mainly located to the north and south/southwest of the airfield. The residential uses range from low-density single-family dwellings on large parcels (greater than 1.0 acre) to med/high-density in the form of manufactured home parks. There are limited industrial uses surrounding NOLF Barin located to the northwest. The undeveloped lands that surround the NOLF are mostly agricultural lands and wetlands to the east and west. Overall, the land use around NOLF reveals a pattern of low to medium density development, as there is still a reasonable amount of undeveloped property. From a land use compatibility standpoint, some of the residential uses surrounding NOLF Barin are incompatible in certain Clear Zones and APZs. An evaluation of specific land uses compatibility is discussed later in this section.

EXISTING ZONING

Zoning is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. The majority of the land areas adjacent to the airfield do not have designated zoning data associated with them and therefore, cannot be presented for analysis. However, based on other information such as aerial photos, county online mapping systems, and individual parcel data, it appears that the practiced zoning in those undesignated areas is consistent with Single Family Residential and Agricultural zones. Overall, existing zoning around NOLF Barin, within the City of Foley and Planning District 22, indicates that there is a potential for growth around the NOLF which could result in compatibility concerns.

FUTURE LAND USE

Maximum Densities for Each Land Use District Classification

Neighborhood: 4 du per acre.

Rural: 1 du per acre.

Conservation: 1 du per acre.

Special: site-specific policies

Baldwin County's 2013 Master Plan, outlines future land use within the county. In general, master plans are tools used by local governments to guide future development of land in a planned and effective manner. The future land use patterns around NOLF Barin includes only three classifications; Neighborhood District, Conservation District, and Special District. The areas to the north and south of the airfield, which is where the majority of the development around NOLF Barin is located, is projected as a Special development district. Per the County's Master Plan, the Special District is a defined area that has site-specific policies adopted to establish and govern the density, intensity, and types of uses allowed on that property. Per the county, this area is classified a Special District because it can have a variety of uses and have the potential to be large developments with a regional impact. This designation does not restrict any type of land-use at this time, but does allow the County to approve or reject a development plan in this area on case-by-case bases. Development around the NOLF is expected to follow current development trends of residential and commercial, however, more lands are expected to be expanded as conservation lands. In the three future land use categories, a mix of residential, commercial, recreation, and light industrial are allowable at various densities. The future land uses within these future districts are potentially incompatible in certain Clear Zones and APZs. An evaluation of specific land uses compatibility concerns for NOLF Barin are presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Barin's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Barin, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Baldwin County parcel data and land use classification information. The evaluation was done on a case by case basis and at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 (see Chapter 6) provides a generalized breakdown of land use compatibility and provides the Navy's land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

The 2015 AICUZ noise contours for NOLF Barin that extend off the installation are exclusively 55 to 60 dB DNL, which do not pose a compatibility concern with any type of land use. However, there are incompatible land uses and existing compatibility

concerns within Clear Zones and APZs for NOLF Barin. As illustrated in Figure 7.5-9, Clear Zones and APZs impact areas off the installation in all directions. Areas impacted are mainly a mix of low to med-high residential areas.

- Area 1: Located north and northwest of the airfield, portions of the Oak Meadows and Fernwood Heights Subdivisions are located within APZ I and II and are currently classified as medium-density residential. These dwellings include both traditional "stick-built" homes and manufactured mobile homes up to 3 dwellings per acre in density. Residential districts are incompatible with APZ I and densities exceeding 1-2 dwellings per acre are incompatible within APZ II. In addition, a large portion of the Southern Oaks Trailer Park lies underneath APZ II. This residential area is classified as high-density with 4 to 6 dwellings per acre and does not meet the AICUZ criteria for compatibility. It is important to note that the northern Clear Zone overlays land classified as medium-density residential; however, it does not appear to be any structures on the land and according to the Baldwin County property data, the majority of the land is owned by the Navy. Additionally, any compatibility issues that exist within this Clear Zone have been addressed in the 2011 Runway Extension EA.

- Area 2: The Clear Zone to the west of the airfield encompasses a minimal area of land that is classified as low-density residential near the corner of Family Circle Lane and Doc McDuffie Road. According to the Baldwin County property data, the Navy has purchased the majority of the land underneath this Clear Zone. However, it is acknowledged that current compatibility issues may exist within this Clear Zone but the analysis and mitigation (acquiring of land) for these issues have been conducted in the 2011 Runway Extension EA. However, it should be noted that aerial photographs do not appear to identify any structures on the land.

- Area 3: Located southwest of the airfield, a small portion of the Wolf Creek Subdivision is located within APZ I and II and are currently classified as medium-density residential. However, it is important to note that the segment of the parcels within the APZ are near the edge of a "Wetland" classification and do not appear to have structures in those areas. However, they are still an area of concern due to their medium-density residential classification and potential for development. Directly south of the airfield, a fraction of APZ II is a situated over a high-density residential trailer park with

densities of 4 to 6 dwellings per acre. The AICUZ instruction states residential districts are incompatible with APZ I; and that residential densities exceeding 1-2 dwellings per acre are not compatible in APZ II.

- ☐ Area 4: Low and Medium-density residential (less than 1-2 dwellings per acre and up to 3 dwellings per acre) areas east of the airfield along Coleman Lane and Patterson Lane are currently in a Clear Zone and APZs that present a compatibility concern. These dwellings include both traditional "stick-built" homes and manufactured mobile homes. The AICUZ instruction views any structures in a Clear Zone as an incompatible use. Based on the existing land use data from Baldwin County, the parcels along Patterson Lane including the Mary E. Dunn Subdivision, under APZ I and APZ II, are mostly medium-density residential uses which has an indicated density of up to 3 dwellings per acre. Residential districts are incompatible with APZ I; however, single-family residential areas are compatible with restrictions within APZ II (see Table 6-1). The maximum density for residential structures in APZ II is 1-2 dwellings per acre. Therefore, the medium-density residential uses in Area 4 above the maximum density for APZ II are incompatible.

- ☐ Area 5: The Clear Zone to the southeast of the airfield encompasses a minimal area of land that is classified as low-density residential. Any structure in a Clear Zone is incompatible; however, there does not appear to be any structures on the land and according to the Baldwin County property data, the majority of the land is owned by the Navy. However, it is acknowledged that current compatibility issues may exist within this Clear Zone but the analysis and mitigation (acquiring of land) for these issues have been conducted in the 2011 Environmental Assessment for Providing T-6 JPATS Solo Capability at NOLFs NAS Whiting Field (referred to as 2011 Runway Extension EA). In addition, portions of the Joe Ferry Subdivision (single-family dwellings) are within APZ I. This subdivision is classified as low-density residential and is incompatible with the Navy's land-use compatibility recommendations for APZ I (Table 6-1). In addition, a church is located within this APZ. Churches are considered public assembly locations and are people-intensive land uses, which are deemed incompatible and strongly discouraged in APZ I. In addition, portions of the Eastwood and Twin Bridges Estates Subdivisions lie underneath APZ II and are classified as medium-density residential which has an indicated density of up to 3 dwellings per acre. These medium-density residential areas are incompatible within APZ II since they are potentially over the maximum density of 1-2 dwellings per acre outlined in the AICUZ instructions.

LAND USE RECOMMENDATIONS

The neighborhoods and land uses identified in this section are and continue to be compatibility concerns in the area around NOLF Barin. The Navy and Baldwin County should continue to place high priority on these areas as encroachment concerns in the future. This following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Barin. Equally important but broader land use planning tools and recommendations are presented in Section 8 of this report as well.

FUTURE LAND USE DECISIONS

When Baldwin County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land-use compatibility recommendations for Clear Zone and APZs. The future land use for the land immediately adjacent to the airfield is projected as a Special development district. But it is important to note that this Special development classification does not extend out and encompass the lands under the Clear Zones and APZs. This planned Special District does not restrict the type of land use and/or development either. Baldwin County Planning and Zoning Commission and NAS Whiting Field should work together to establish a broader special planning area (such as "military influence areas" or "airport overlay zones/districts") with development restrictions for areas in and outside the established APZ at NOLF Barin that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. As a beginning point, the local government should use the flight tracks presented in Section 3 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

UPDATE LAND USE PLANS AND MAPS

Baldwin County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs and Clear Zones for NOLF Barin and OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with Baldwin County to update their land use maps to indicate the new boundary for NOLF Barin and include a "Military Land Use" Classification for the parcels owned by the Navy. These updates will further aid county officials, planners and private citizens in their decisions and policies regarding future land use development surrounding NOLF Barin.

MONITOR AREAS OF POTENTIAL CONCERN

There are numerous residential dwellings located underneath APZ II at NOLF Barin, but the current densities are well below the maximum density of 1-2 dwellings per acre recommended by the Navy's guidance. In addition, there are open lands underneath both APZ I and II that are currently classified as Residential that have the potential to be developed in the future. These areas should be continuously monitored for changes to the development density. These areas will become incompatible per the AICUZ criteria, if residential development is allowed and/or continues at a higher density level.

PUBLIC LAND ACQUISITION

The Navy should continue its efforts in purchasing and acquiring public lands as it becomes available around NOLF Barin to protect key land assets by limiting impacts from development of that land that is considered incompatible with air station activities. Priority should continue to be placed on the lands within the Clear Zones.

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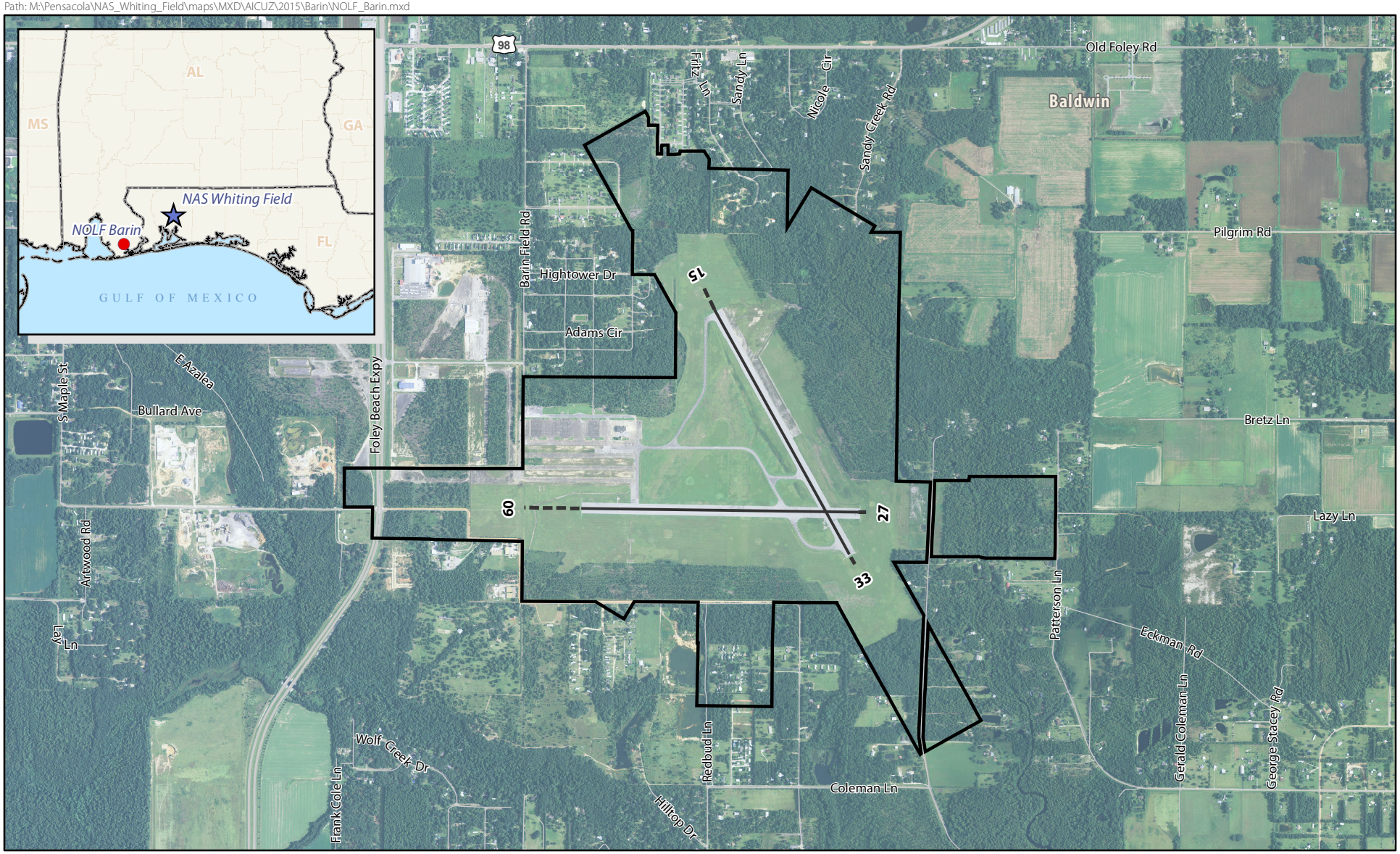
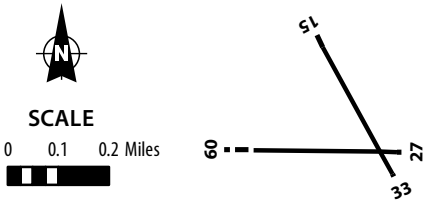




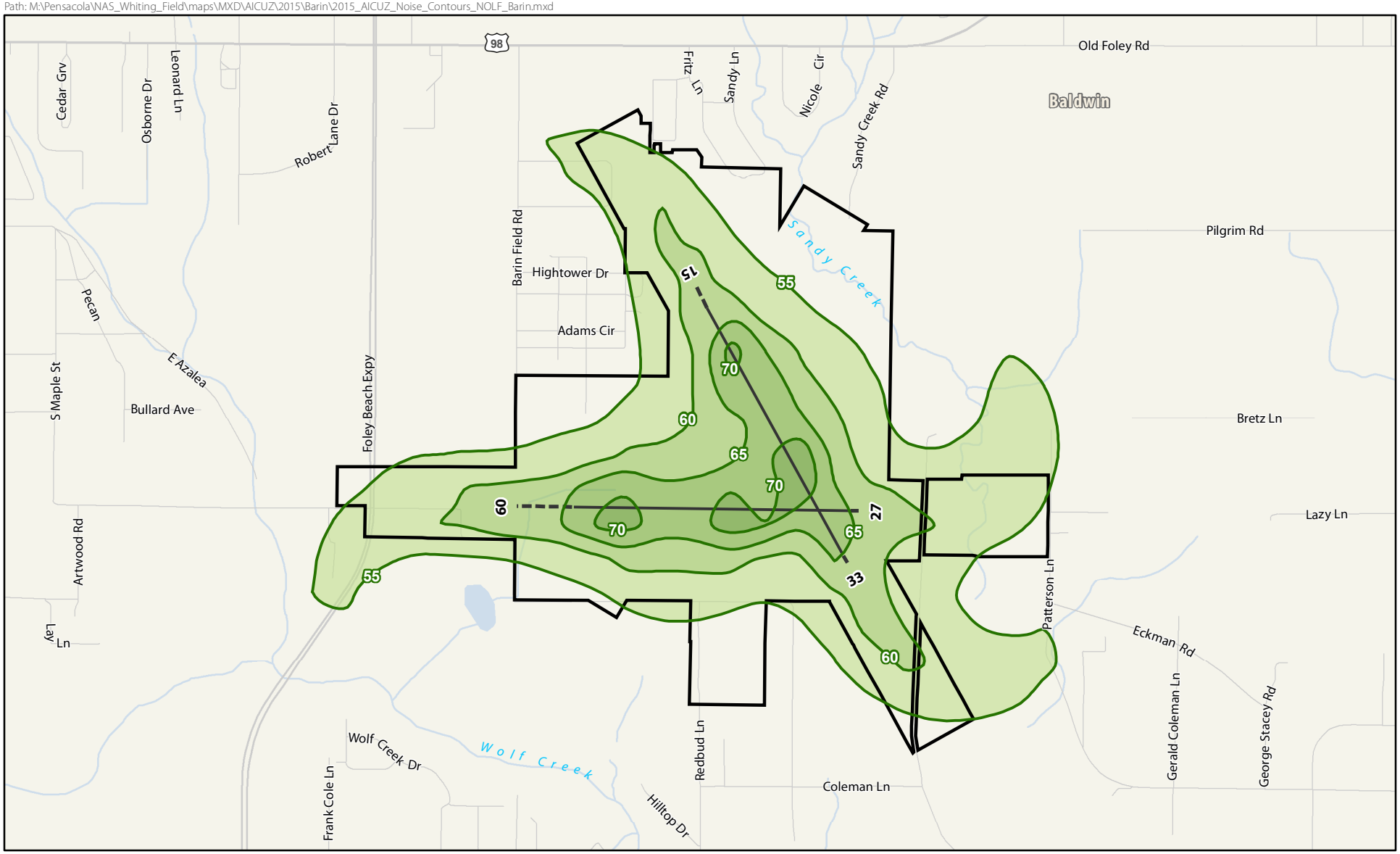
Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary

Figure 7.6-1
NOLF Barin
Baldwin County, Alabama

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\2015_AICUZ_Noise_Contours_NOLF_Barin.mxd



N

SCALE

0 0.1 0.2 Miles

15
60
27
33

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary

dB DNL Value

- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL

Figure 7.6-2
2015 AICUZ Noise Contours, NOLF Barin
Baldwin County, Alabama

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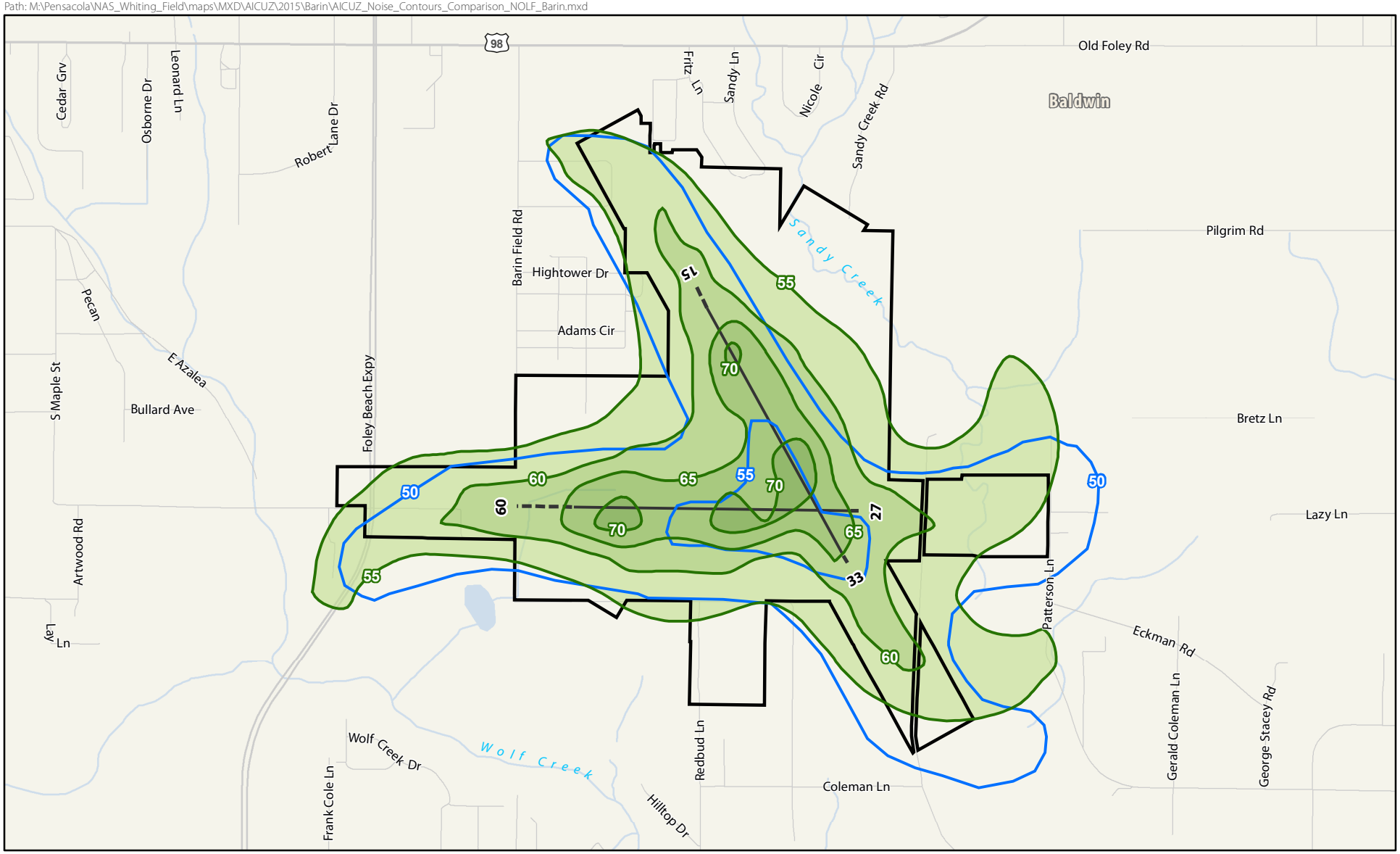

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SCALE

0 0.1 0.2 Miles

15
60
27
33

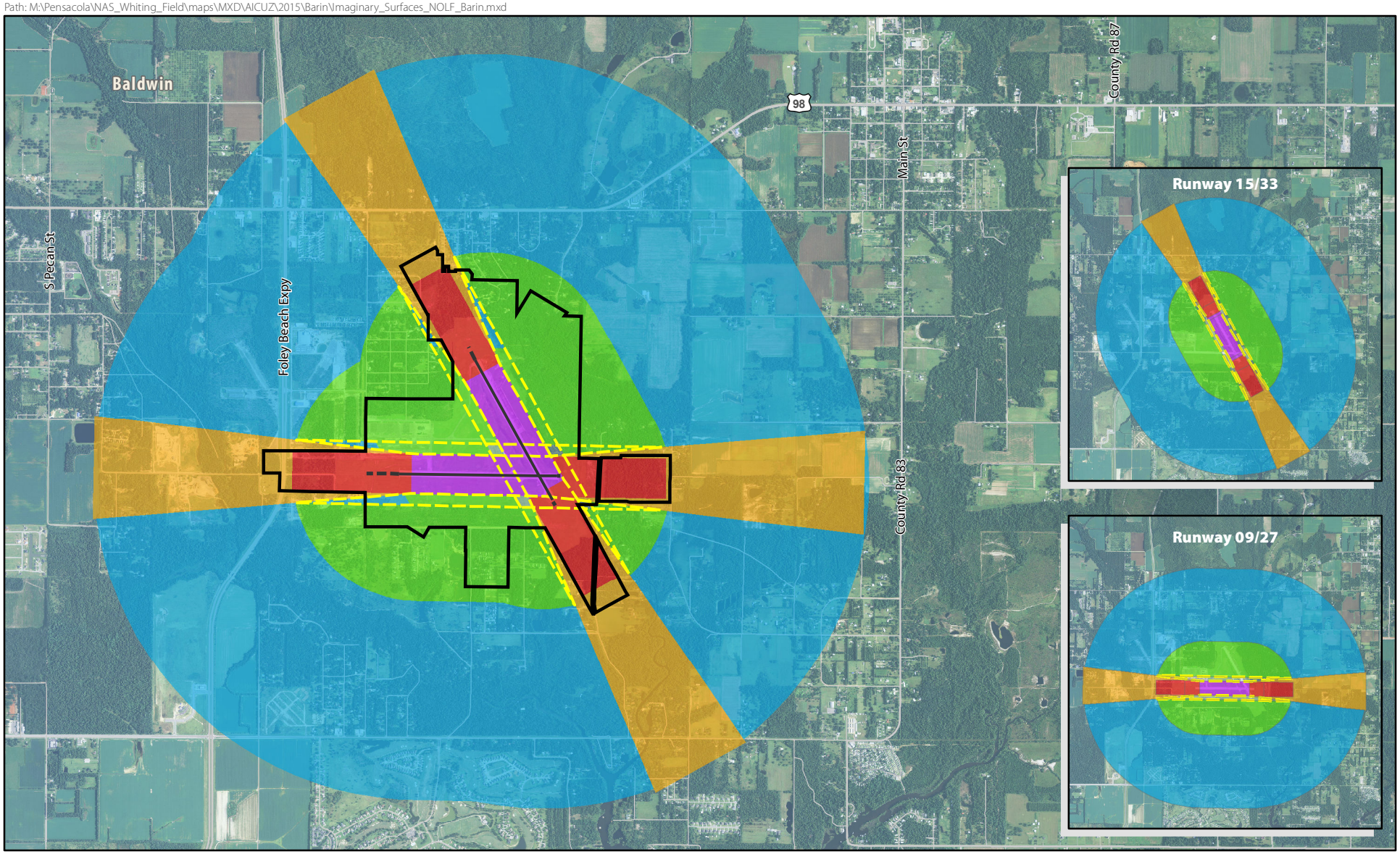
SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary
- 1990 AICUZ Noise Contours
- 2015 AICUZ Noise Contours
  - 55 dB DNL
  - 60 dB DNL
  - 65 dB DNL
  - 70 dB DNL

Figure 7.6-3
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Barin
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\Imaginary_Surfaces_NOLF_Barin.mxd



SCALE
0 0.2 0.4 Miles

15
60
27
33

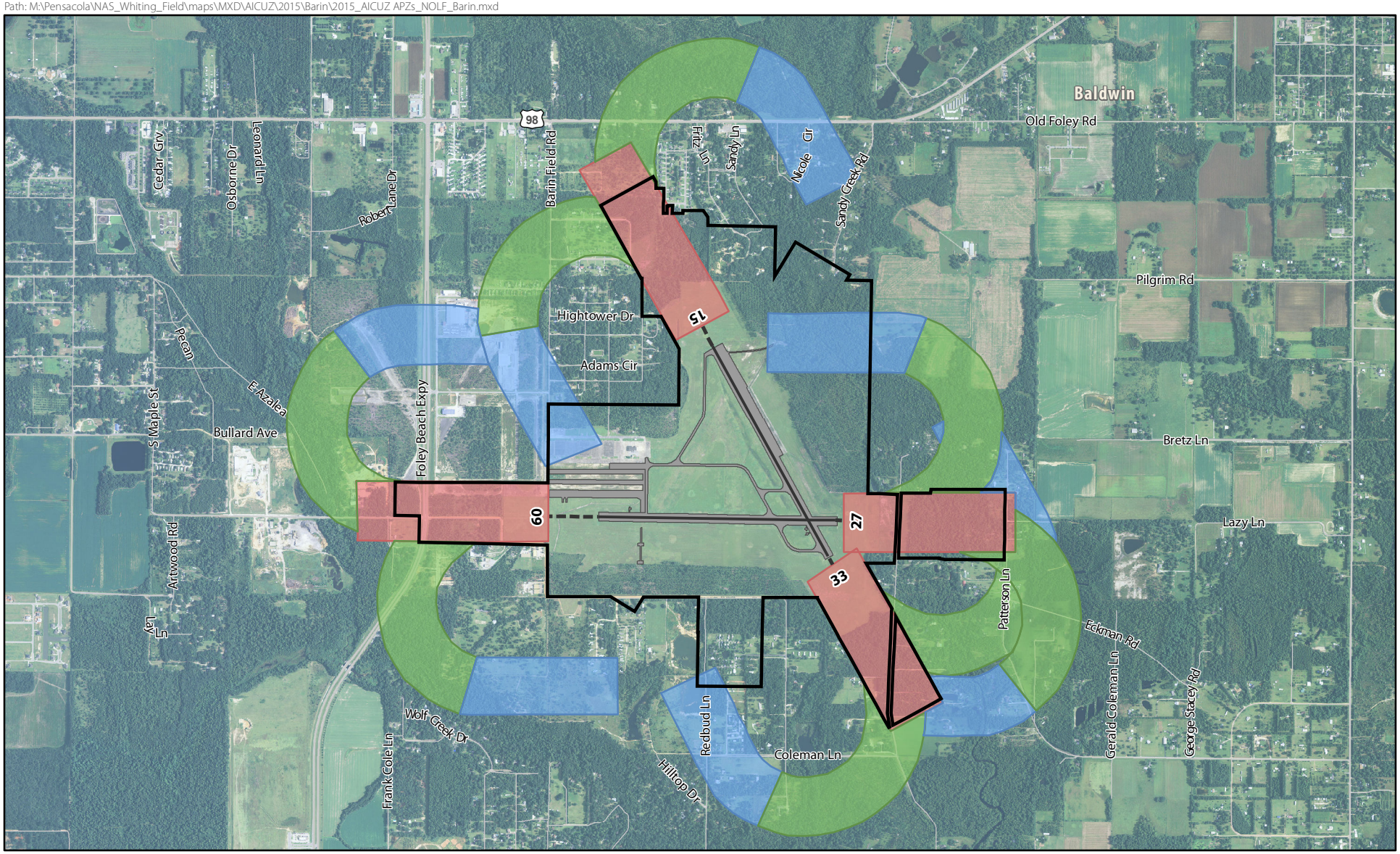
Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- H: Transitional Surface

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.6-4
Imaginary Surfaces, NOLF Barin
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\2015_AICUZ APZs_NOLF_Barin.mxd



SCALE
0 0.1 0.2 Miles

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Legend

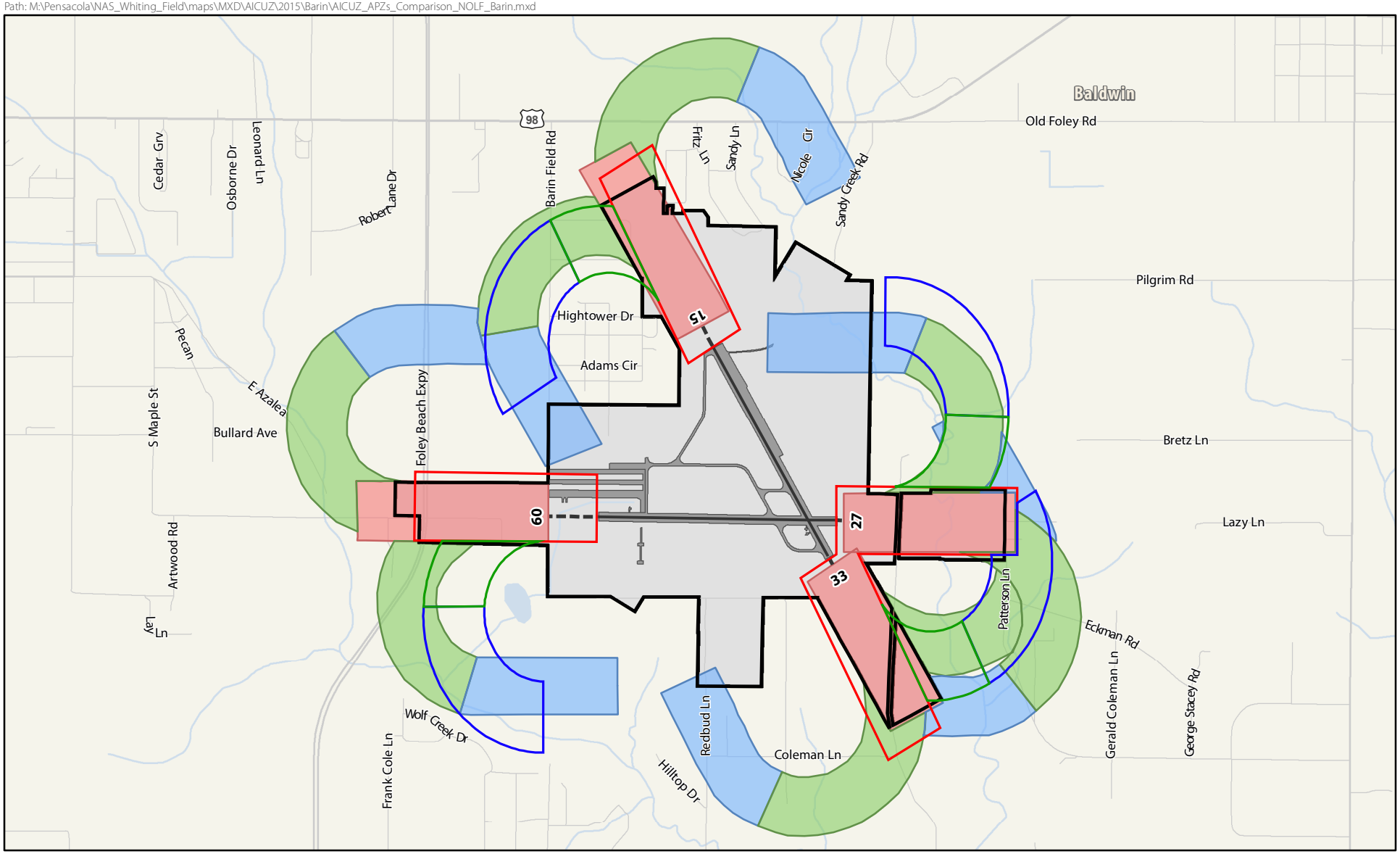
- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.6-5
2015 AICUZ APZs, NOLF Barin
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\AICUZ_APZs_Comparison_NOLF_Barin.mxd



SCALE
0 0.1 0.2 Miles

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

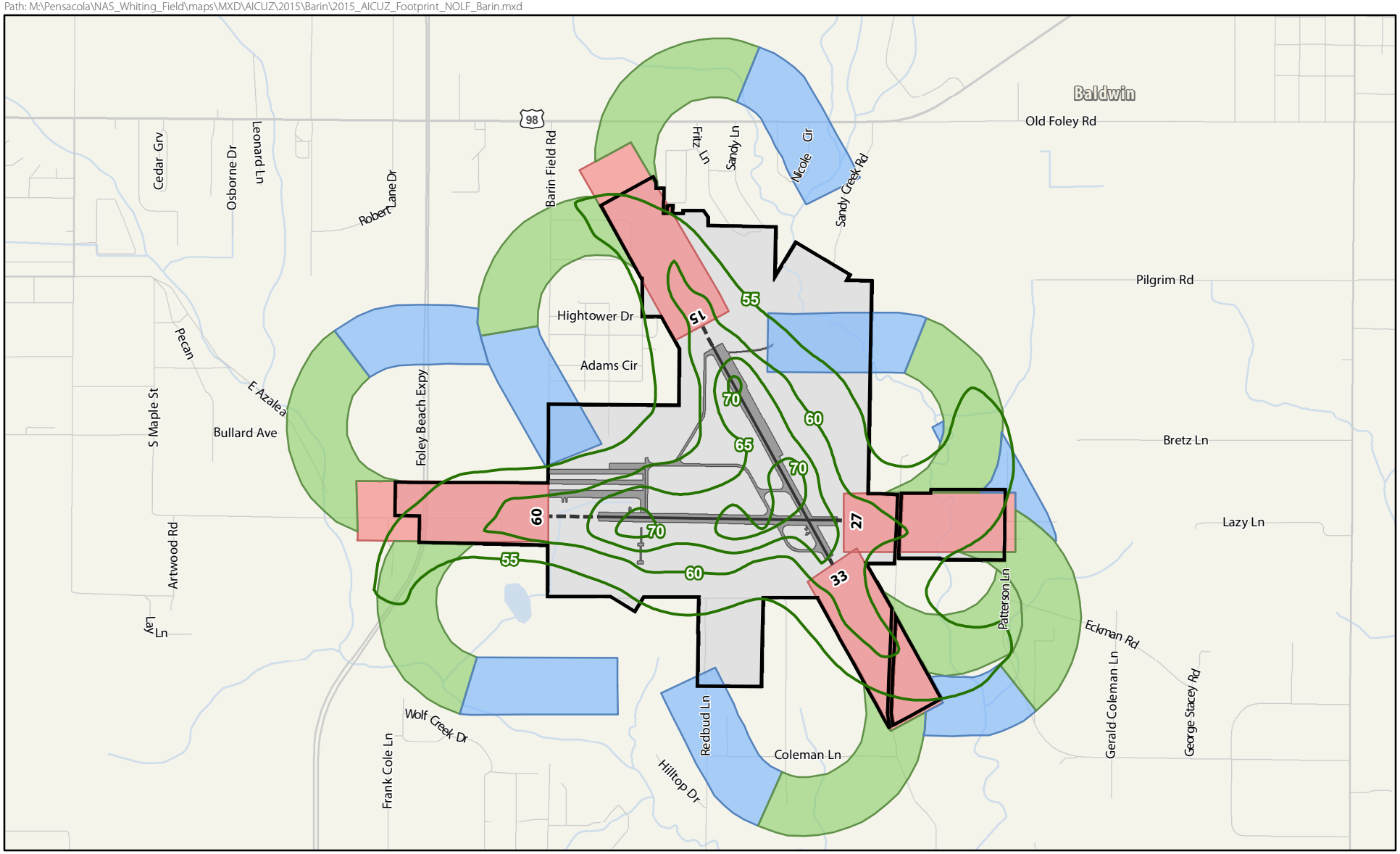
- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- NOLF Barin Boundary
- Airfield

Accident Potential Zone (2015)
- Clear Zone
- APZ I
- APZ II

Accident Potential Zone (1990)
- Clear Zone
- APZ I
- APZ II

Figure 7.6-6
Comparison of 1990 and 2015 AICUZ APZs, NOLF Barin
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\2015_AICUZ_Footprint_NOLF_Barin.mxd



SCALE
0 0.1 0.2 Miles

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Barin Boundary

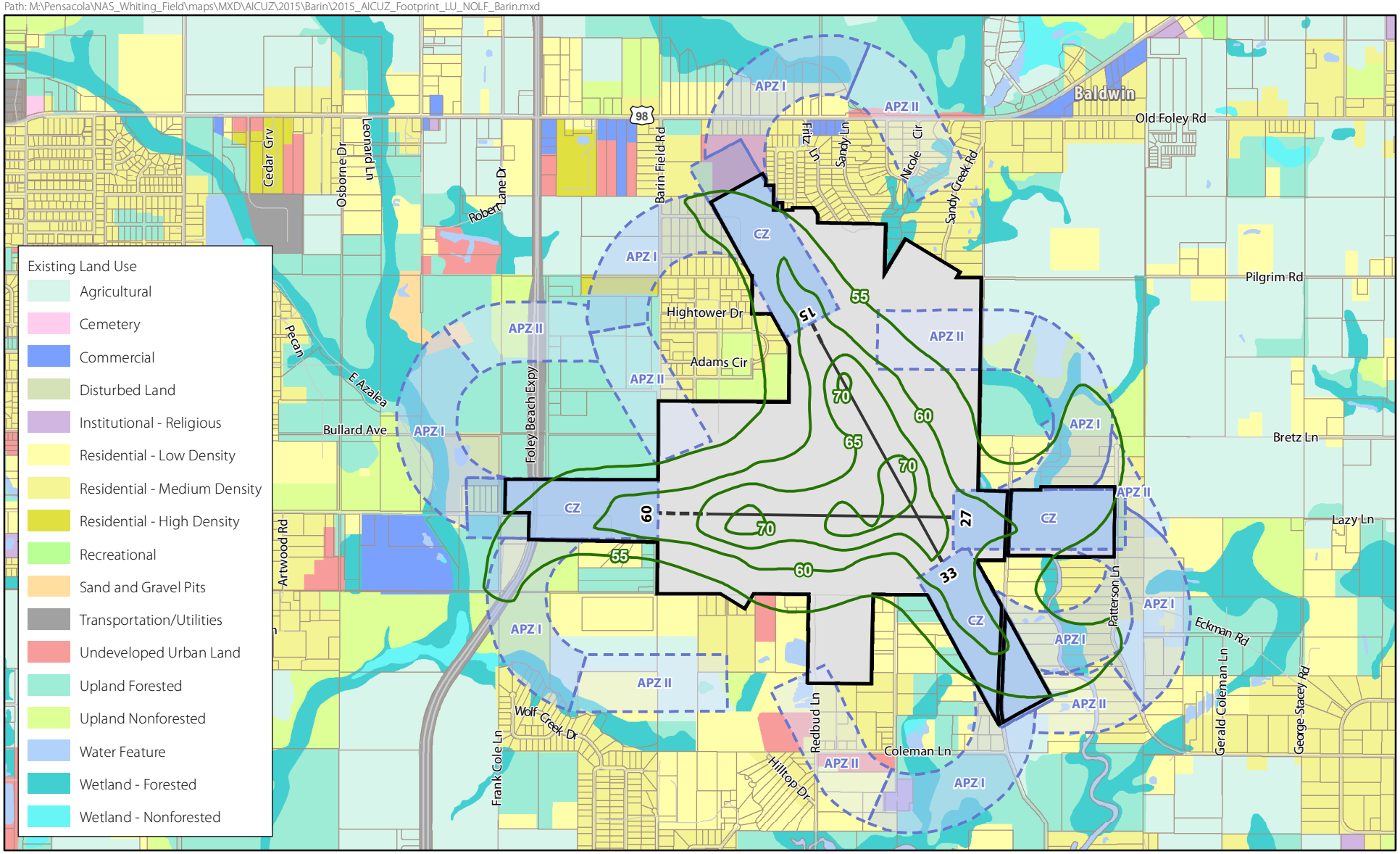
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.6-7
2015 AICUZ Footprint, NOLF Barin
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\2015_AICUZ_Footprint_LU_NOLF_Barin.mxd



SCALE
0 0.1 0.2 Miles

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- 2015 AICUZ Noise Contours
- NOLF Barin Boundary

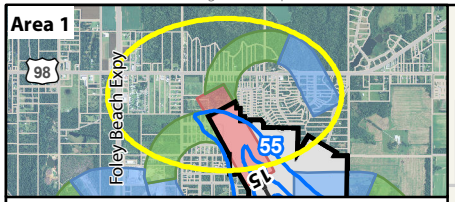
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

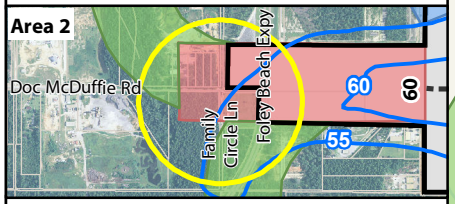
SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Baldwin County 2010; Ecology and Environment, Inc. 2015.

Figure 7.6-8
2015 AICUZ Footprint, with Existing Land Use, NOLF Barin
Baldwin County, Alabama

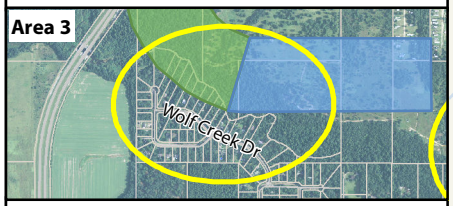
Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Barin\Compatibility_Concerns_NOLF_Barin.mxd



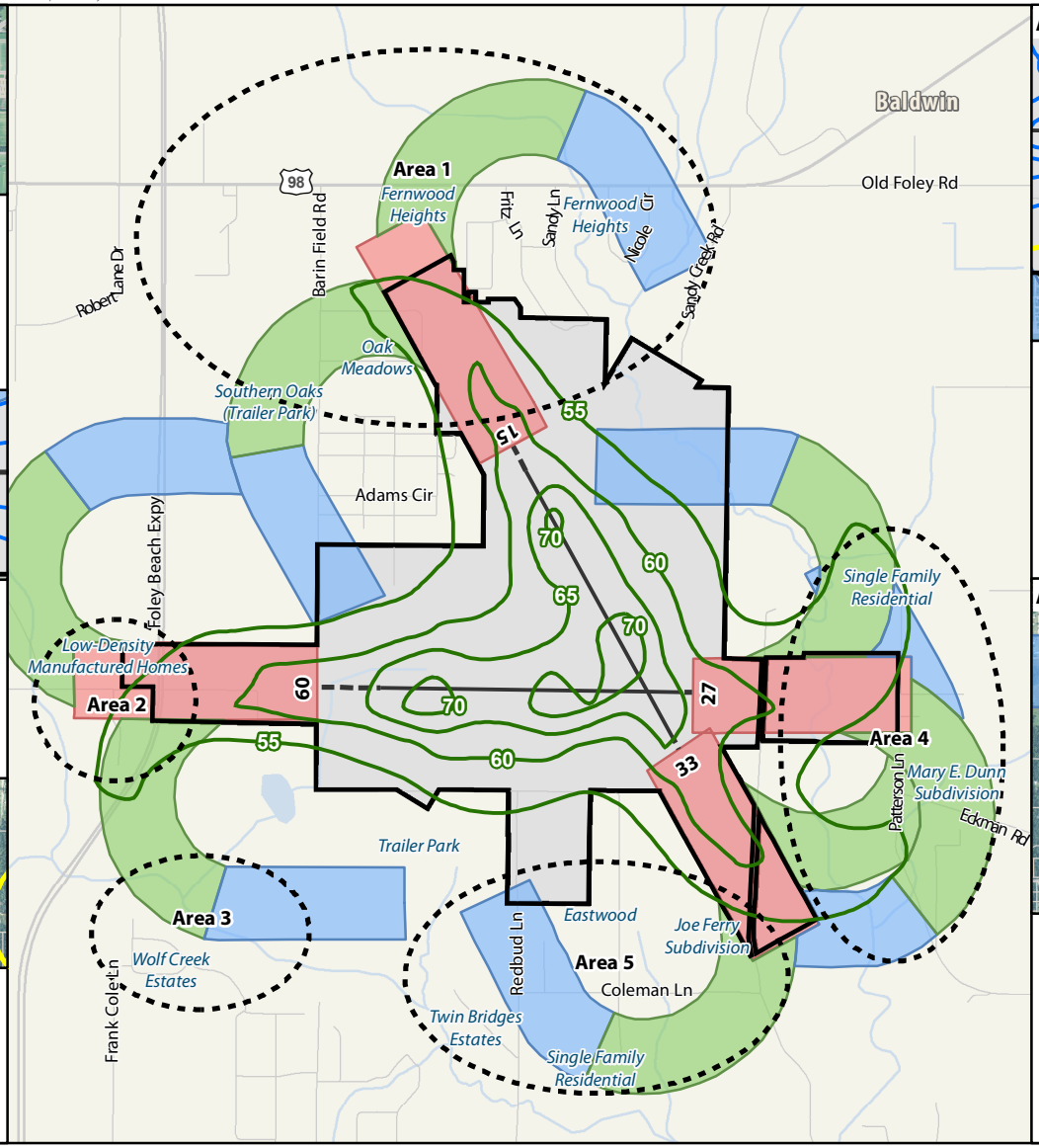
Portions of the Oak Meadows and the Fernwood Heights Subdivisions are located within a Clear Zone and APZ's. In addition, a med - high-density residential trailer park, Southern Oaks, development is located within APZ I. Residential uses within the Clear Zone and APZs are an incompatible land use.

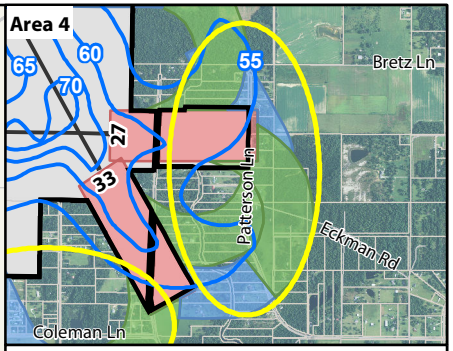


There are low-density residential dwellings including manufactured homes located near the corner of Family Circle Lane and Doc McDuffie Road that are within a Clear Zone and APZ. Clear Zones are intended to be clear of all structures. Residential uses within the Clear Zone and APZs are an incompatible land use.

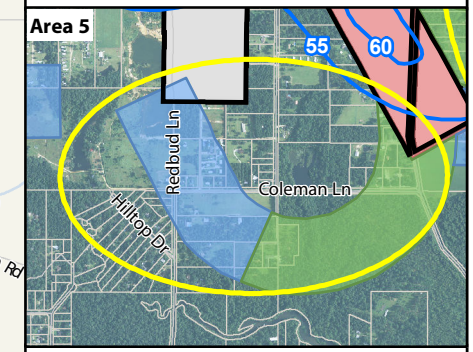


6-9 parcels located in the northern portion of the Wolf Creek Estates Subdivision are located within APZ I and II. In addition, a portion of a high-density residential trailer park is located within APZ II. Residential uses within APZs are an incompatible land use.





Single-family residences including manufactured homes located along the west and east sides of Patterson Lane are located within a Clear Zone and APZ's. In addition, the Mary E. Dunn Subdivision is located within APZ I. Clear Zones are intended to be clear of all structures. Residential uses within the Clear Zone and APZ's are an incompatible land use.



Portions of the Twin Bridge Estates, Eastwood Subdivision, and the Joe Ferry Subdivision are located within APZ I and APZ II. There are other single-family residential units including manufactured homes not specifically associated with a subdivision within these APZ's as well. Residential uses within APZ's are an incompatible land use.

N

SCALE

0 0.1 0.2 Miles

15 60 27 33

Legend

- Major Highway
- Other Major Road
- Local Road
- Runway
- Runway Extension
- 2015 AICUZ Noise Contours
- NOLF Barin Boundary
- Parcel Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.6-9
Compatibility Concerns - 2015 Composite Map, NOLF Barin
Baldwin County, Alabama

NOLF WOLF

BALDWIN COUNTY

ALABAMA

7.7 NOLF WOLF COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Wolf. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Wolf Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Wolf, Baldwin County, Alabama	Figure 7.7-1
NOISE CONTOURS	
2015 AICUZ Noise Contours, NOLF Wolf, Baldwin County, Alabama	Figure 7.7-2
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Wolf, Baldwin County, Alabama	Figure 7.7-3
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Wolf, Baldwin County, Alabama	Figure 7.7-4
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Wolf, Baldwin County, Alabama	Figure 7.7-5
LAND USE	
2015 AICUZ Footprint with Existing Land Use, Baldwin County, Alabama	Figure 7.7-6
2015 AICUZ Footprint with Existing Zoning, Baldwin County, Alabama	Figure 7.7-7
Compatibility Concerns – 2015 Composite Map, NOLF Wolf, Baldwin County, Alabama	Figure 7.7-8

AIRFIELD OPERATIONS

NOLF Wolf is a fixed-wing training airfield located in Baldwin County, Alabama (Figure 7.7-1). This airfield, previously used for fixed-wing pilot training, is owned and operated by the Navy and is currently inactive. There are three runways at NOLF Wolf, Runway 04/22, Runway 09/27, and Runway 18/36. Each of these currently inactive runways is 3,000 feet in length. These runways were adequate to accommodate T-34 training operations; however, the runways do not meet the operational requirements for T-6 aircraft.

NOLF Wolf was evaluated in the Final Environmental Assessment for Providing T-6 JPATS Solo Capability at Navy Outlying Landing Fields, Naval Air Station Whiting Field, Florida (Navy 2011). NOLF Wolf was not chosen as a preferred alternative.

For the purposes of this AICUZ Study, NOLF Wolf's 1990 AICUZ noise contours and APZs have been used for evaluating the airfield.

NOISE CONTOURS

This section discusses the 1990 AICUZ noise contours, adopted as the 2015 AICUZ noise contours, for NOLF Wolf (Figure 7.7-2). This section also provides a detailed description of the noise environment surrounding the airfield prior to becoming inactive. Acreages of the land areas included in these noise zones are described in Table 7.7-1. Although this airfield is currently inactive, this information is provided as part of a strategy to preserve potential future operations at NOLF Wolf, pending the Navy's long-term decision about this airfield. Land use recommendations within noise zones for this airfield are provided and discussed later in this section.

TABLE 7.7-1 AREAS WITHIN NOISE CONTOURS (DNL), NOLF WOLF

NOISE CONTOUR	TOTAL LAND AREA 2015 AICUZ NOISE ZONES (ACRES)
50-55 dB DNL	862
55-60 dB DNL	145
60-65 dB DNL	2
65-70 dB DNL	0
>70 dB DNL	0
TOTAL AREA	**1,009**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Figure 7.7-3 presents the imaginary surfaces surrounding NOLF Wolf.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas. This section presents the 1990 AICUZ APZs, adopted as the 2015 AICUZ

APZs, for NOLF Wolf (Figure 7.7-4), including a detailed analysis of the areas impacted. Land use recommendations within the APZs for this airfield are provided and discussed later in this section. Although this airfield is currently inactive, this information is provided as part of a strategy to preserve potential future operations at NOLF Wolf, pending the Navy's long-term decision about this airfield.

AICUZ Instruction requires Clear Zones for all runway ends. Before this airfield became inactive, APZ I and APZ II were required for NOLF Wolf because flight operations for the three runways at this airfield exceeded 5,000 operations annually. Approximately 533 acres of off-station lands are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural.

Table 7.7-2 provides the acreages that fall within the Clear Zones and APZs for NOLF Wolf.

TABLE 7.7-2 LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF WOLF

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
2015 AICUZ	On-Station	215	0	12	0	1	0	228
	Off-Station	157	0	132	0	244	0	533
	TOTALS	372	0	144	0	245	0	761
		372		144		245		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to: U.S. Waterbodies (USGS 2012).

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within aircraft noise zones and APZs by examining existing and planned land uses near NOLF Wolf. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint" (Figure 7.7-5). The land use compatibility criteria used to evaluate compatibility for this AICUZ Study were previously presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Wolf is located in unincorporated areas of Baldwin County, Alabama. Therefore, the land use ordinances covering the off-installation property within the AICUZ footprint are within the County's jurisdiction. Land use patterns and zoning in the immediate vicinity of NOLF Wolf, along with the land use compatibility assessment and analysis conducted, are presented below.

EXISTING LAND USE

Baldwin County Residential Densities

- Low Density: 1 du per 30,000 to 80,000 sq. ft. (0.68 to 1.83 acres)
- Med Density: 1 du per 7,500 to 15,000 sq. ft. (0.17 to 0.34 acres)
- High Density: 4 to 6 du per acre.

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. Land use surrounding NOLF Wolf features very low-intensity development, with limited residential, water/wetlands, and agricultural lands. Figure 7.7-6 illustrates existing land uses surrounding NOLF Wolf. The vast majority of land use surrounding the airfield is agricultural. However, there are a few low-density residential uses in proximity to the airfield. The residential uses are single-family dwellings on large parcels (greater than 1.0 acre), including manufactured homes. The County's agricultural land use classification allows for residential uses. Based on Baldwin County data, there does not appear to be any significant commercial or industrial uses surrounding NOLF Wolf. Overall, land use around NOLF Wolf reveals a pattern of low-density residential development, and there is still a significant amount of undeveloped property surrounding the airfield. Regarding land use compatibility, some of the residential uses surrounding NOLF Wolf are incompatible in certain Clear Zones and APZs. An evaluation of specific land use compatibility is provided later in this section.

EXISTING ZONING

"Zoning" is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Figure 7.7-7 illustrates the existing zoning surrounding NOLF Wolf. In general, much of the land surrounding the airfield remains vacant, with a primary designation of Agricultural and Single-Family Residential zoning. Agricultural zoning allows for low-density residential dwellings. The land areas south of the airfield do not have designated zoning data associated with them and, therefore, cannot be presented for analysis. However, based on other information (e.g., aerial photos, Baldwin County online mapping systems, and individual parcel data), it appears that the practiced zoning in those undesignated areas is consistent with Agricultural. Overall, existing zoning adjacent to NOLF Wolf and the availability of open land indicates that there is the potential for growth around the airfield that could result in compatibility concerns.

FUTURE LAND USE

Baldwin County's Master Plan, adopted in 2013, outlines future land use within the county. In general, this type of long-range planning document is used by local governments to guide future development of land in a planned and effective manner. There are several future land use classifications in the Master Plan, including: Agriculture, Commercial, Conservation, Industrial, Public/Semi-Public, and Residential. The majority of land surrounding NOLF Wolf is denoted as Agricultural in the future land use plan, with some Residential uses as well as Public/Semi-Public areas near the shoreline.

Maximum Densities for Each Land Use District Classification

- Neighborhood: 4 du per acre.
- Rural: 1 du per acre.
- Conservation: 1 du per acre.
- Special: site-specific policies

It should be noted that there is no "AICUZ" or "Military Use Area" type designation with associated land use restrictions, as seen around other airfields, but the County has considered adopting a JLUS and/or establishing a Military Use Area within this district. The majority of the future land use surrounding NOLF Wolf is labeled as a Rural District. This category was designed to protect the essential open character of rural areas until it is time to reclassify the land to appropriate residential, commercial, or industrial categories. Development around NOLF Wolf is expected to increase due to plans for a new highway and bridge that would allow for better access to the area. Commercial real estate developers own the majority of the surrounding land, and this area is projected to be in high demand for expansion of residential and commercial development in the near future (Navy 2011). Future increases in residential development and land use surrounding NOLF Wolf have the

potential to be incompatible in certain Clear Zones and APZs. An evaluation of current land use compatibility concerns for NOLF Wolf is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Wolf's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Wolf, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Baldwin County parcel data and land use classification information. The evaluation was performed on a case-by-case basis and at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 (see Chapter 6) provides the Navy's land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

NOLF Wolf's 2015 AICUZ noise contours that extend off the installation are exclusively 50 to 55 dB DNL, which do not pose a compatibility concern with any type of land use. However, there are incompatible land uses and existing compatibility concerns within Clear Zones and APZs for NOLF Wolf. As illustrated on Figure 7.7-8, Clear Zones and APZs impact areas off the installation in all directions. Areas impacted are mainly agricultural, but one low-density residence is also impacted.

- Area 1: There is a single-family residential dwelling located east of the airfield near the corner of Fish Trap Road and Wolf Field Road that is currently in a Clear Zone and presents a compatibility concern. In addition, based on aerial views, there are two additional structures located on this residential parcel. The AICUZ Instruction views any structure within a Clear Zone as an incompatible use.

- Area 2: Located directly south of the airfield, the land under this area of concern does not have any existing zoning data classifications associated with it. Therefore, proper analysis of potential future incompatible land uses could not be conducted for this area. However, it is noted that this area has the potential for future incompatible land use issues, since the majority of the Clear Zone and both APZ I and APZ II would be impacted by any development on this commercially owned property with proximity to shore resources and planned infrastructure improvements.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF WOLF

The residential land uses identified in this section are a compatibility concern in the area around NOLF Wolf. The Navy and Baldwin County should continue to place a high priority on these encroachment concerns.

The following section presents land use planning tools and recommendations for implementing and achieving a successful AICUZ Program, specific to NOLF Wolf. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.

FUTURE LAND USE DECISIONS

When Baldwin County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones and APZs. The future land use immediately adjacent to the airfield has been projected as a Special Development district. However, it is important to note that this Special Development classification does not extend out and encompass the lands under the Clear Zones and APZs, or restrict the type of land use and/or development in this area. The Baldwin County Planning and Zoning Commission and NAS Whiting Field should consider a long-term strategy to protect this area through the creation of a military influence area or airport overlay zone/district). These zones would present development restrictions for areas in and outside of the established APZs at NOLF Wolf that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future. The local government should use the flight tracks presented in Chapter 3 to preserve the operational integrity of these flight tracks and protect the health and safety of the underlying population.

UPDATE LAND USE PLAN AND MAPS

When Baldwin County produces long-range planning documents, they should include the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Wolf, as well as the land use recommendations provided in OPNAVINST 11010.36C. Furthermore, NAS Whiting Field should work with Baldwin County to update county land use maps to indicate the new boundary for NOLF Wolf and include a "Military Land Use" classification for the parcels owned by the Navy. In addition, Baldwin County should

update county land use and zoning maps to properly identify the future classifications for the land identified in Area 2. These updates will further aid Baldwin County officials, planners, and private citizens in their decisions and policies regarding future land use and development surrounding NOLF Wolf.

MONITOR AREAS OF POTENTIAL CONCERN

There are a few residential dwellings located around NOLF Wolf with densities well below 1-2 dwellings per acre. The areas surrounding the airfield should be continuously monitored for changes to development and density. These areas have the potential to become incompatible, per the AICUZ criteria, if the anticipated residential and commercial growth occurs as a result of infrastructure improvements.

PUBLIC LAND ACQUISITION

In light of the inactive nature of this airfield, there are no current recommendations related to the public acquisition of nearby lands. This topic should be revisited if future mission plans are identified.

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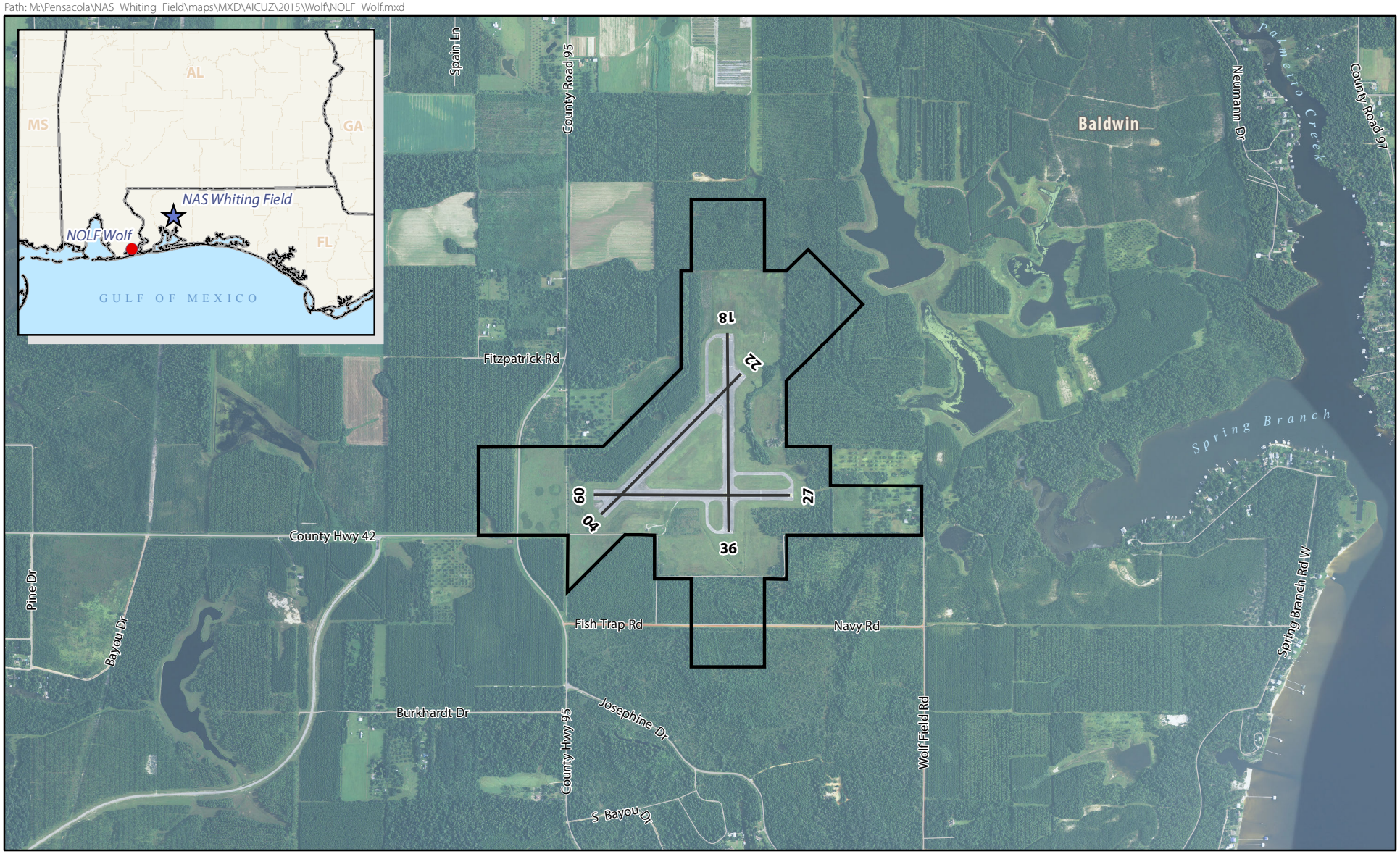


N

SCALE

0 0.2 0.4 Miles

18
22
09
27
04
36

Legend

Local Road

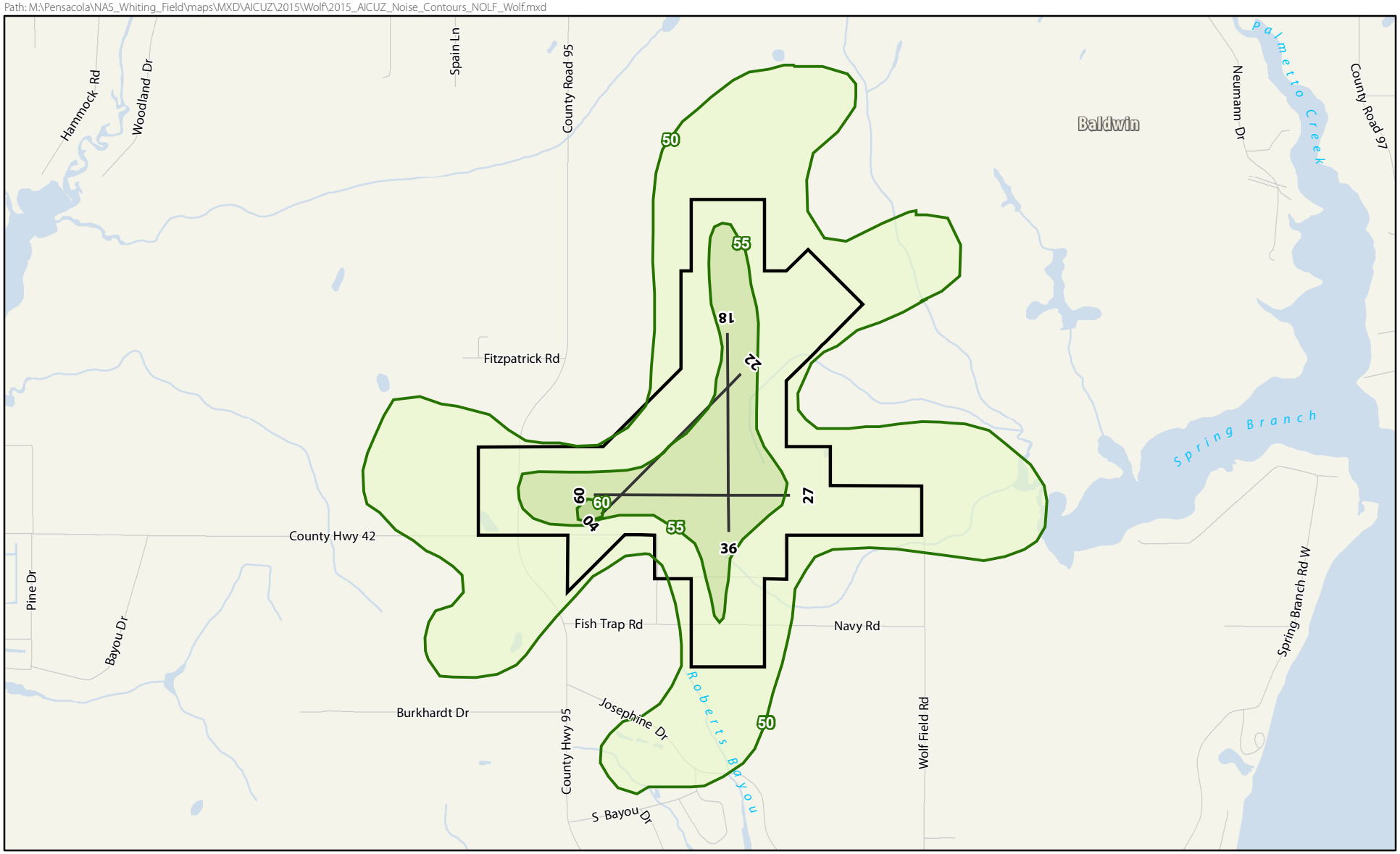
Runway

NOLF Wolf Boundary

Figure 7.7-1
NOLF Wolf
Baldwin County, Alabama

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Wolf\2015_AICUZ_Noise_Contours_NOLF_Wolf.mxd



N

SCALE

0 0.2 0.4 Miles

18 22 27 36 09 04

Legend

Local Road

Runway

NOLF Wolf Boundary

dB DNL Value

50 dB DNL

55 dB DNL

60 dB DNL

Figure 7.7-2
2015 AICUZ Noise Contours, NOLF Wolf
Baldwin County, Alabama

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

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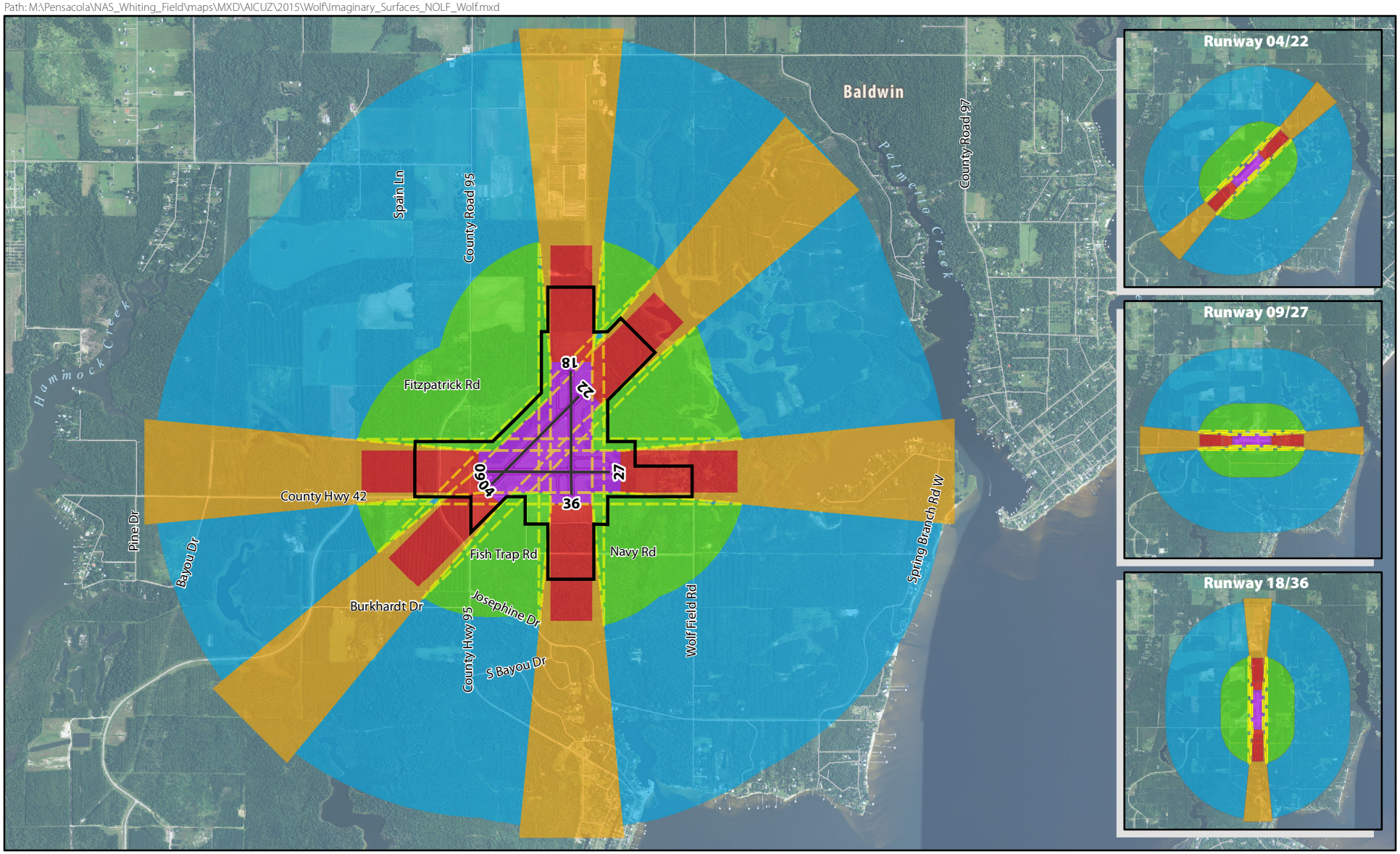


N

SCALE

0 0.2 0.4 Miles

18 22 09 27 36

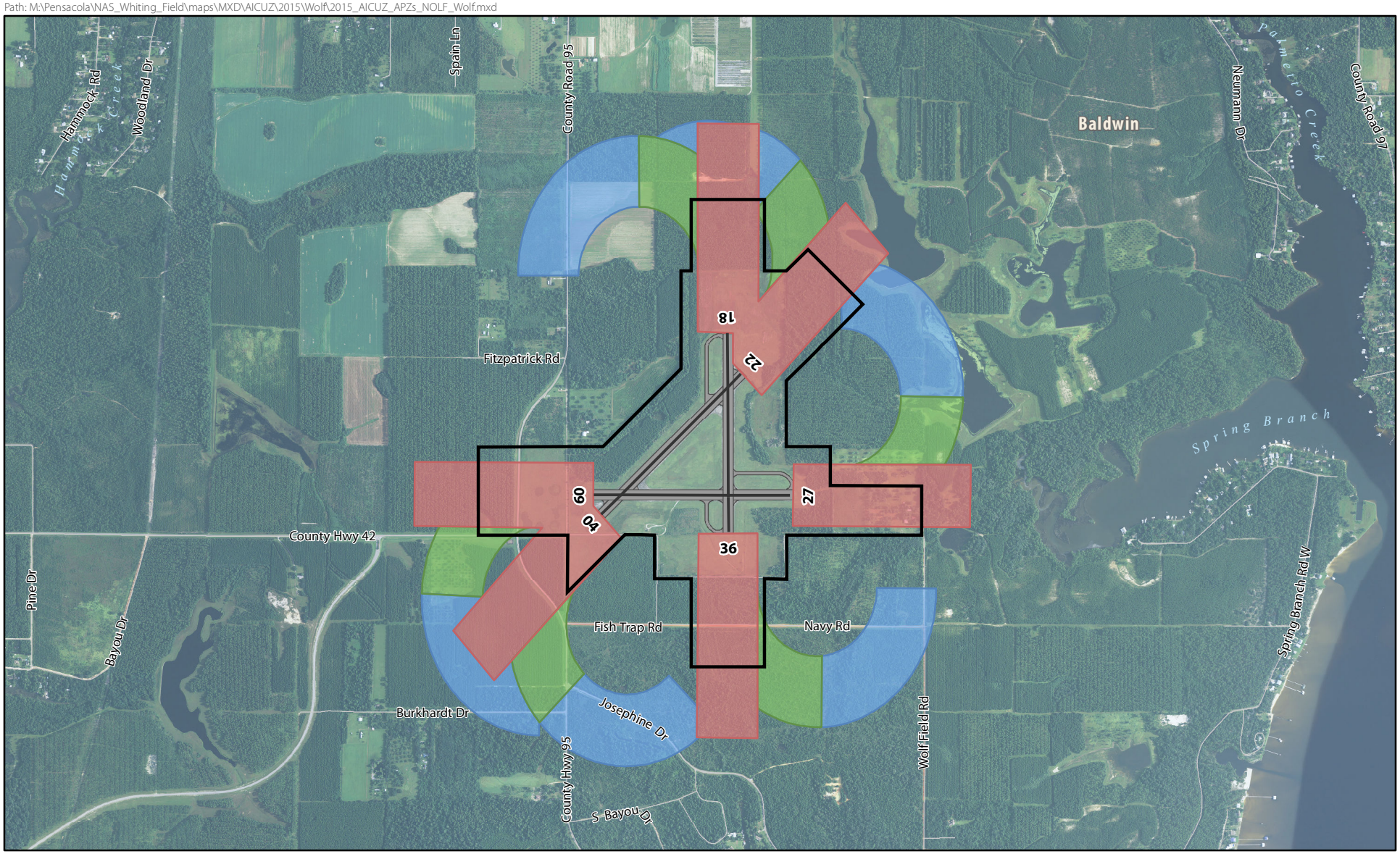
Legend

- Local Road
- Runway
- NOLF Wolf Boundary
- A: Primary Surface
- B: Clear Zone Surface
- C: Approach-Departure Clearance Surface
- E: Inner Horizontal Surface
- F: Conical Surface
- H: Transitional Surface

Figure 7.7-3
Imaginary Surfaces, NOLF Wolf
Baldwin County, Alabama

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Wolf\2015_AICUZ_APZs_NOLF_Wolf.mxd



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SCALE

0 0.2 0.4 Miles

18 22 09 04 27 36

Legend

- Local Road
- Runway
- NOLF Wolf Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.7-4
2015 AICUZ APZs, NOLF Wolf
Baldwin County, Alabama

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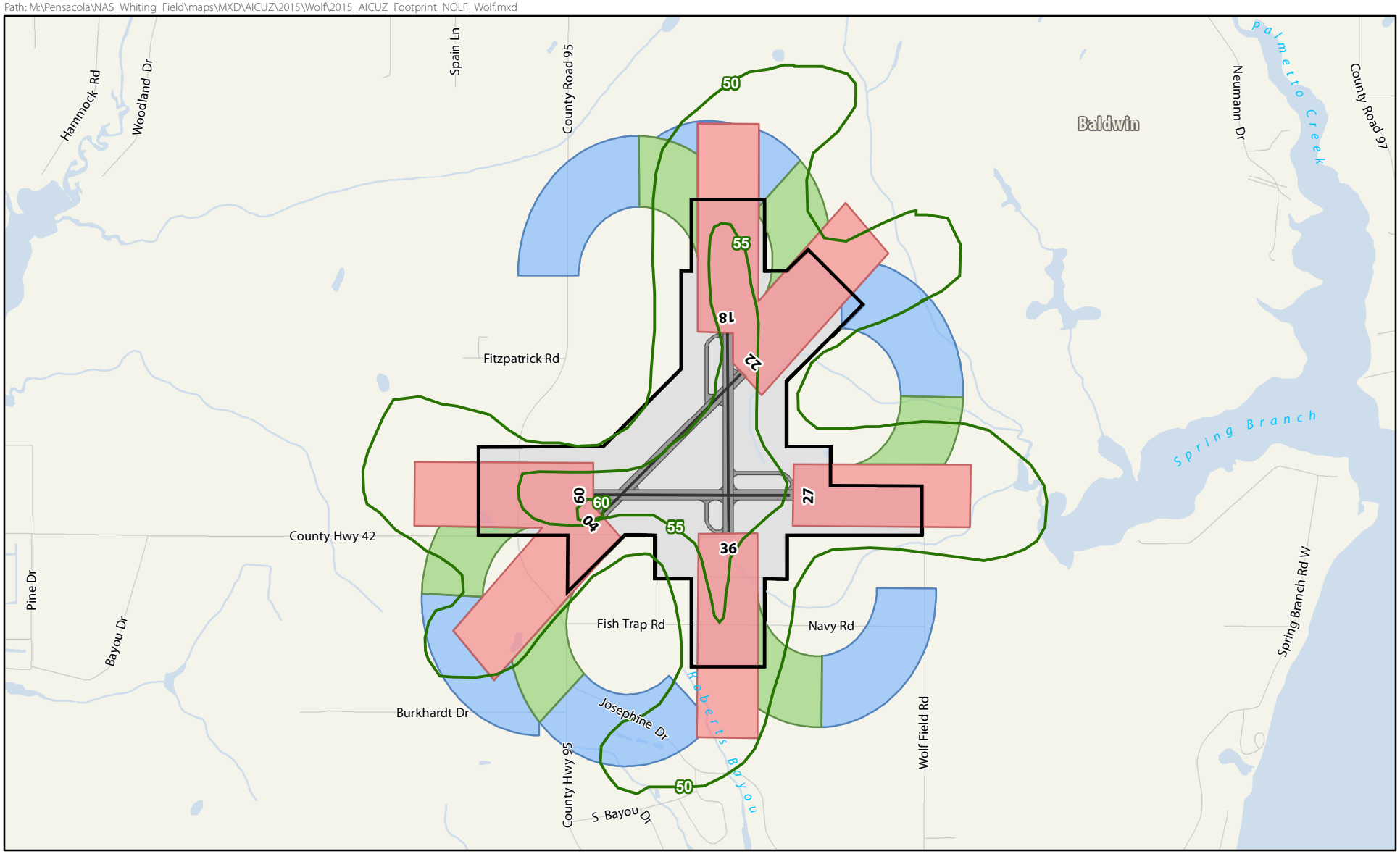
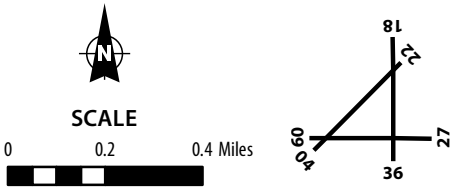




Legend

- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Wolf Boundary

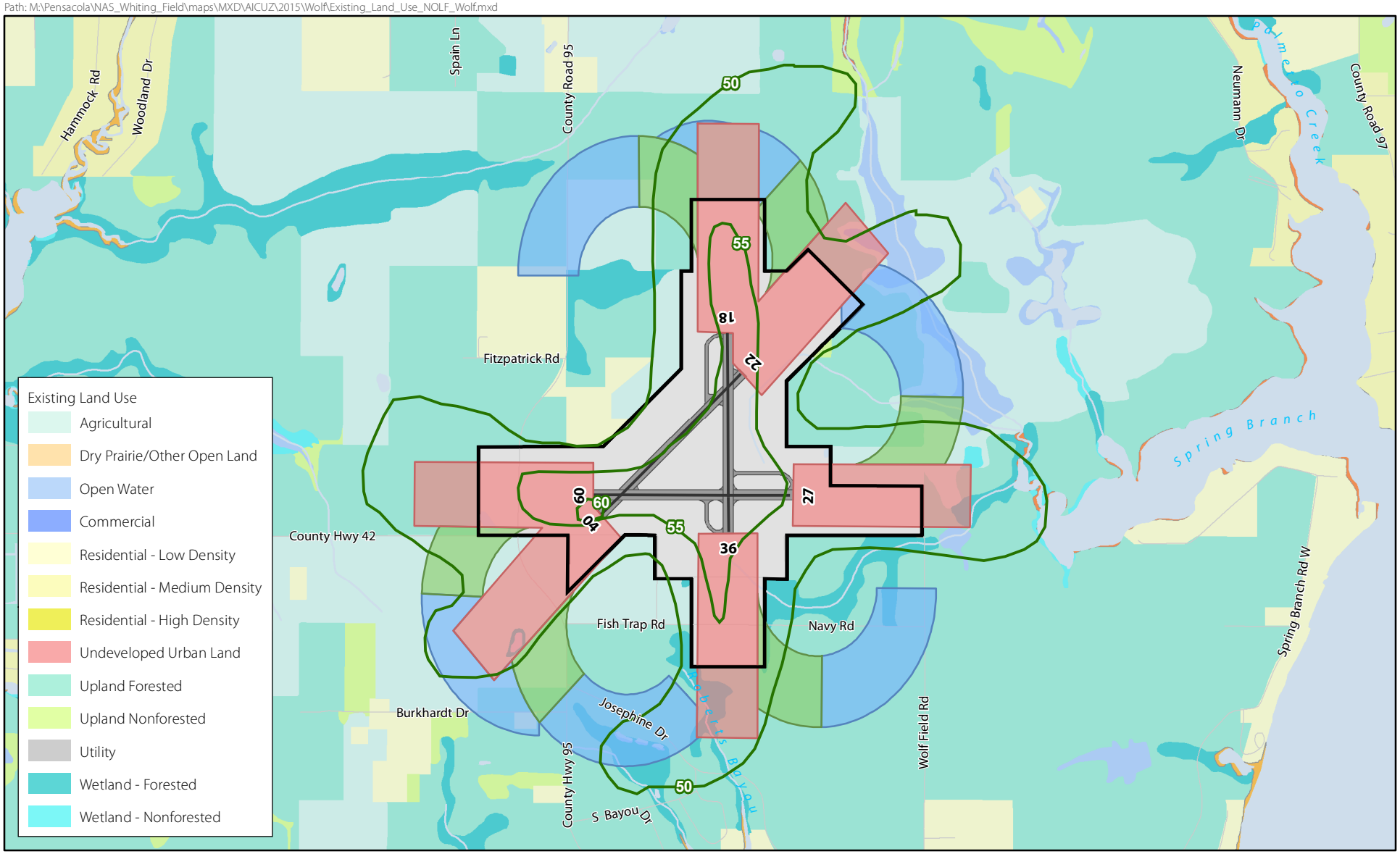
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.7-5
2015 AICUZ Footprint, NOLF Wolf
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Wolf\Existing_Land_Use_NOLF_Wolf.mxd



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SCALE

0 0.2 0.4 Miles

Legend

- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Wolf Boundary

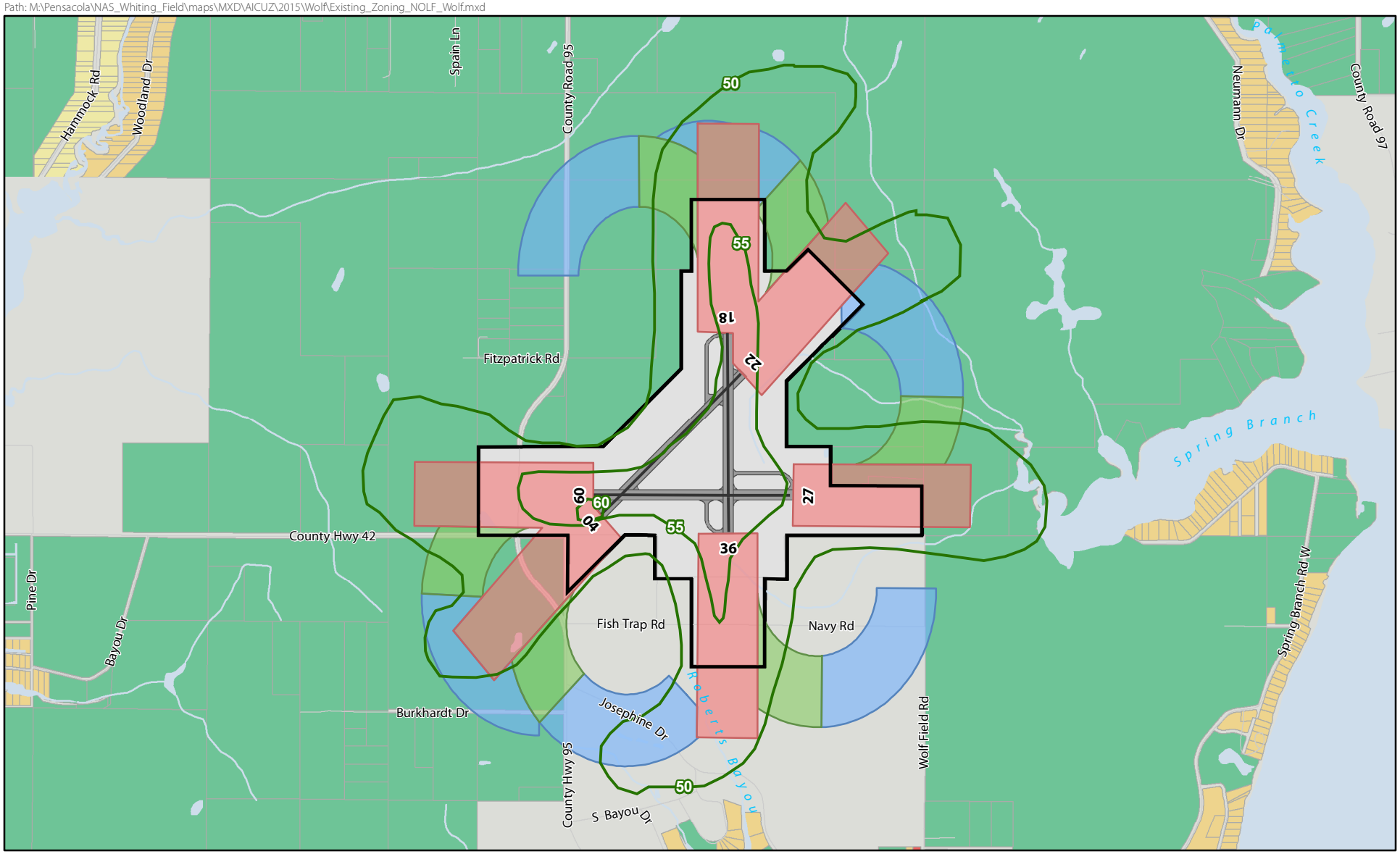
Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.7-6
2015 AICUZ Footprint with Existing Land Use NOLF Wolf
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Wolf\Existing_Zoning_NOLF_Wolf.mxd



SCALE
0 0.2 0.4 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Local Road
- Runway
- 2015 AICUZ Noise Contours

Accident Potential Zone (2015)

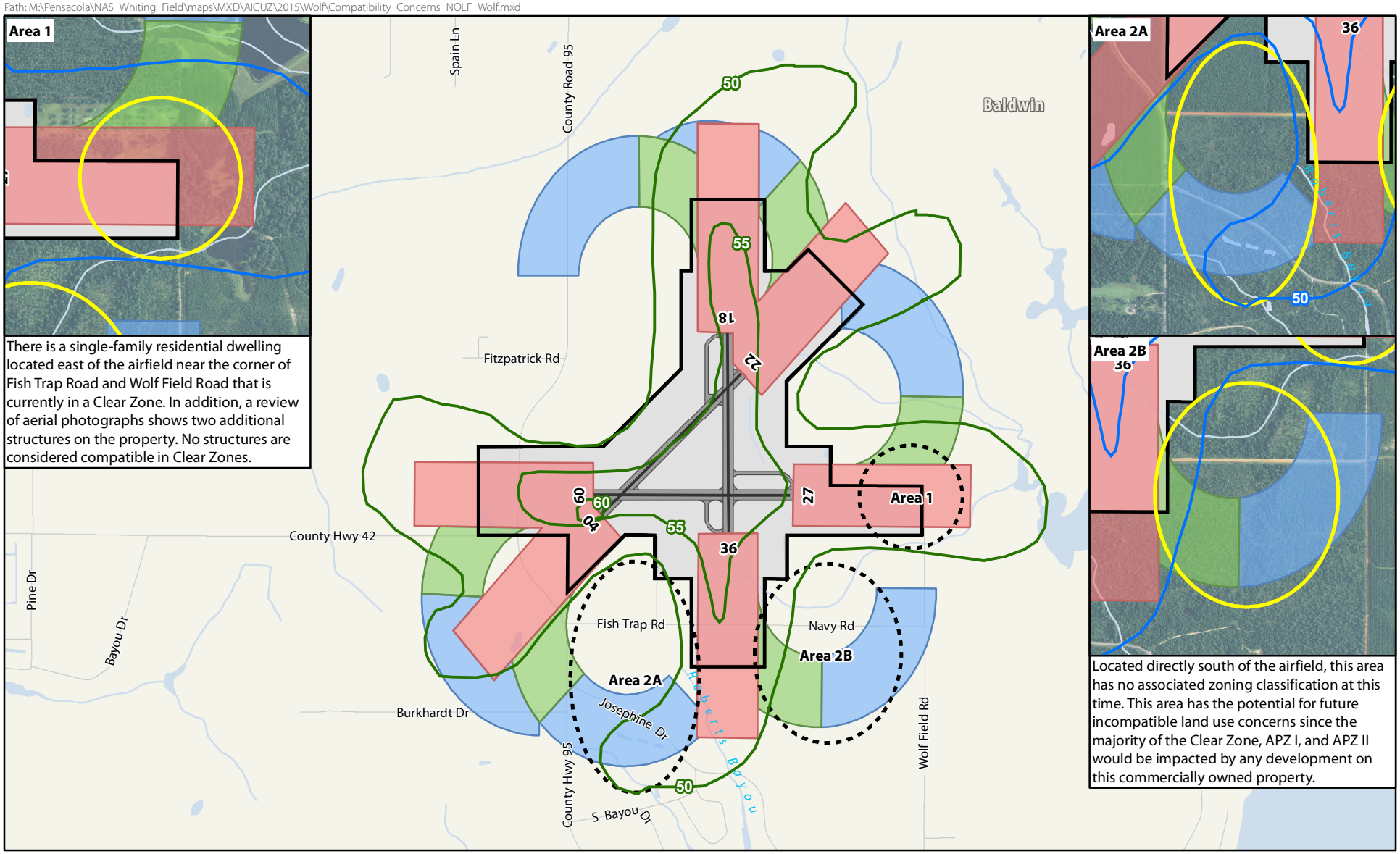
- Clear Zone
- APZ I
- APZ II
- NOLF Wolf Boundary

Exisitng Land Use Classification

- Rural Agriculture District (RA)
- Single Family District (RSF-1)
- Single Family District (RSF-2)
- Residential Single Family Estate District (RSF-E)
- No Zoning In Place

Figure 7.7-7
2015 AICUZ Footprint with Existing Zoning NOLF Wolf
Baldwin County, Alabama

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Wolf\Compatibility_Concerns_NOLF_Wolf.mxd



SCALE
0 0.2 0.4 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Local Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Wolf Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.7-8
Compatibility Concerns - 2015 Composite Map, NOLF Wolf
Baldwin County, Alabama

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NOLF CHOCTAW

SANTA ROSA COUNTY

FLORIDA

7.8 NOLF CHOCTAW COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Choctaw. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Choctaw Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-1
NOISE CONTOURS	
2015 AICUZ Noise Contours, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-2
IMAGINARY SURFACES	
Imaginary Surfaces, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-3
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-4
COMPOSITE MAP	
2015 AICUZ Footprint, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-5
LAND USE	
2015 AICUZ Footprint with Existing Land Use, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-6
2015 AICUZ Footprint with Existing Zoning, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-7
2015 AICUZ Footprint with Future Land Use, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-8
Compatibility Concerns – 2015 Composite Map, NOLF Choctaw, Santa Rosa County, Florida	Figure 7.8-9

AIRFIELD OPERATIONS

NOLF Choctaw is a fixed-wing and rotary-wing training airfield located in Santa Rosa County, Florida (Figure 7.8-1). Flight operations at NOLF Choctaw have fluctuated over time, ranging from a peak of 147,223 operations in 2012 to a low of 17,090 operations in 2014. Historical operations at NOLF Choctaw are detailed in Table 3-2, Operational Tempo Over Time for NAS Whiting Field and NOLFs.

Existing military operations at NOLF Choctaw are executed with T-6 aircraft from NAS Pensacola, transient aircraft from NAS Pensacola and Eglin AFB. Aircraft operations at NOLF Choctaw include arrivals, departures, touch-and-go's, and FCLPs. Daytime and nighttime operations are conducted at the airfield and aircraft are not routinely parked overnight at NOLF Choctaw, nor are maintenance activities conducted at the airfield.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis for projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The U.S. Air Force identified NOLF Choctaw as a primary NOLF to support the JSF Initial Joint Training Site (IJTS) stationed at Eglin AFB. The U.S Air Force forecasts that total operations at NOLF Choctaw will be approximately 96,571 annual flight operations in CY2025 (USAF 2010). Table 7.8-1 shows the modeled distribution of these annual airfield operations by aircraft type.

TABLE 7.8-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF CHOCTAW

AIRCRAFT TYPE	NUMBER OF OPERATIONS
F-35	20,104
Other Aircraft	76,467
TOTAL	**96,571**

Source: BRRC 2015; NAS Whiting Field 2010; Navy 2010

RUNWAY AND FLIGHT TRACKS

As discussed in Section 3.2.4, each airfield has designated runways, and those runways have designated flight tracks depicting a specific route an aircraft must follow while conducting an operation on the associated runway. NOLF Choctaw has one runway, Runway 18/36, which measures 8,000 feet in length.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section discusses the 2015 AICUZ noise contours for NOLF Choctaw and provides a detailed description of the noise environment surrounding the airfield. Also provided are figure overlays for the 2015 noise contours (as presented in the 2005 BRAC Decisions and Related Actions Final Environmental Impact Statement, Eglin Air Force Base, Florida, October 2008). These contours reflect the those adopted by Santa Rosa County, Florida, for current planning efforts are underway. This targeting of land use recommendations is to mitigate noise impacts. Land use and recommendations within noise zones for this airfield are provided and discussed later in this section.

The 2015 noise contours for NOLF Choctaw are within the immediate vicinity of the airfield, with a majority of the high noise contours concentrated within the installation's boundary (Figure 7.8-2). The 85 dB DNL contour extends marginally off station and follows the pattern operations, which are the dominant operations conducted at this airfield. The outermost 65 dB DNL contour lobes to the north and south follow the path of the arrival and departure tracks.

Table 7.8-2 provides the noise impacts calculated for the 2015 noise contours.

TABLE 7.8-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF CHOCTAW

NOISE CONTOUR	TOTAL LAND AREA	TOTAL OFF STATION LAND AREA
	2015 AICUZ NOISE ZONES (ACRES)	2015 AICUZ NOISE ZONES (ACRES)
65-70 dB DNL	7,129	7,129
70-75 dB DNL	2,260	2,260
75-80 dB DNL	3,001	2,738
80-85 dB DNL	1,190	800
85-90 dB DNL	1,315	287
TOTAL AREA	**14,896**	**13,214**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.

IMAGINARY SURFACES

As discussed in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight paths and become less restrictive as the distance from the runway increases. Figure 7.8-3 presents the imaginary surfaces and transition planes for NOLF Choctaw.

ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap occurred. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible

development within these areas. The following section presents the 2015 APZs for NOLF Choctaw (Figure 7.8-4), including a detailed analysis of the areas impacted.

AICUZ Instruction requires Clear Zones for all runway ends. APZ I and APZ II are required for NOLF Choctaw because flight operations for the runway at this airfield exceed 5,000 operations annually. The curving APZs I and II to the north and straight out and curving APZs I and II to the south are required because arrival and departure operations exceed 5,000 annually. The quantity of FCLP operations requires the APZ II portion to extend the entire length of the track, resulting in a closed-loop APZ combination to the east and west of the runway. Approximately 3,127 acres of off-station lands and 2,305 acres over water areas are impacted by the 2015 AICUZ APZs. The majority of the land is agricultural and rural.

Table 7.8-3 provides the acreages that fall within the Clear Zones and APZs for NOLF Choctaw.

TABLE 7.8-3 LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZS (ACRES), NOLF CHOCTAW

DATA	LOCATION	CLEAR ZONE		APZ I		APZ II		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	LAND	WATER	
2015 AICUZ	On-Station	244	0	70	0	35	0	349
	Off-Station	0	0	332	813	2,795	1,492	5,432
	TOTALS	244	0	402	813	2,830	1,492	5,781
		244		1,215		4,322		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study
[2] The water boundary was defined according to U.S. Waterbodies (USGS 2012).

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within aircraft noise zones and APZs by examining existing and planned land uses near NOLF Choctaw. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint" (Figure 7.8-5). The land use compatibility criteria to evaluate compatibility for this AICUZ Study were presented in Chapter 6, along with a description of the local planning authority. The analysis was based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

NOLF Choctaw is located in unincorporated areas of Santa Rosa County, Florida. Therefore, the land use ordinances covering the off-installation property within the AICUZ footprint are within the County's jurisdiction. Land use patterns and zoning in the immediate vicinity of NOLF Choctaw, along with the land use compatibility assessment and analysis conducted, are presented below.

Maximum Densities for Each Land Use District Classification

Neighborhood: 4 du per acre.

Rural: 1 du per acre.

Conservation: 1 du per acre.

Special: site-specific policies

EXISTING LAND USE

"Land use" is a term given to describe the management of land and the extent to which it has been modified. Typical uses include agricultural and forested areas, open water, and developed, rural, and vacant lands. Patterns of land use arise naturally in communities through customs and practices and regulations and designations from local governments. Land use surrounding NOLF Choctaw features low-intensity development with mostly public-owned conservation, recreational/open space/water, silviculture, and government/military lands. Figure 7.8-6 illustrates existing land use surrounding NOLF Choctaw. There are limited residential land uses west of the airfield near the shoreline of Black Water Bay. These are single-family residential uses and, according to Santa Rosa County, uses within this category include single-family homes, group homes, institutional uses, and public and private utilities. However, based on parcel description, the limited designations located around NOLF Choctaw are strictly single-family homes. Overall, the land use and zoning around the NOLF reveals a pattern of very low-density development, with an abundance of undeveloped/vacant lands surround the airfield. Future development of these vacant lands could directly impact the AICUZ footprint at NOLF Choctaw. Regarding land use compatibility, some of

the existing residential uses surrounding NOLF Choctaw are incompatible within certain noise zones. An evaluation of specific land uses compatibility is discussed later in this section.

EXISTING ZONING

Residential Zoning District Classifications

- AG: Agricultural and Rural Residential
- RR-1: Rural Residential Single Family
- R-1: Single Family Residential
- R-1M: Mixed Residential Subdivision
- R-2: Medium Density Residential Limited
- R-3: Medium High Density Residential

"Zoning" is a term used in urban planning for a system of land use regulations. Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Figure 7.8-7 illustrates existing zoning surrounding NOLF Choctaw. In general, much of the land surrounding NOLF Choctaw remains vacant, with the primary zoning consisting of rural residential, agricultural, and military districts. The land areas west and southwest of the airfield have a zoning district classification of single family residential (R-1) and rural residential single family (RR-1) district. Land areas north of the airfield, beyond the military zone, are designated an agriculture/rural residential (AG) zone. The lands to the east are all zoned military (MIL), Eglin AFB, and do not pose a compatibility issue. It is also important to note that the vacant lands identified on Figure 7.8-6 are mostly zoned for residential land uses. Existing zoning adjacent to the airfield indicates the potential for growth around the NOLF within the R-1, RR-1, and AG zones.

Per Santa Rosa's Comprehensive Plan 2008–2025, a Military Airport Zone (MAZ) overlay district extending approximately 0.5 mile from the perimeter of the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Choctaw (Figure 7.8-7). In addition, for NOLF Choctaw, MAZ boundaries encompass an area west of State Road 87, north and east of East Bay and south of the Yellow River. This was done as part of the JLUS adopted by the County in 2005, so not to negatively impact current and long-term viability of the airfield, and to promote health and welfare by limiting incompatible land uses and allow compatible land uses within the area. Zoning data obtained from the County indicate an MAZ that extends over the NOLF and encompasses the AICUZ footprint and noise zones for NOLF Choctaw. In addition, residential zones within APZs have been identified and designated as R1/R2-APZ zones. The MAZ district and residential within an APZ area are regulatory designations that indicate specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations.

FUTURE LAND USE

Santa Rosa County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned and effective manner. Figures 7.8-8 illustrates the future land uses surrounding NOLF Choctaw. The future land use pattern around NOLF Choctaw is consistent with current development trends with the majority future land use being conservation/recreation, single-family residential, and military designations. There is an increase in residential land use designation west and south of the airfield that is currently designated as publicly owned property, identified as Escribano Point. Any future development in those areas around NOLF Choctaw will most likely result in an increase in population density and potential incompatible developments.

Overall, land use around the airfield is a mixture of low-density residential and conservation areas. Future land use indicates the potential for growth around the NOLF within the single-family residential (SFR) and conservation/recreation (CON/REC) areas. Therefore, future land uses within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Choctaw is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Choctaw's noise zones and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Choctaw, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County parcel data, land use classification, and zoning district information. The evaluation was performed on a case-by-case basis and at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 (see Chapter 6) provides a generalized breakdown of land use compatibility and provides the Navy's land use compatibility classifications and the associated land use compatibility designations for noise zones and APZs from OPNAVINST 11011.36C.

NOLF Choctaw's 2015 AICUZ noise contours that extend off the installation are primarily 65 to 70 dB DNL, with limited areas within the 70 to 75 dB DNL noise contour extending off the installation; however, existing residential districts within the 65+

dB DNL noise zones present compatibility concerns. Based on the data, there are no incompatible land uses within any of the Clear Zones associated with NOLF Choctaw since the land under those zones is owned by the DOD. However, there are potential incompatible land uses and concerns within certain APZs for NOLF Choctaw due to designated zoning. APZs and noise zones impact areas off the installation, mainly to the west and south. These off-station areas of impact are mainly low-density residential areas, as described below and depicted on Figure 7.8-9.

- Area 1: Portions of APZ II and the 65 to 75 dB DNL noise contour extend over residential zoned areas. The current land uses in these areas are not incompatible with ACIUZ guidelines at this time. However, the land areas located under APZ II and within the 65 to 75 dB DNL noise contours are a concern due to the potential of future residential development pursuant to the future land use and current zoning designations as Single Family Residential (R-1). The AICUZ instruction views residential uses exceeding 2 dwellings per incompatible within APZ II and discourages residential land uses within 65+ dB DNL noise zones. The land under these areas should be monitored to prevent incompatible development.

- Area 2: The current land uses in these areas are not incompatible with ACIUZ guidelines at this time. However, the land areas located under APZ I and APZ II (west) are a concern due to the potential of future residential development pursuant to the future land use and existing zoning designations. In addition, any future residential development in these areas would also be within the 70-85 dB DNL noise contours. Residential zones within these APZs have been identified and designated as R1/R2 APZ zones which specify that there are residentially zone lands that lay under an airport APZ. This is used so that proper notification and awareness is available for any future development within these areas. Residential uses located under APZ I and within 65+ dB DNL noise zones are incompatible with the Navy's land-use compatibility recommendations.

- Area 3: There are low-density residential dwellings located along the shoreline on Grassey Point Road within the 65-70 dB DNL noise contour. Residential uses within this noise contour are not compatible and should be prohibited. In addition, other lands located in this area are currently within the Single Family Residential (R-1) and Rural Residential Single Family (RR-1) zoning district. Based on this and the future land us designation, these areas are a compatibility concern due to the

potential of future residential development. Any future residential development in these areas would be within the 65-75 dB DNL noise contours and incompatible.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF CHOCTAW

The neighborhoods and land uses identified in this section are and continue to be compatibility concerns in the area around NOLF Choctaw. The Navy and Santa Rosa County should continue to place high priority on these encroachment concerns.

The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Choctaw. Equally important, but broader, land use planning tools and recommendations for the federal, state, and regional levels are presented in Chapter 8 of this AICUZ Study.

FUTURE LAND USE DECISIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should continue to consider the Navy's land-use compatibility recommendations for Clear Zone and APZs. The current and future land use for the land immediately adjacent to the airfield is predominantly residential that pose compatibility concerns. The County's Comp Plan states that a MAZ overlay district around the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Choctaw. Santa Rosa County Planning and Zoning Commission and NAS Whiting Field should continue to work together to fully implement the MAZ district with development restrictions for areas in and outside the established APZ at NOLF Choctaw that have been identified as current compatibility concerns or are most likely to present compatibility problems in the future.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan to reflect the 2015 AICUZ Clear Zones, APZ, and noise contours for NOLF Choctaw and OPNAVINST 11010.36C. This update will further aid county officials, planners, and private citizens in their decisions and policies regarding future land use and development surrounding NOLF Choctaw.

MONITOR AREAS OF POTENTIAL CONCERN

There is a great deal of vacant residentially zoned lands surrounding NOLF Choctaw that are underneath APZs and within 65+ dB DNL noise zones; however, these areas should be continuously monitored for changes to development density and to prevent incompatible land uses. These areas will become a incompatible, per the AICUZ criteria, if residential development is allowed.

PUBLIC LAND ACQUISITION

The Navy should continue its efforts to purchase and acquire public lands in the vicinity of NOLF Choctaw as they become available. This will result in the protection of key land assets by limiting impacts from development that is considered incompatible with air station activities.

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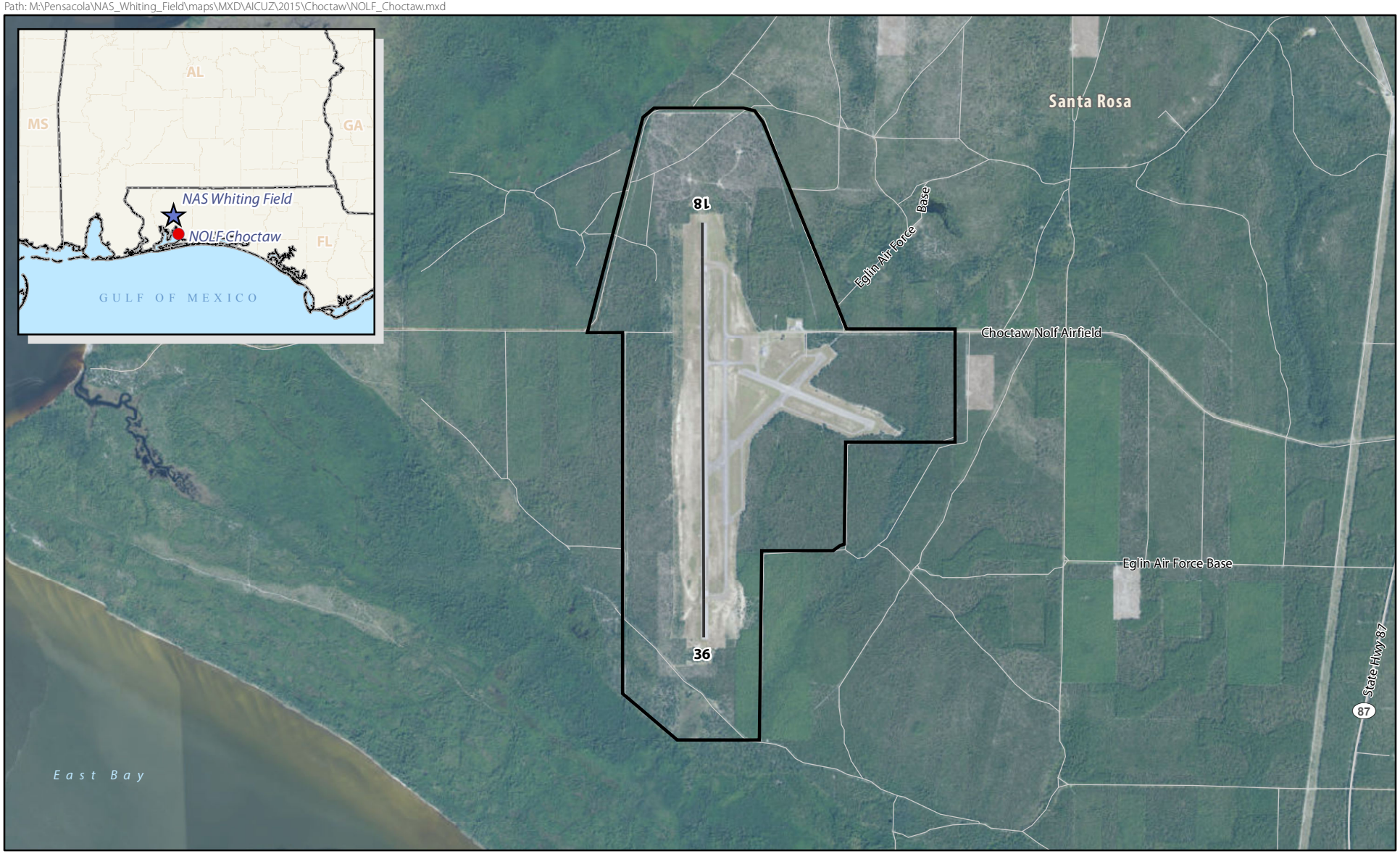

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SCALE

0 0.2 0.4 Miles

18

36

Legend

- Major Road
- Local Road
- Runway
- NOLF Choctaw Boundary

SOURCE: ESRI 2010, 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.8-1
NOLF Choctaw
Santa Rosa County, Florida

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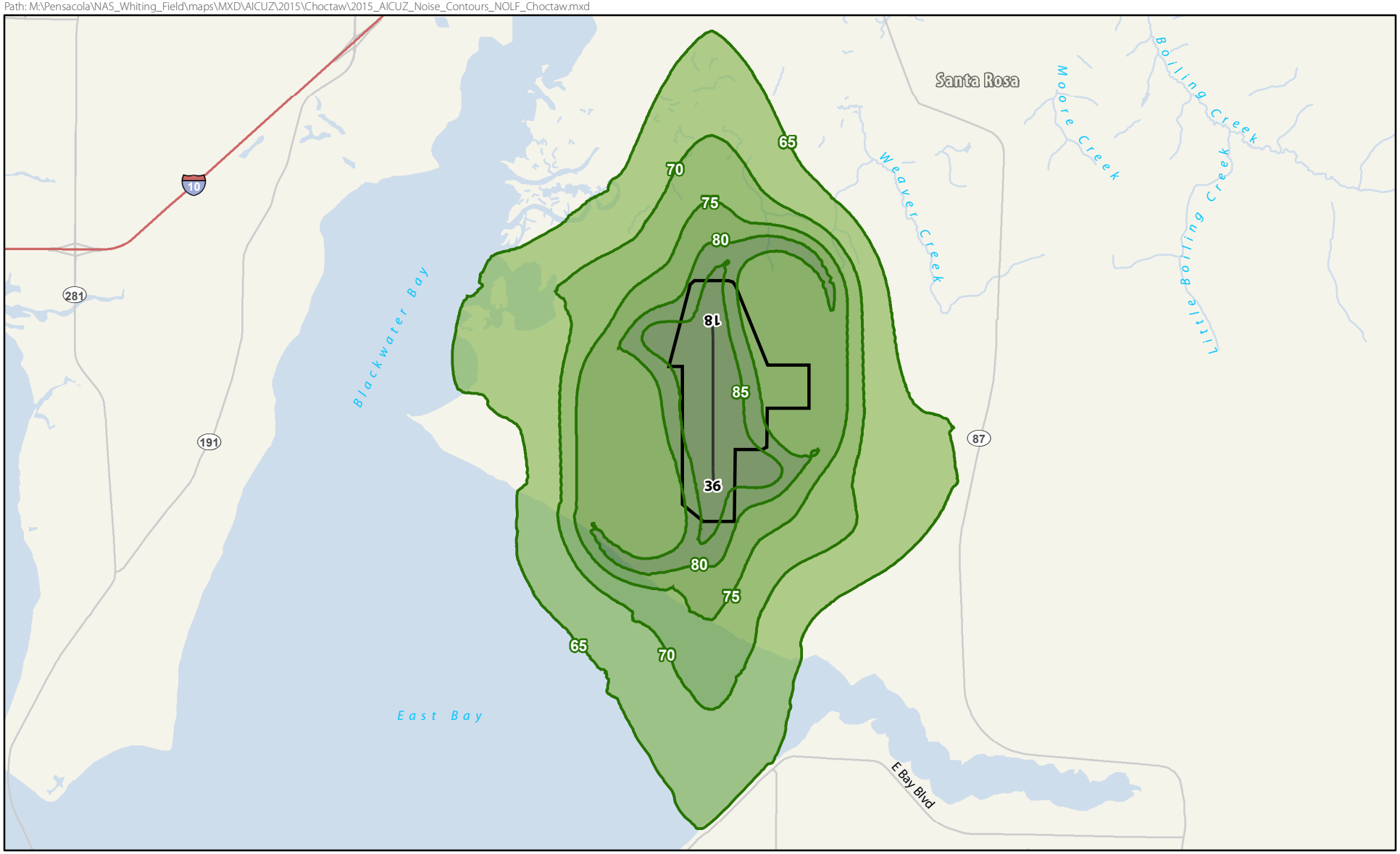

N

SCALE

0 0.5 1 Miles

81

36

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Road
- Runway
- NOLF Choctaw Boundary

dB DNL Value

- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL
- 85 dB DNL

Figure 7.8-2
2015 AICUZ Noise Contours, NOLF Choctaw
Santa Rosa County, Florida

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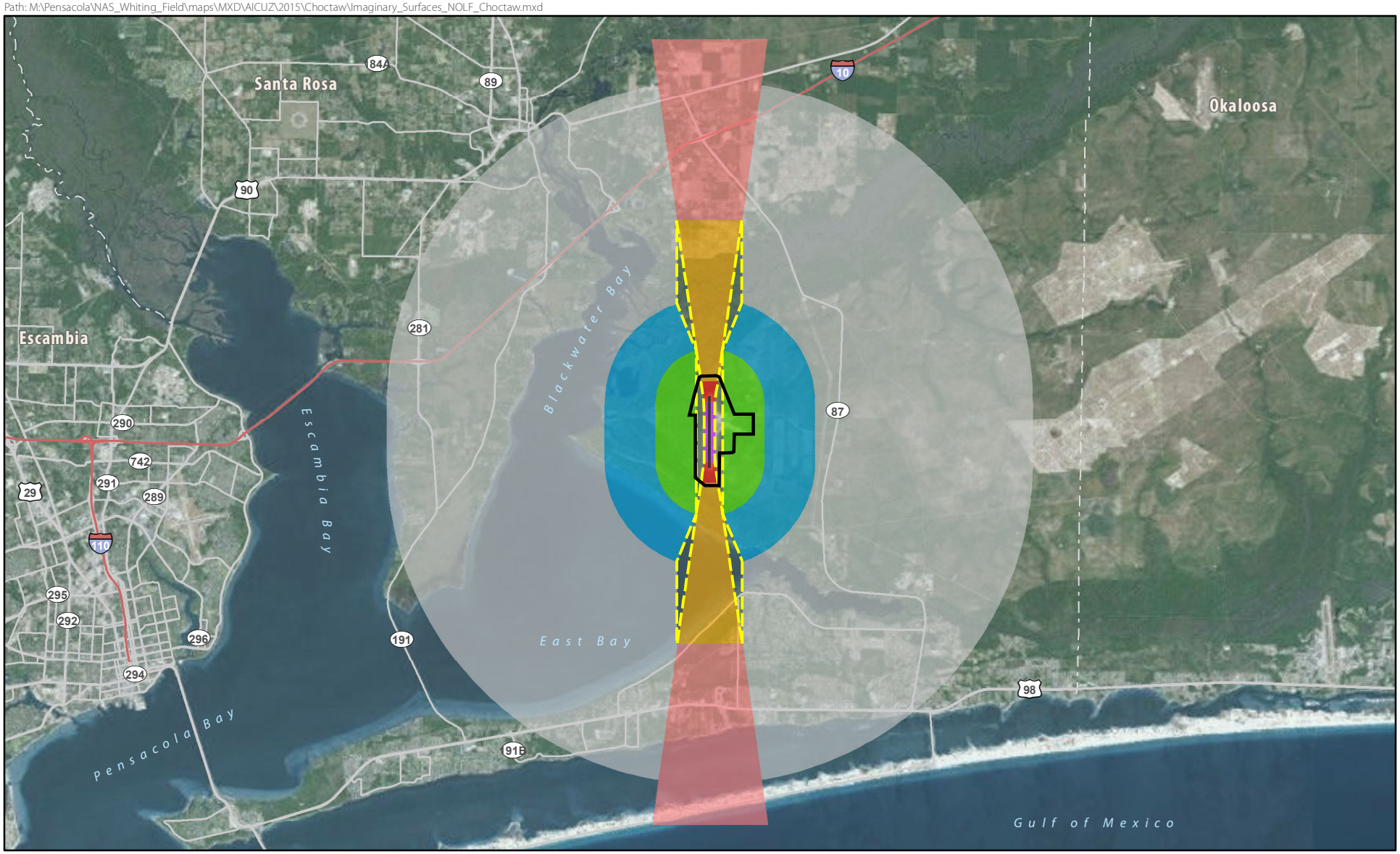

SOURCE: ESRI 2010, 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.8-3
Imaginary Surfaces, NOLF Choctaw
Santa Rosa County, Florida

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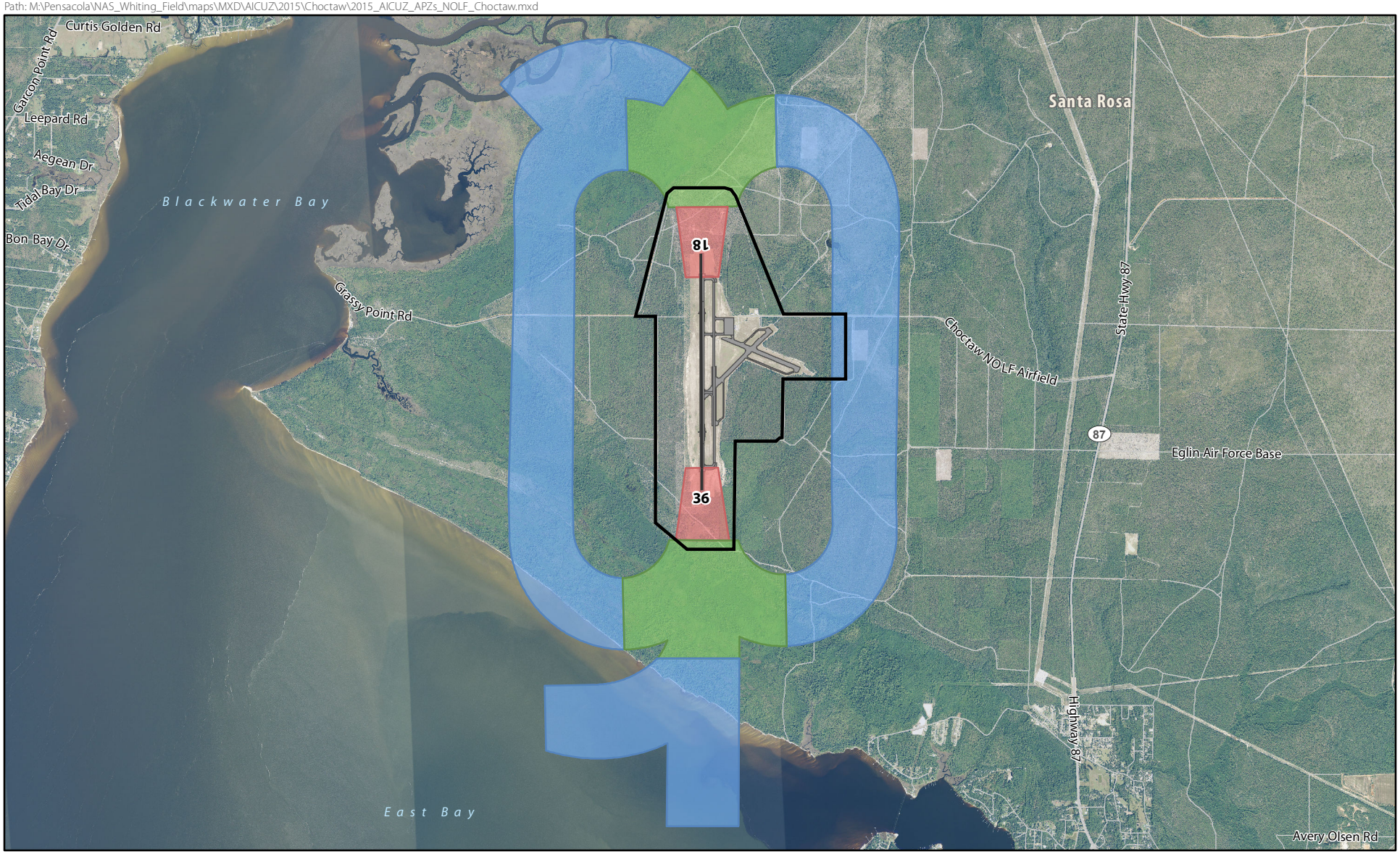


SCALE
0 0.5 1 Miles

18
36

SOURCE: ESRI 2010, 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

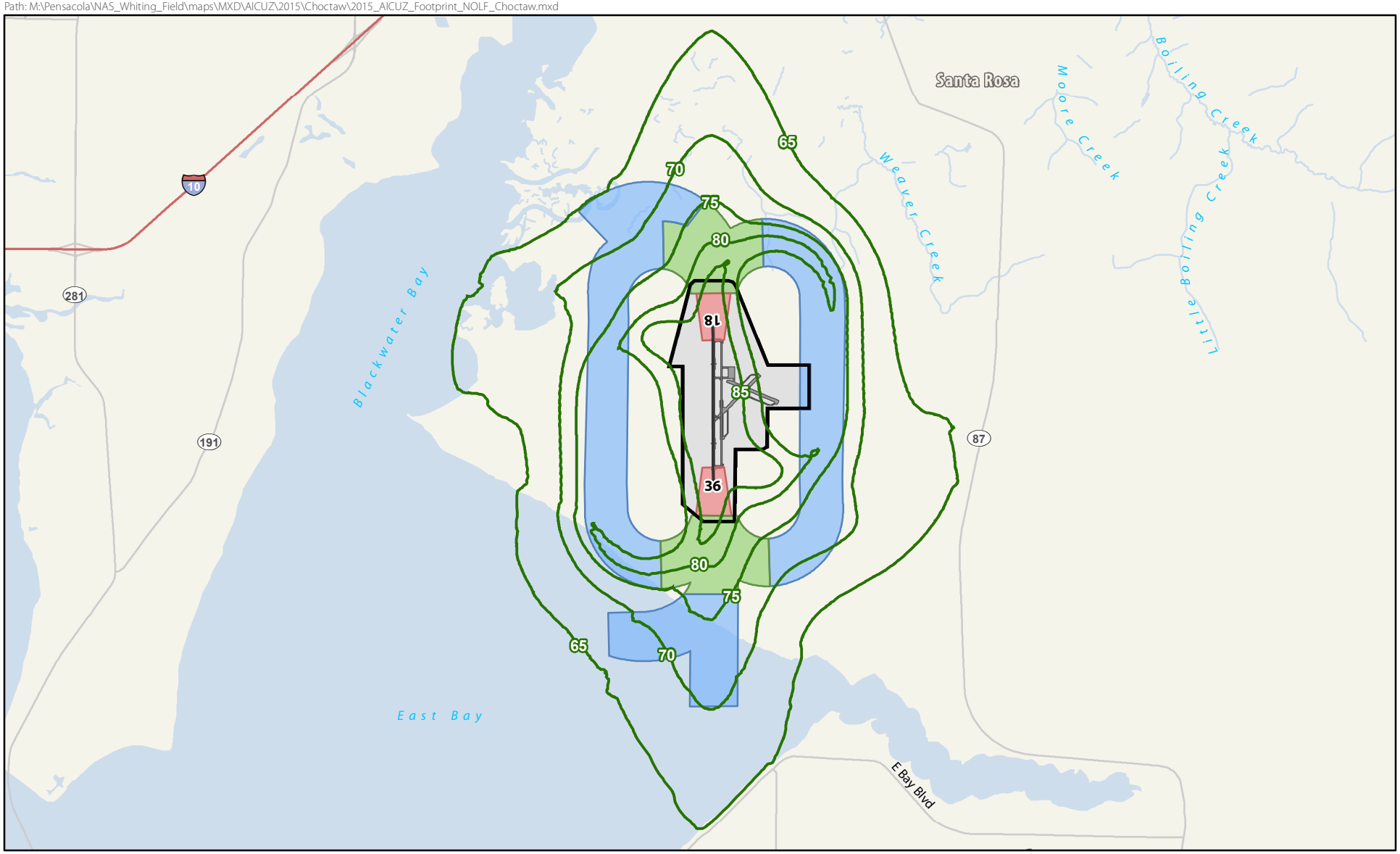
- Major Road
- Local Road
- Runway
- NOLF Choctaw Boundary
- Airfield

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.8-4
2015 AICUZ APZs, NOLF Choctaw
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Choctaw\2015_AICUZ_Footprint_NOLF_Choctaw.mxd



SCALE

0 0.5 1 Miles

18

36

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Choctaw Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.8-5
2015 AICUZ Footprint, NOLF Choctaw
Santa Rosa County, Florida

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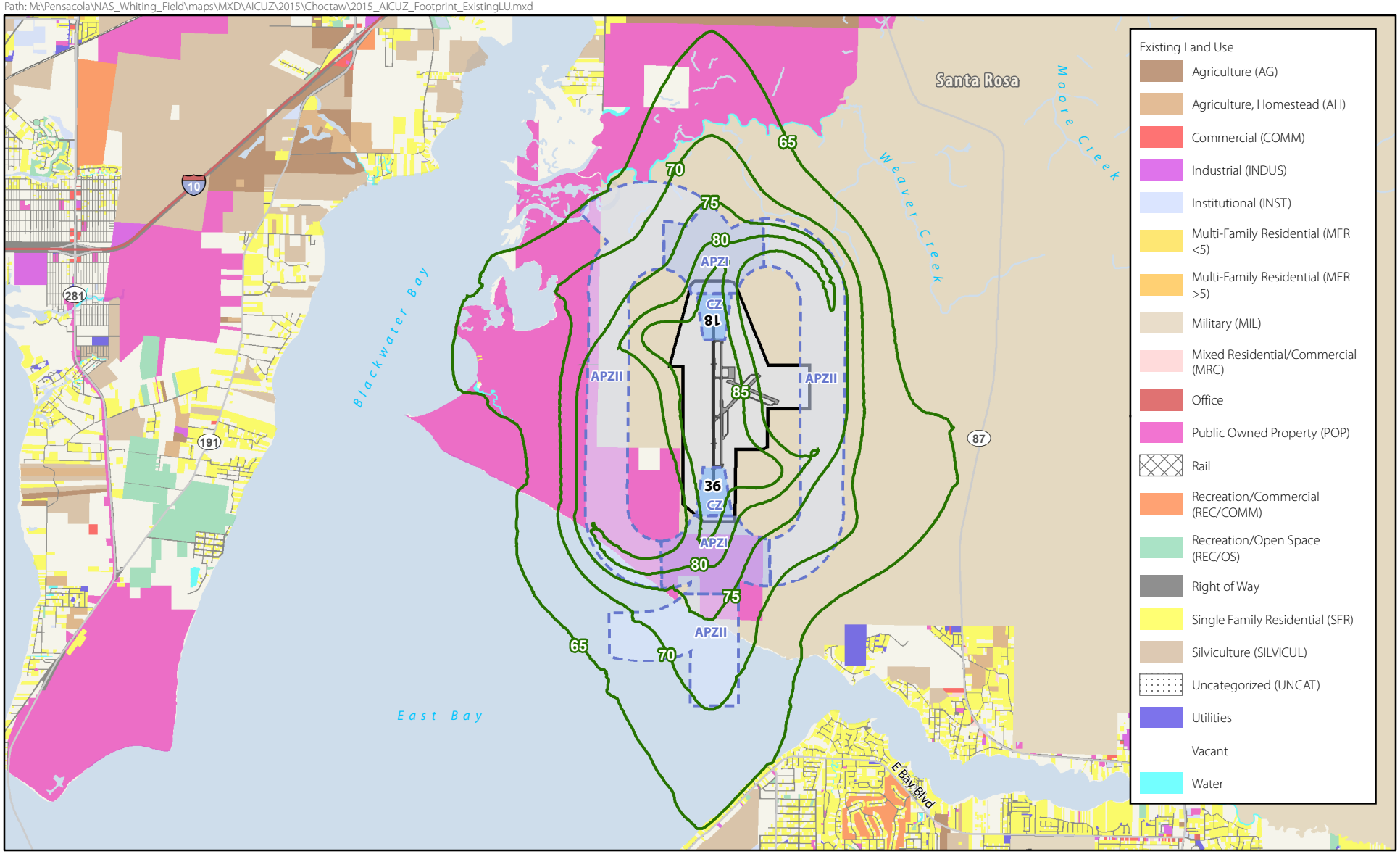

Legend

- Interstate
- Major Highway
- Major Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Choctaw Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

SCALE

0 0.5 1 Miles

18

36

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.8-6
2015 AICUZ Footprint with Existing Land Use
NOLF Choctaw
Santa Rosa County, Florida

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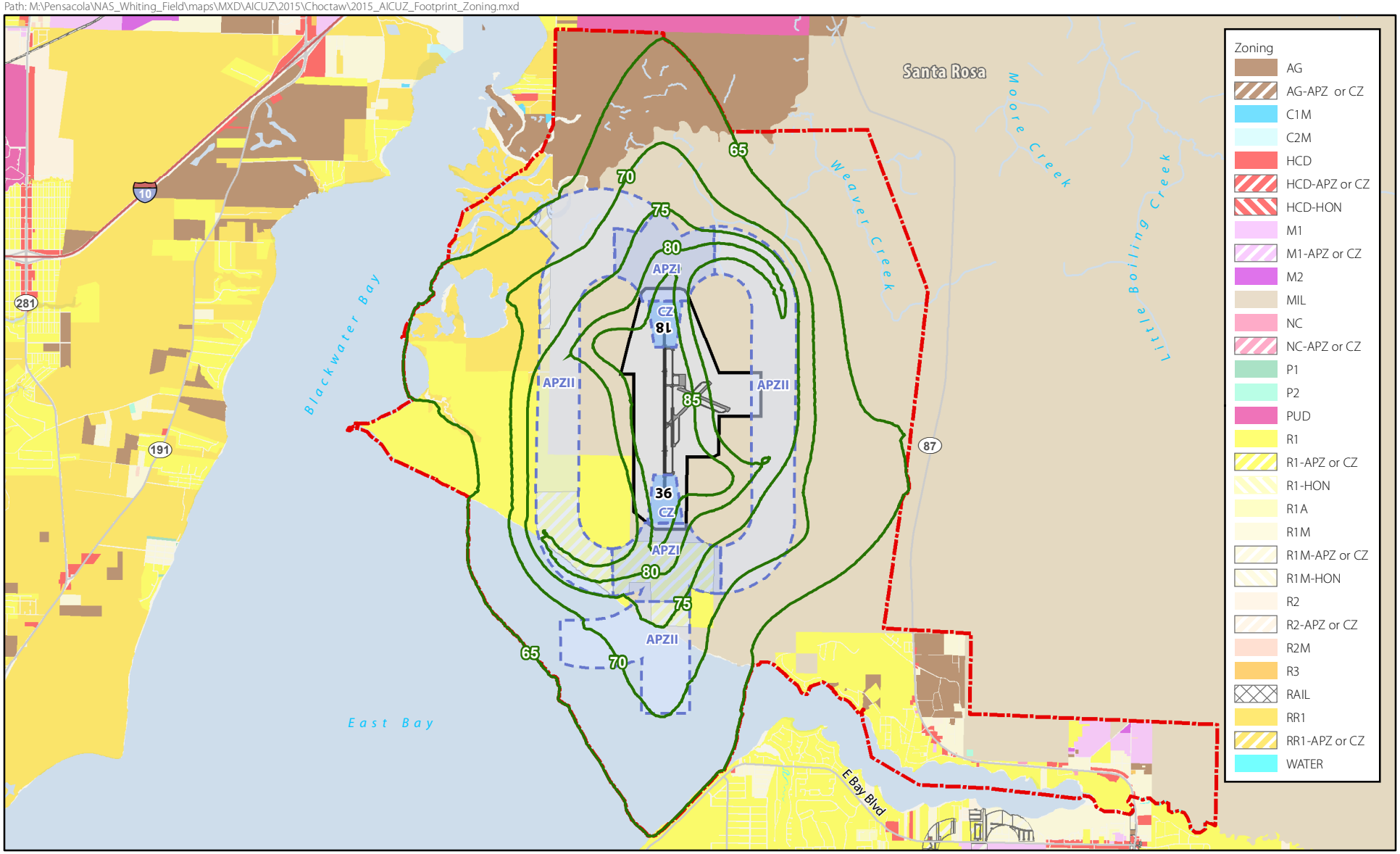

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SCALE

0 0.5 1 Miles

18

36

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2009, 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Legend

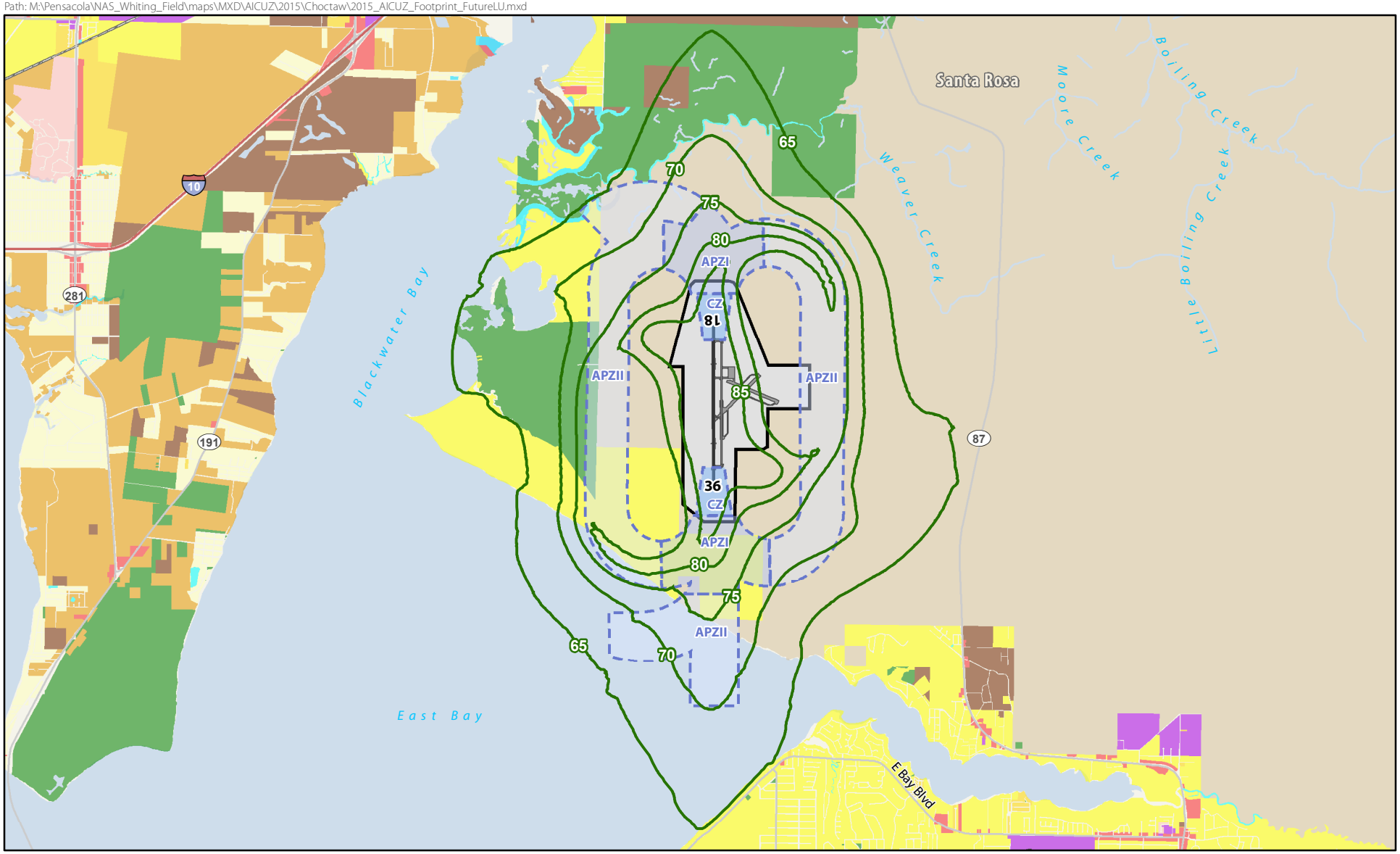
- Interstate
- Major Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Choctaw Boundary
- Military Airport Zone

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.8-7
2015 AICUZ Footprint with Existing Zoning
NOLF Choctaw
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Choctaw\2015_AICUZ_Footprint_FutureLU.mxd



Legend

- 18 — Major
- 2015 AICUZ Noise
- 36 — NOLF Choctaw

Accident Potential Zone
- Clear
- APZ I
- APZ II

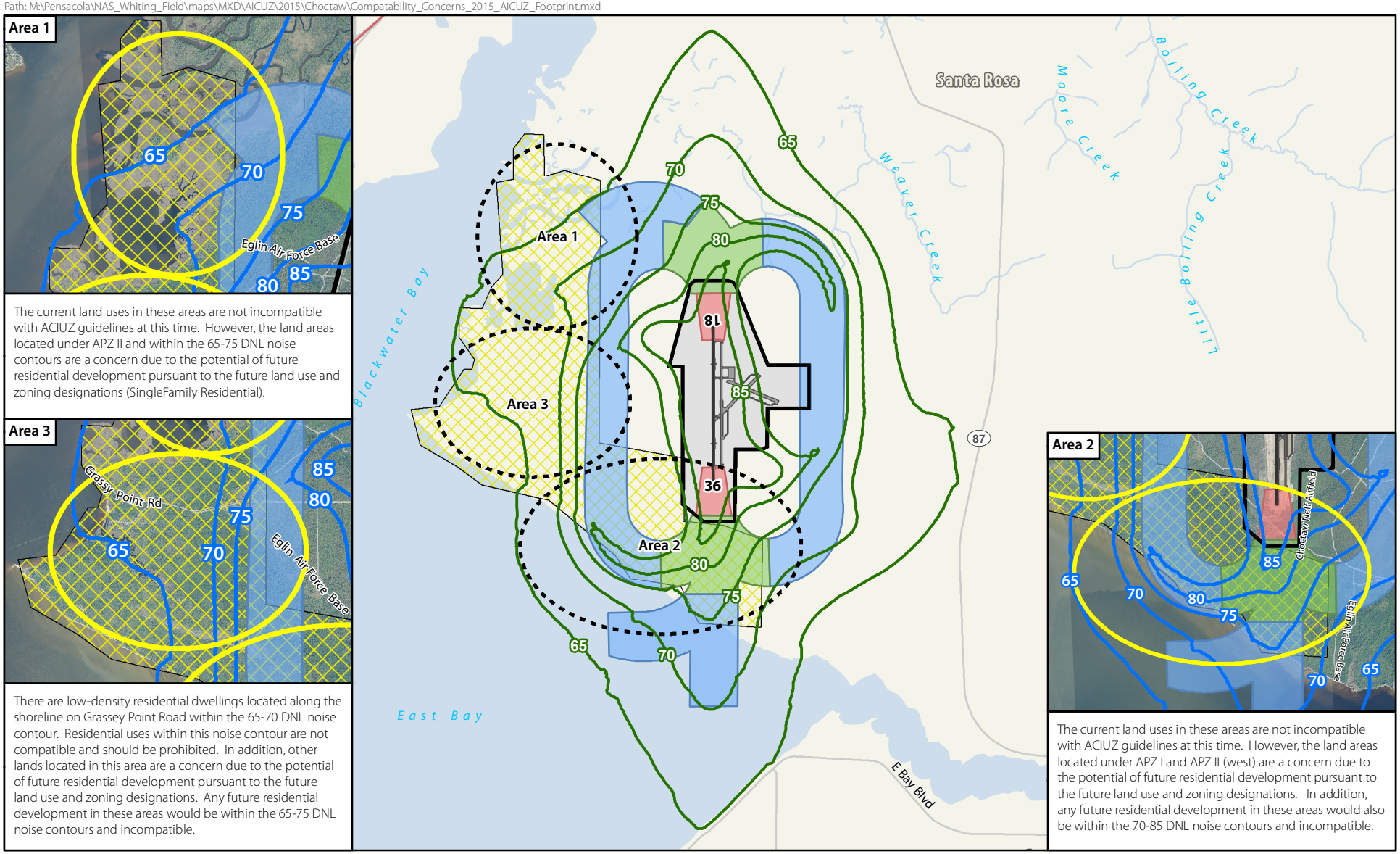
Future Land
- Agriculture
- Single Family Residential
- Medium Density Residential (MDR)
- Residential
- Commercial
- Conservation/Recreation (CON/REC)
- Garcon Point Single Family Residential (GPSFR)
- Garcon Point Rural Residential (GPRR)
- Industrial
- Marina
- Military
- Mixed Residential Commercial (MRC)
- Rail
- Water

SCALE
0 0.5 1 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.8-8
2015 AICUZ Footprint with Future Land Use NOLF Choctaw
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2015\Choctaw\Compatability_Concerns_2015_AICUZ_Footprint.mxd



The current land uses in these areas are not incompatible with ACIUZ guidelines at this time. However, the land areas located under APZ II and within the 65-75 DNL noise contours are a concern due to the potential of future residential development pursuant to the future land use and zoning designations (SingleFamily Residential).

There are low-density residential dwellings located along the shoreline on Grassey Point Road within the 65-70 DNL noise contour. Residential uses within this noise contour are not compatible and should be prohibited. In addition, other lands located in this area are a concern due to the potential of future residential development pursuant to the future land use and zoning designations. Any future residential development in these areas would be within the 65-75 DNL noise contours and incompatible.

The current land uses in these areas are not incompatible with ACIUZ guidelines at this time. However, the land areas located under APZ I and APZ II (west) are a concern due to the potential of future residential development pursuant to the future land use and zoning designations. In addition, any future residential development in these areas would also be within the 70-85 DNL noise contours and incompatible.

SCALE
0 0.5 1 Miles

18
36

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Road
- Runway
- 2015 AICUZ Noise Contours
- Airfield
- Zoning indicates the potential for future Single Family Residential uses in these areas
- NOLF Choctaw Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I
- APZ II

Figure 7.8-9
Compatability Concerns - 2015 Composite Map
NOLF Choctaw
Santa Rosa County, Florida

NOLF SITE 8

ESCAMBIA COUNTY

FLORIDA

7.9 NOLF SITE 8 COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Site 8. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Site 8 Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Site 8, Escambia County, Florida	Figure 7.9-1
Representative Flight Tracks, NOLF Site 8, Escambia County, Florida	Figure 7.9-2
NOISE CONTOURS	
2015 Noise Contours, NOLF Site 8, Escambia County, Florida	Figure 7.9-3
2015 Noise Gradients, NOLF Site 8, Escambia County, Florida	Figure 7.9-4
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Site 8, Escambia County, Florida	Figure 7.9-5
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Site 8, Escambia County, Florida	Figure 7.9-6
Comparison of 1990 and 2015 AICUZ APZs, NOLF Site 8, Escambia County, Florida	Figure 7.9-7
COMPOSITE MAP	
2015 Composite AICUZ Footprint, NOLF Site 8, Escambia County, Florida	Figure 7.9-8
LAND USE	
2015 AICUZ Footprint with Existing Land Use, NOLF Site 8, Escambia County, Florida	Figure 7.9-9
2015 AICUZ Footprint with Existing Zoning, NOLF Site 8, Escambia County, Florida	Figure 7.9-10
2015 AICUZ Footprint with Future Land Use, NOLF Site 8, Escambia County, Florida	Figure 7.9-11
Compatibility Concerns - 2015 AICUZ Footprint, NOLF Site 8, Escambia County, Florida	Figure 7.9-12

AIRFIELD OPERATIONS

NOLF Site 8 is a rotary-wing training airfield located approximately 22 miles southwest of NAS Whiting Filed and just south of Interstate 10, in Escambia County, Florida (Figure 7.9-1) Located on 640 acres at an elevation of 159 feet MSL, NOLF Site 8 is owned and operated by the Navy. NOLF Site 8 is predominantly grass and has limited facilities that house "crash crews" and refueling operations. This NOLF serves as a training location for TH-57s and as a refueling location for the western training area of the NAS Whiting Field Complex.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. Flight operations at NOLF Site 8 have fluctuated over time, ranging from a peak of 194,698 operations in 2010 to a low of 26,783 operations in 2001. Historical operations at NOLF Site 8 are presented in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs.

The Navy forecasts 132,274 annual flight operations at NOLF Site 8 in CY2025 (Table 7.9-1). This will represent a 25 percent increase in annual flight operations relative to the 105,970 operations reported for NOLF Site 8 in the baseline 1990 AICUZ Study. Table 7.9-1 shows the modeled distribution of the projected annual airfield operations for NOLF Site 8.

TABLE 7.9-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF SITE 8

OPERATION TYPE	NUMBER OF OPERATIONS
Arrival	3,905
Departure	3,905
Standard Pattern	75,170
180° Autorotation	10,738
90° Autorotation	10,738
Tail Rotor/Boost Off	10,738
Tactical Pattern	12,200
Confined Area Landing	4,880
TOTAL	**132,274**
1990 AICUZ Total	**105,970**

Sources: BRRC 2015; NAS Whiting Field 2010

FLIGHT TRACKS

Existing military operations at NOLF Site 8 are performed by TH-57 helicopters and include training and refueling operations. While the majority of operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.), the field is approved for and plans to conduct night vision goggle (NVG) operations during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.). There is a maximum of 12 aircraft allowed to operate at NOLF Site 8 at one time, with six aircraft permitted on each side of the airfield (Figure 7.9-2). Only two aircraft are allowed on a side where confined area landings (CALs) are being conducted.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section illustrates the 2015 AICUZ noise contours for NOLF Site 8 and describes the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ (1990) and the 2015 AICUZ noise contours. This comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. The comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NOLF Site 8's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The only noise sources considered for the NOLF Site 8 noise model are TH-57 aircraft operations. The 2015 noise contours for NOLF Site 8 overlay the area in the immediate vicinity of the airfield, with a majority of the noise contours concentrated within the NOLF boundary (Figure 7.9-3). The 65 to 70 dB DNL noise contour is within Noise Zone 2 (are of moderate impact) and extends outside of the NOLF boundary near the northeast corner, north of Frank Reeder Road. The higher-level DNL noise contours are concentrated on-station near the low work areas (arranged in a circular shape) and the fuel pits located in the northeast corner. Figure 7.9-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over NOLF 8's land area.

The 2015 AICUZ noise contours are slightly different in size and location when compared to the 1990 AICUZ noise contours (Figure 7.9-5). The slight changes between the 1990 and 2015 AICUZ noise contours are attributed to:

- ☐ Changes in operational levels (the number of operations has slightly increased from the 1990 to the 2015 AICUZ studies); and
- ☐ Improved noise mapping techniques (discussed in Section 1.4).

Compared to 1990 AICUZ noise contours, the 60 to 65 dB DNL noise contour for 2015 extends farther off the airfield; this contour is within Zone 1 (area of no to low impact); similarly, the 65 to 70 dB DNL noise contour extends slightly farther outside the airfield; this contour is within Zone 2 (area of moderate impact).

When comparing impacts between the 1990 and 2015 AICUZ noise contours (both on- and off-station), noise contours have increased by 514 acres, with a slight increase (15 acres) for off-station areas within the 65 to70 dB DNL noise contour (Noise Zone 2). Table 7.9-2 provides acreages of land areas within specific noise contours at NOLF Site 8; acreages for off-station impacts are also provided.

TABLE 7.9-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF SITE 8

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	479	298	519	517
55-60 dB DNL	461	73	401	303
60-65 dB DNL	69	7	237	56
65-70 dB DNL	7	3	310	18
70-75 dB DNL	0	0	63	0
>75 dB DNL	0	0	0	0
TOTAL AREA	**1,016**	**381**	**1,530**	**894**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours.

IMAGINARY SURFACES

As noted in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the landing area and corresponding flight path and become less restrictive as the distance from the landing area increases. Imaginary surface data were unavailable for rotary-wing airfields at the NAS Whiting Field Complex; therefore, they were not analyzed as part of this study for NOLF Site 8.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based on analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NOLF Site 8 (Figure 7.9-6), including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ Study APZs (Figure 7.9-7). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and assists in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NOLF Site 8 are provided and discussed in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all VFR landing areas, and APZ I is required for all landing areas that support daily training and operational missions. Approximately 126 acres are impacted by the 2015 AICUZ Clear Zones and APZ I at NOLF Site 8; this is a 75-acre decrease from 1990 to 2015. This decrease in coverage is primarily associated with changes in

the types and locations of annual operations conducted at NOLF Site 8. All impacted areas are located within the installation boundary. Table 7.9-3 compares the 1990 and 2015 AICUZ acreages within the Clear Zones and APZ I for NOLF Site 8.

TABLE 7.9-3 LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZ I (ACRES), NOLF SITE 8

DATA	LOCATION	CLEAR ZONE		APZ I		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	45	0	156	0	201
	Off-Station	0	0	0	0	0
	TOTALS	45	0	156	0	201
		45		156		
2015 AICUZ	On-Station	30	0	96	0	126
	Off-Station	0	0	0	0	0
	TOTALS	30	0	96	0	126
		30		96		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study.
[2] No waterbodies are located within 2015 APZs.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Site 8. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Site 8, presented on Figure 7.9-8, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study were presented in Section 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

Escambia County Residential Densities

- Rural Residential: 1 du/4 acre
- Low-Density Residential: 4 du/acre
- Medium Density Residential: 10 du/acre
- High Density Residential: 18 du/acre
- Rural Mixed-Use: 2 du/acre
- Low-Density Mixed-Use: 7 du/acre
- High Density Mixed-Use: 25 du/acre
- Commercial: 25 du/acre
- Heavy Commercial/Light Industrial: FLU-Restricted Max 25 du/acre

Land use is a term given to describe the management of land and the extent to which it has been modified and utilized. Typical land cover types include agricultural, residential, recreational, commercial, industrial, and conservation areas. Patterns of land use arise naturally in communities, but are guided by regulations and development codes from local government. Figure 7.9-9 illustrates existing land uses surrounding NOLF Site 8. Land use surrounding NOLF Site 8 features low- to medium-intensity development, with mostly residential and commercial uses. The residential land uses adjacent to the airfield include single- and multi-family residences as well as mobile homes. Based on Escambia County parcel information, these residential developments include the Blackberry Ridge, Forage Estates, Eleral Estates, Brunson Meadows, and Keystone subdivisions to the west. The Bell Ridge Forest and Nature Trail is located to the south. In addition, there are a few institutional land uses southwest of NOLF Site 8 that are associated with Sacred Heart Hospital, Beulah Academy, and the Windy Hill Baptist Church. The prominent commercial land use directly east of the airfield is associated with the Bell-Heritage Oaks Commerce Park.

Overall, the land use around the NOLF reveals a pattern of low- to medium-density development. There are still vacant lots associated with many of the surrounding subdivisions and other undeveloped lands. Future development of these vacant lands could encroach on the AICUZ footprint at NOLF Site 8. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.9-10 illustrates existing zoning surrounding NOLF Site 8. In general, much of the land surrounding NOLF Site 8 is zoned for residential use. The land areas west, southwest, and south of the airfield have zoning district classifications of low-density residential (LDR) and medium-density residential (MDR), with a mixture of high-density mixed-use (HDMU),

commercial (Com), and heavy commercial and light industrial (HC/LI). District areas north of the airfield are predominantly low-density residential and some industrial (Ind). The lands to the east are zoned heavy commercial and light industrial and low-density residential, but it should be noted that a large portion of those lands have an existing land use classification of commercial and some agricultural. Existing zoning adjacent to the airfield indicates the potential for growth around NOLF Site 8 within the low density residential, commercial, and heavy commercial and light industrial zones.

Zoning District Classifications

LDR: Low-Density Residential

MDR: Medium-Density Residential

HDMU: High-Density Mixed-Use

Com: Commercial

HC/LI: Heavy Commercial/Light Industrial

Ind: Industrial

Per Escambia' County's Comprehensive Plan (2015), an Airfield Influence Planning District (AIPD) encompassing the 1990 AICUZ footprint and noise zones was established for NOLF Site 8. This was instituted as part of the 2003 JLUS adopted by the County as a means of addressing encroachment, creating a buffer to lessen impacts from and to property owners, and protecting the health, safety, and welfare of citizens living in proximity to the NOLF. Figure 7.9-10 illustrates the AIPD zones that extend over NOLF Site 8. The AIPD districts and zoning within an APZ area are regulatory designations that indicate specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations. The districts and the recommended conditions for each are as follows: AIPD-1 includes the current Clear Zones, APZs, and noise contours of 65 dB DNL and higher (Noise Zones 2 and 3), as well as lands that are within 1,000 feet or less of the NOLF boundary; density restrictions within AIPD-1 to maintain compatibility with airfield operations are set at three dwelling units per acre. The AIPD-2 boundary is a 0.5-mile buffer drawn from the NOLF boundary.

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.9-11 illustrates the future land uses surrounding NOLF Site 8. The future land use pattern around NOLF Site 8 is consistent with current development trends, with the majority of future land use being residential with mixed-use commercial. However, the residential land use designations are mostly low- and medium-density residential; any future development in those areas around NOLF Site 8 could result in an increase in population density. Future land use indicates the potential for growth around the NOLF within the mixed-use suburban and mixed-use urban zoning districts. Therefore, future land uses

within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Site 8 is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Site 8's noise zones, Clear Zones, and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Site 8, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Escambia County parcel data, land use classifications, and zoning district information. The evaluation was performed at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 provides a breakdown of land use compatibility for noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. There are 2015 AICUZ noise contours for NOLF Site 8 that extend off-station and that pose a compatibility concern because these contours are within Noise Zone 2 (area of moderate impact); however, these residential districts are limited to the 65 to 70 dB DNL noise contour.

The 2015 AICUZ Clear Zones and APZs do not extend beyond the NOLF Site 8 boundary; thus, there are no incompatible land uses within any of those zones. As illustrated on Figure 7.9-12, noise zones impact areas off the installation, mainly to the northeast of the boundary. Areas impacted are zoned low-density residential and heavy commercial/light industrial and are described below.

- Area 1: Single-family detached dwellings and manufactured mobile homes, zoned low-density residential (4 dwellings per acre), located northeast of the airfield along Frank Reeder Road, are currently within the 65 to 70 dB DNL noise contour. There is also a lot within the 65 to 70 dB DNL noise contour that is zoned low-density residential, but this lot is currently being used for agricultural purposes. Furthermore, two lots that almost total an acre are currently vacant and undeveloped. A total of 15.52 acres of land adjacent to the site boundary are within the 65 to 70 dB DNL noise contour. The future land use of these lots is designated mixed-use suburban (maximum of 25 dwelling units per acre). Residential

uses are discouraged in the 65 to 70 dB DNL noise contour; this noise contour is within Noise Zone 2 (area of moderate impact).

- ☐ Area 2: Single-family detached dwellings zoned low-density residential (less than 4 dwellings per acre), located northeast of the airfield along Frank Reeder Road, are currently within the 70 to 75 dB DNL noise contour. There is also a lot within the 70 to 75 dB DNL noise contour that is zoned low-density residential, but this lot is currently being used for agricultural purposes. A total of 2.75 acres of land adjacent to the site boundary are within the 70 to 75 dB DNL noise contour. The future land use of these lots are designated mixed-use suburban (maximum of 25 dwelling units per acre). The Navy strongly discourages residential use in 70 to 75 dB DNL noise contour; this noise contour is within Noise Zone 2 (area of moderate impact).

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF SITE 8

The neighborhoods and land uses identified in this section are, and continue to be, compatibility concerns in the area around NOLF Site 8. The Navy and Escambia County should continue to monitor these areas of incompatible land uses, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Site 8. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Escambia County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones, APZs and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly residential. Residential land use around NOLF Site 8 poses compatibility concerns because the Navy discourages residential uses within the 65 to 70 dB DNL noise contour and strongly discourages it within the 70 to 75 dB DNL noise contour. The County's Comprehensive Plan provides an AIPD overlay district around the airfield and encompassing the 1990 AICUZ footprint for NOLF Site 8. The County should revise their AIPD to include the updated 2015 AICUZ footprint. The Escambia County Planning and Zoning Commission and NAS Whiting Field

should continue to work together to fully implement the AIPD with development restrictions for areas inside and outside the noise zones at NOLF Site 8 that have been identified as current compatibility concerns, or are most likely to present compatibility issues in the future.

UPDATE LAND USE PLAN AND MAPS

Escambia County should update its Comprehensive Plan to reflect the 2015 AICUZ noise contours, Clear Zones, and APZs for NOLF Site 8 and OPNAVINST 11010.36C. This update will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Site 8.

MONITOR AREAS OF POTENTIAL CONCERN

There are a few vacant lots zoned low-density residential northeast of NOLF Site 8 that are within 65+ DNL noise contours. It is recommended that these areas are continuously monitored for changes to the development density, and the Navy should communicate with the planning authorities to discuss concerns regarding incompatible land uses. These areas will become a concern, per AICUZ criteria, if the residential development is allowed. All new buildings shall be constructed using nationally accepted sound attenuation methods based on the level of noise exposure, which can be determined by the location of the building within the adopted noise contour maps. This applies to new construction and the moving of buildings (including mobile homes/manufactures homes) into the noise zones located within the airport/airfield overlay zones. Residential homes within 65+ dB DNL noise contours are required to have an interior noise level reduction of at least 25 dB. Also, real estate disclosure shall be provided to those planning to buy property within the areas of potential concern.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. The Navy should continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals. Such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

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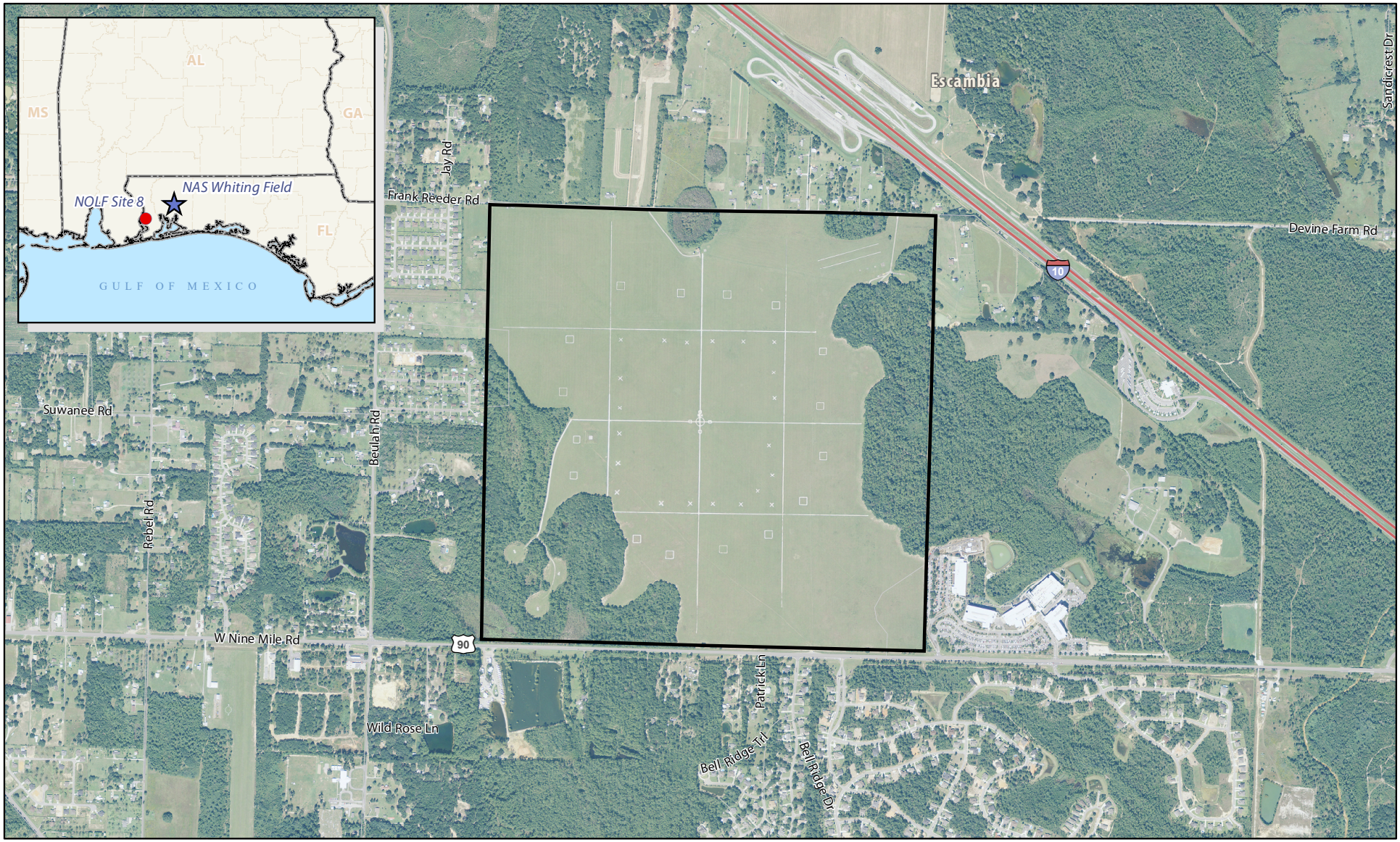


N

SCALE

0 0.1 0.2 Miles

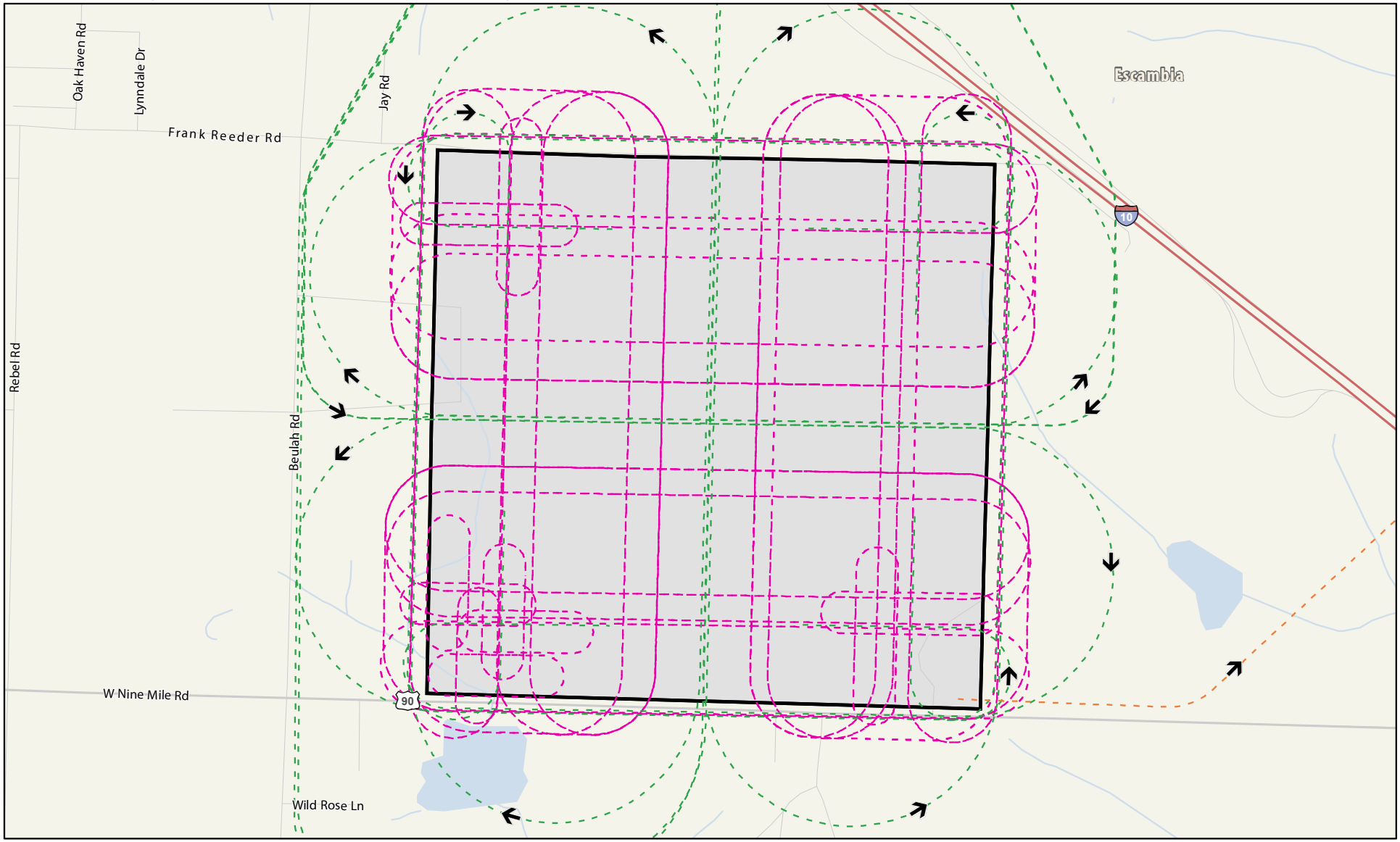
Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Figure 7.9-1
NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-2_Representative_Flight_Tracks_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

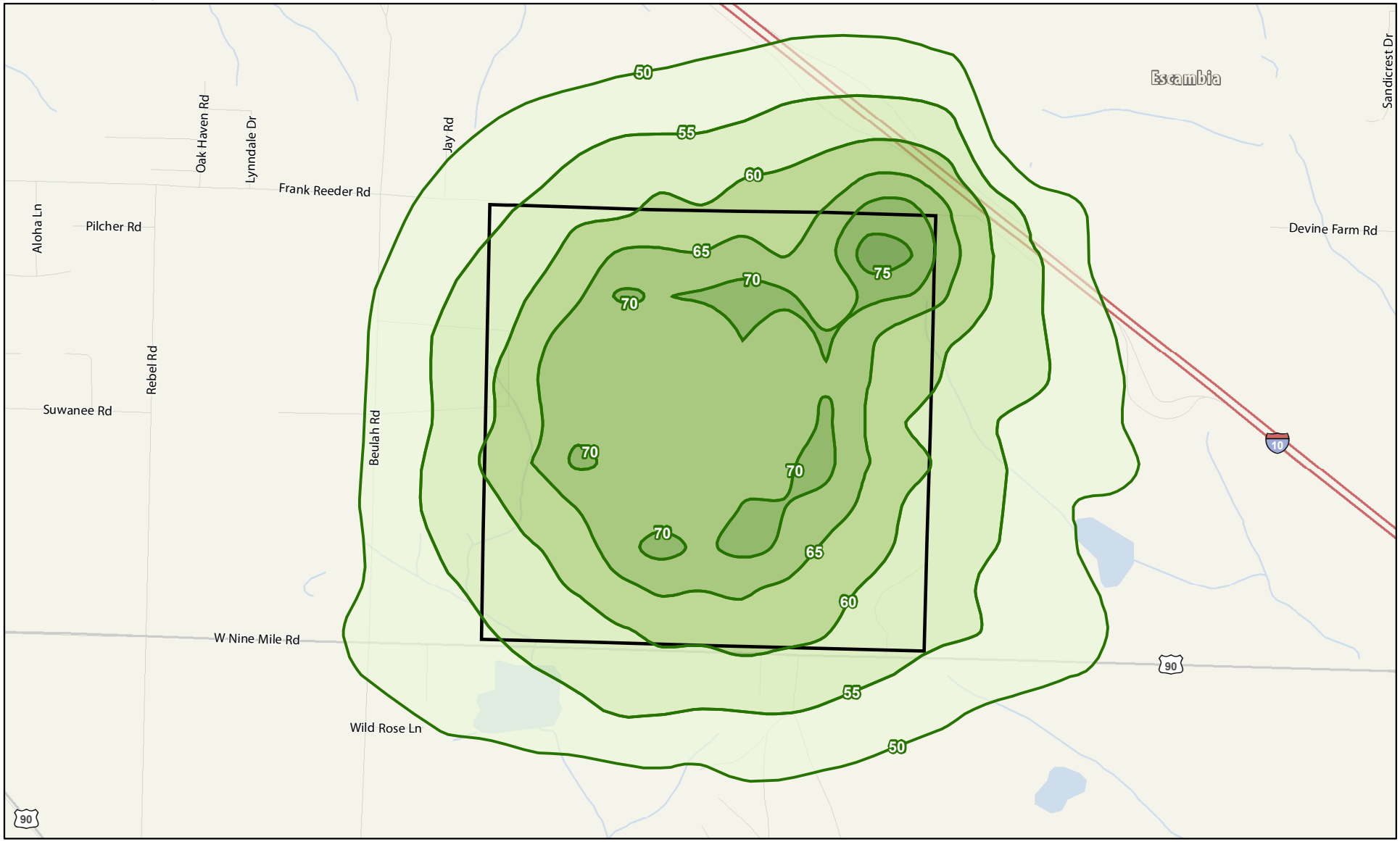
Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary
- Arrival
- Closed Pattern
- Departure

Figure 7.9-2
Representative Flight Tracks, NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-3_2015_AICUZ_Noise_Contours_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary

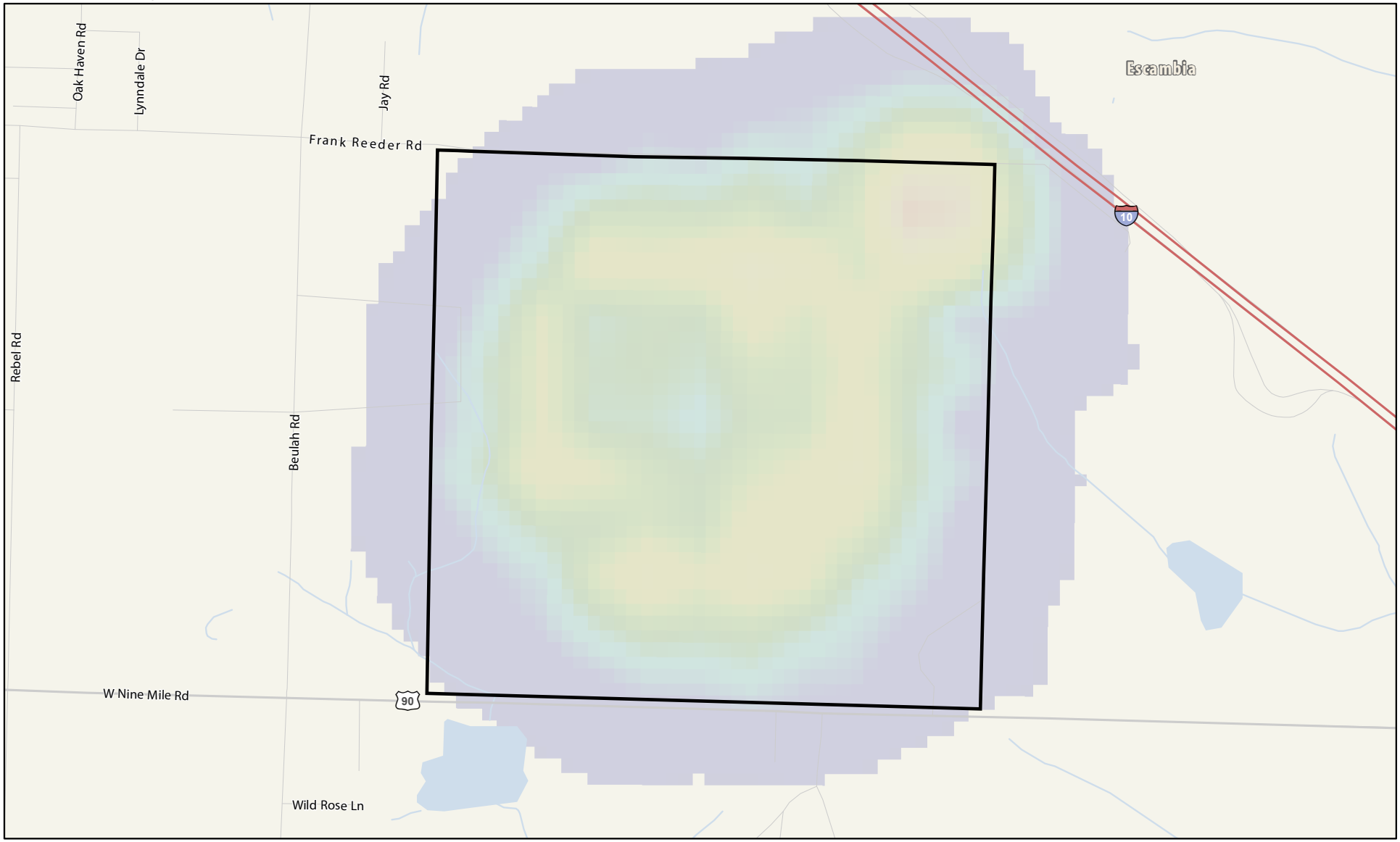
dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.9-3
2015 AICUZ Noise Contours, NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-4_2015_AICUZ_Noise_Gradients_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

Interstate

Major Highway

Local Road

NOLF Site 8 Boundary

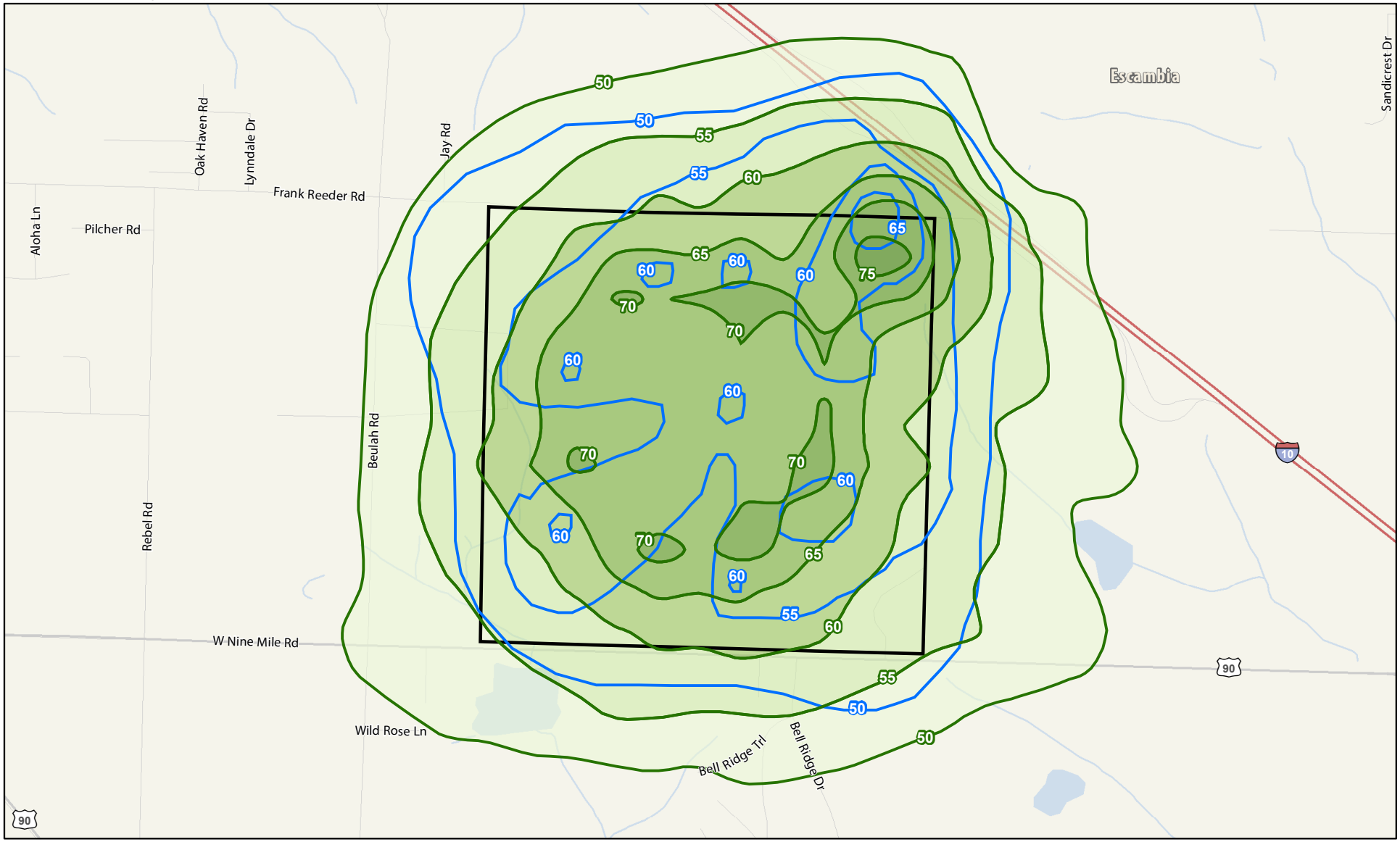
Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.9-4
2015 AICUZ Noise Gradients, NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-5_AICUZ_Noise_Contours_Comparison_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary
- 1990 AICUZ Noise Contours

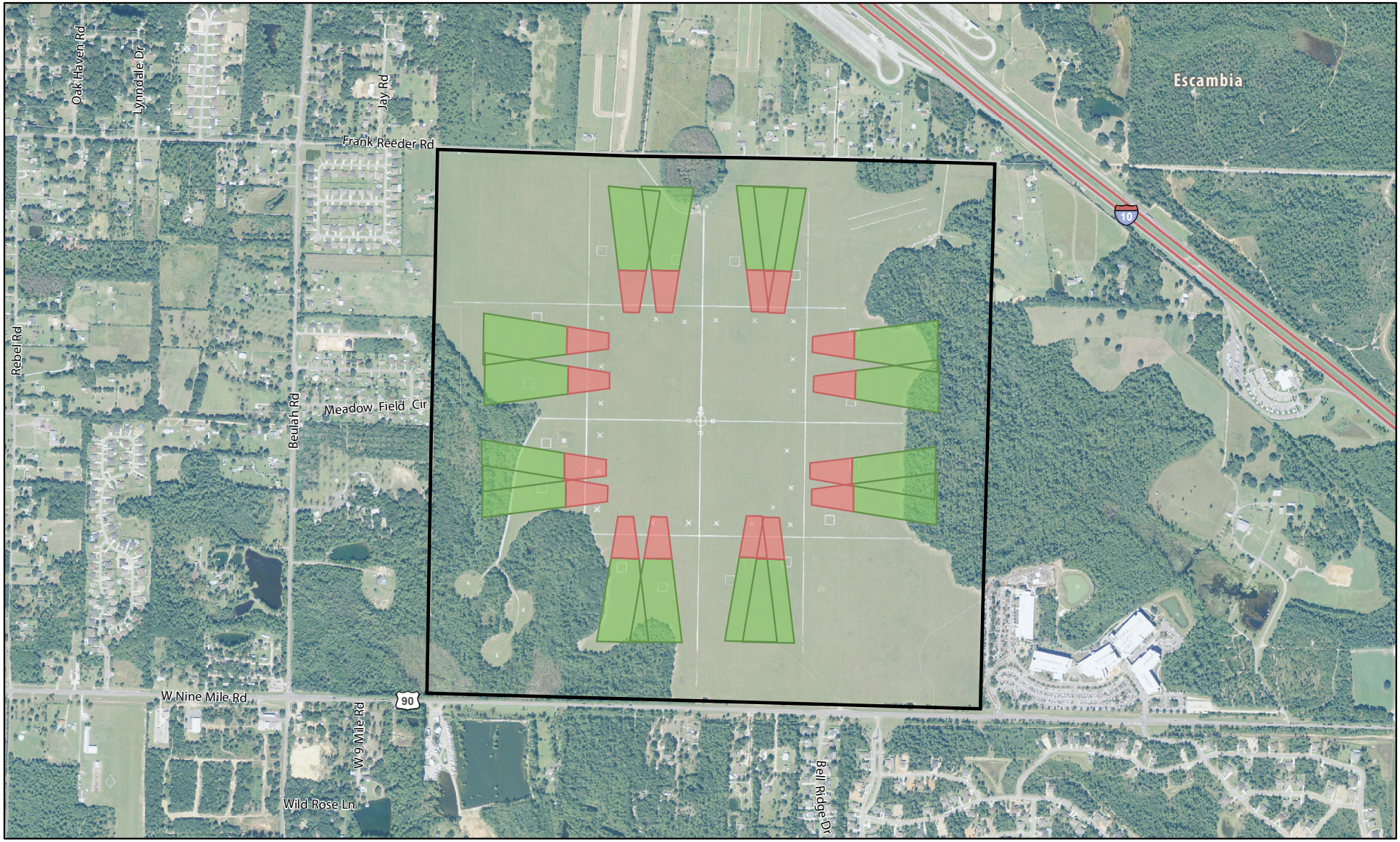
2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.9-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-6_2015_AICUZ_APZs_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary

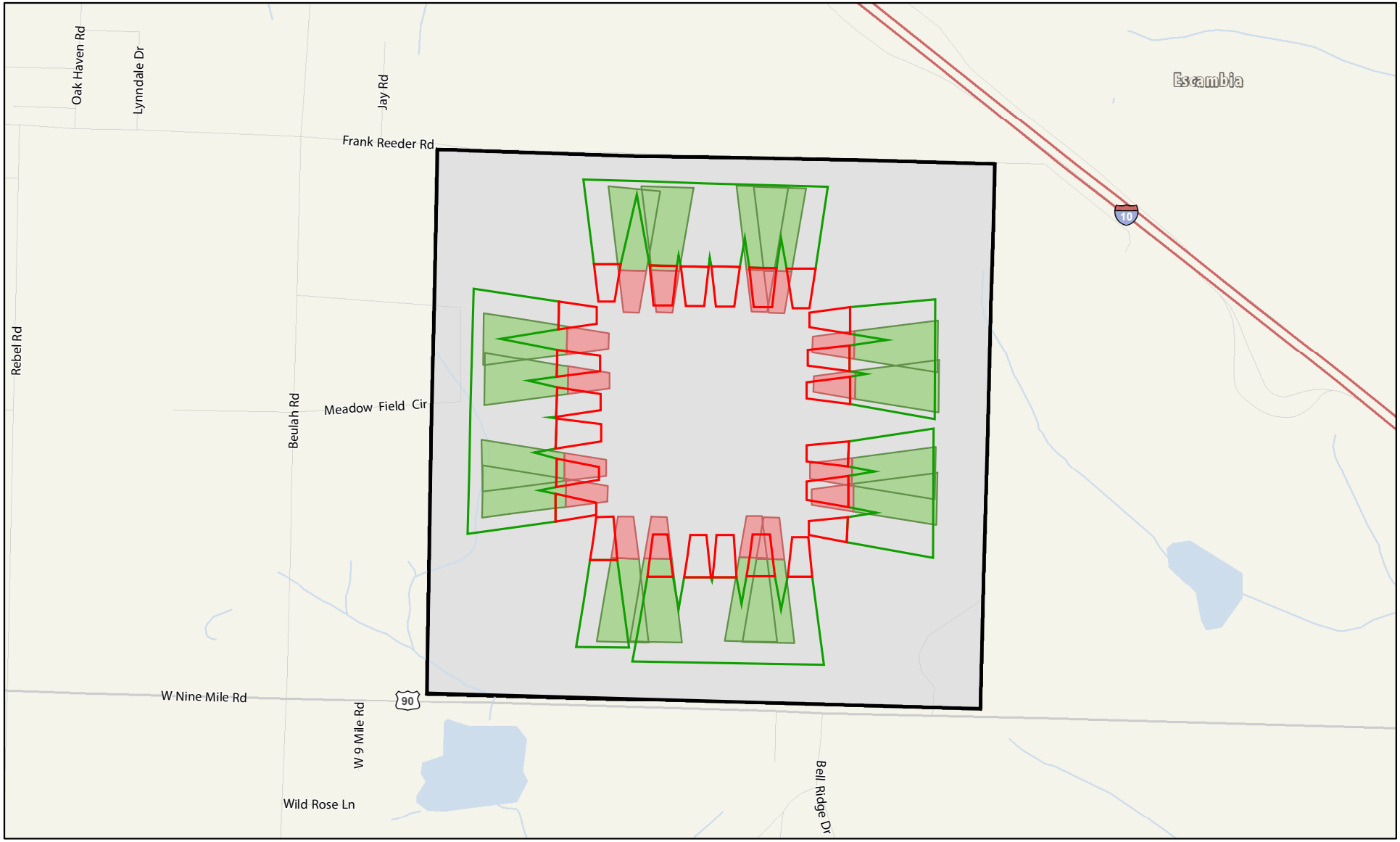
Accident Potential Zone (2015)

- Clear Zone
- APZ I

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2016, NAIP 2013.

Figure 7.9-6
2015 AICUZ APZs, NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-7_AICUZ_APZs_Comparison_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Site 8 Boundary

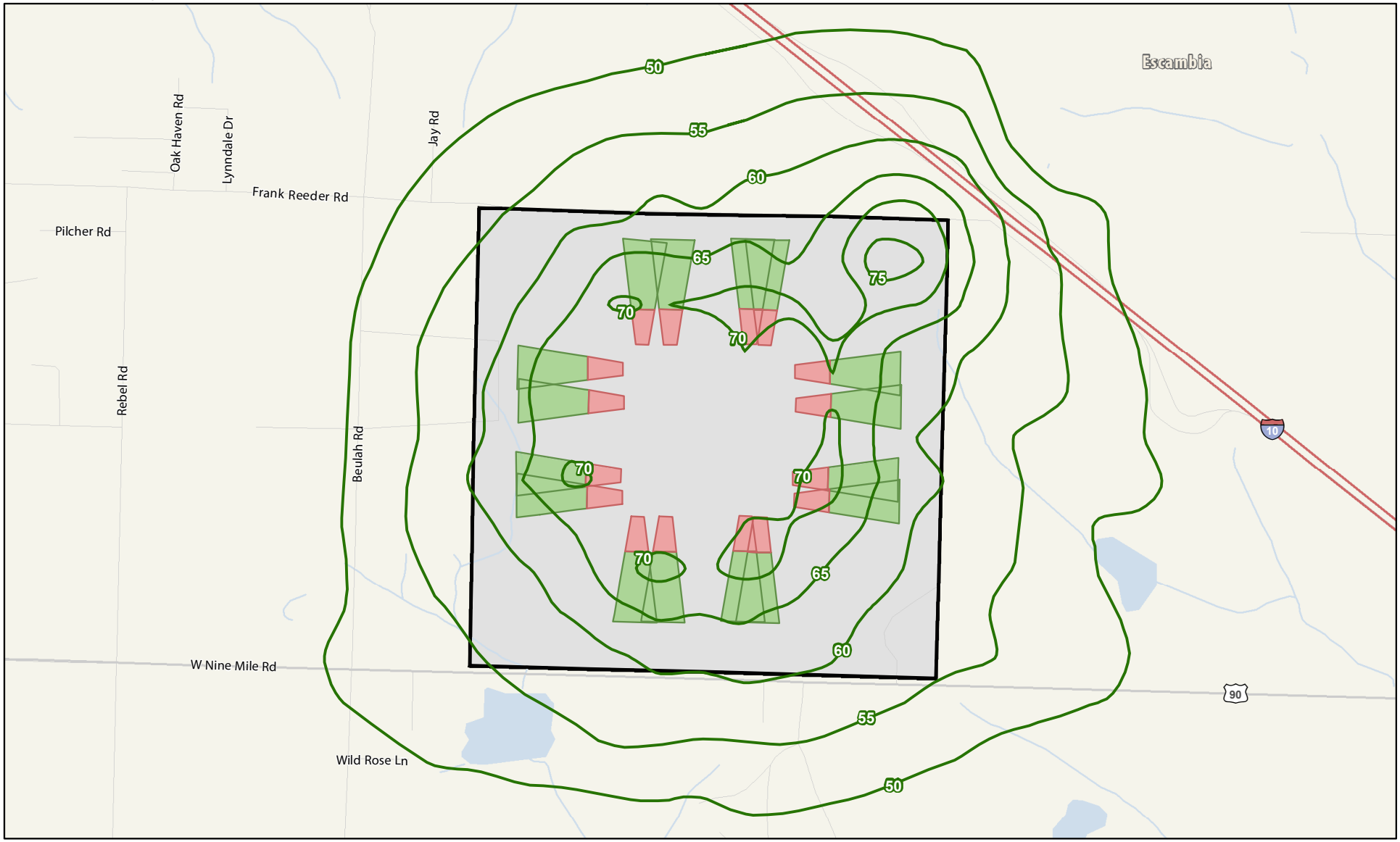
Accident Potential Zone (2015)
- Clear Zone
- APZ I

Accident Potential Zone (1990)
- Clear Zone
- APZ I

Figure 7.9-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-8_2015_AICUZ_Footprint_NOLF_Site8.mxd



Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Site 8 Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

N

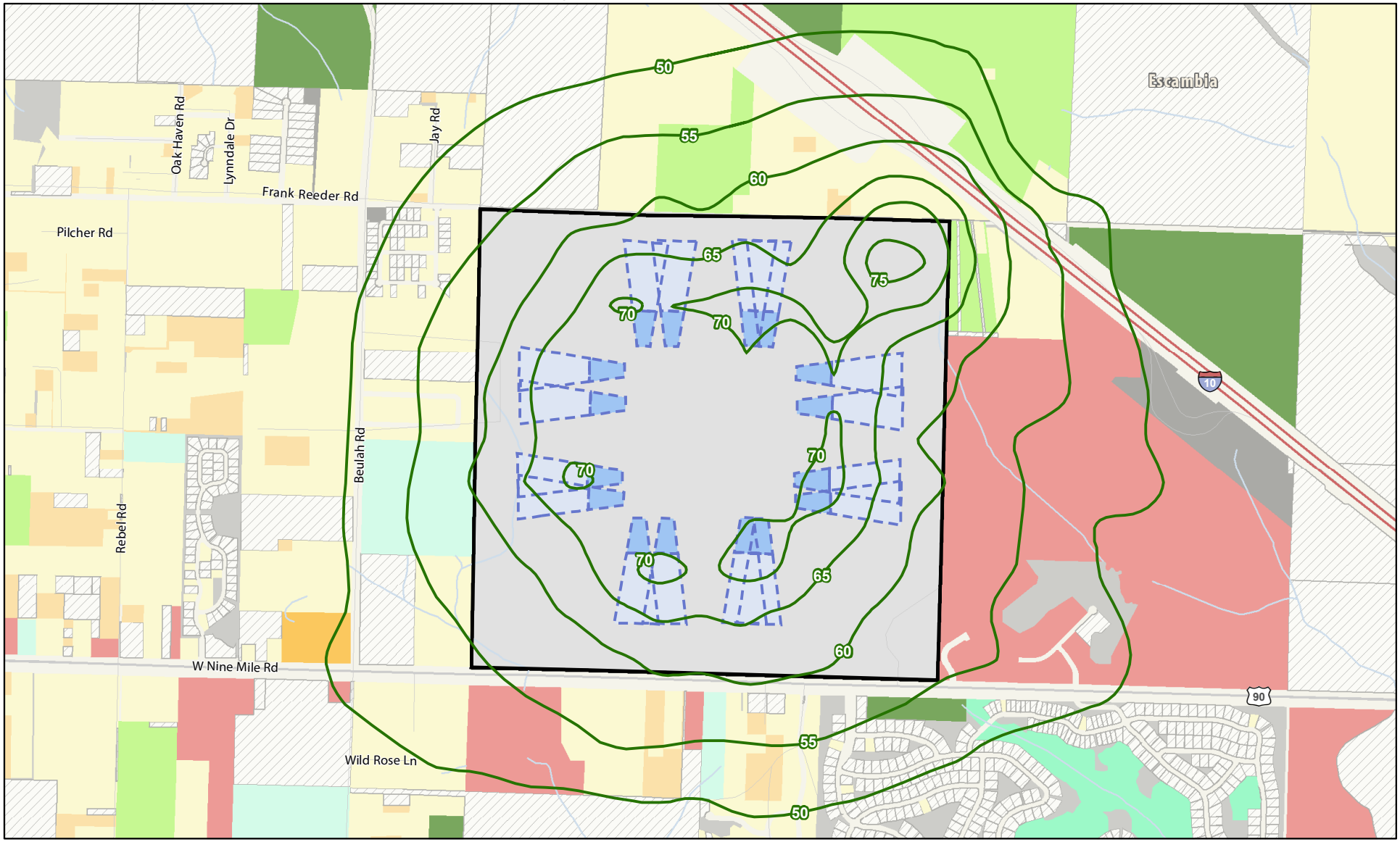
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.9-8
2015 AICUZ Footprint, NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-9_2015_AICUZ_Footprint_Existing_LU_NOLF_Site8.mxd



N

SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Escambia County 2015; Ecology and Environment, Inc. 2016.

Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Site 8 Boundary

Accident Potential Zone (2015)

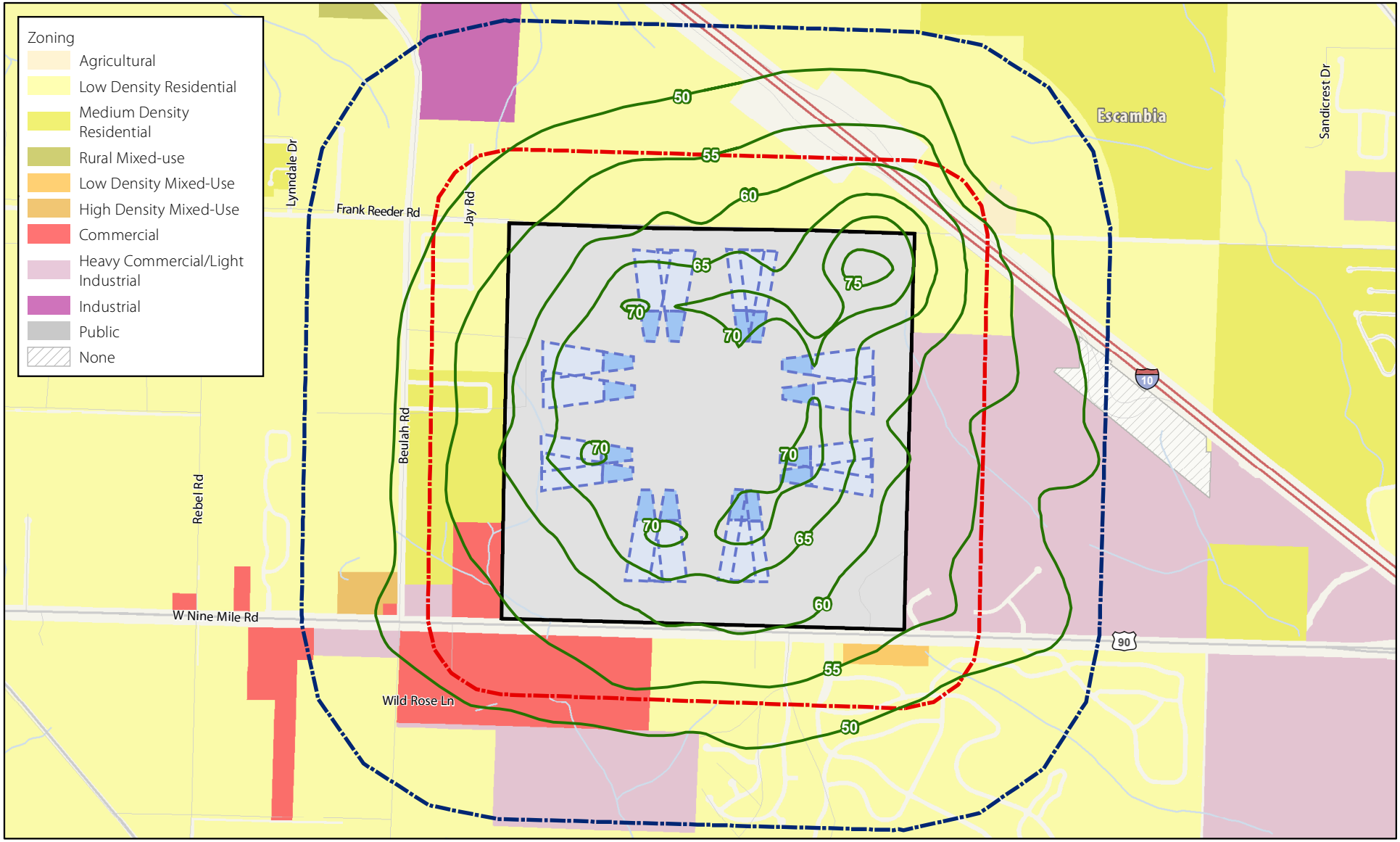
- Clear Zone
- APZ I

Existing Land Use

- Agricultural
- Commercial
- Conservation
- Institutional
- Military
- Mobile Home
- Mobile Home Park
- Public
- Single-Family Detached
- Utilities
- Vacant/Undeveloped
- Wooded/Silviculture

Figure 7.9-9
2015 Composite AICUZ Map, Existing Land Use, NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-10_2015_AICUZ_Footprint_Zoning_NOLF_Site8.mxd



SCALE
0 0.1 0.2 Miles

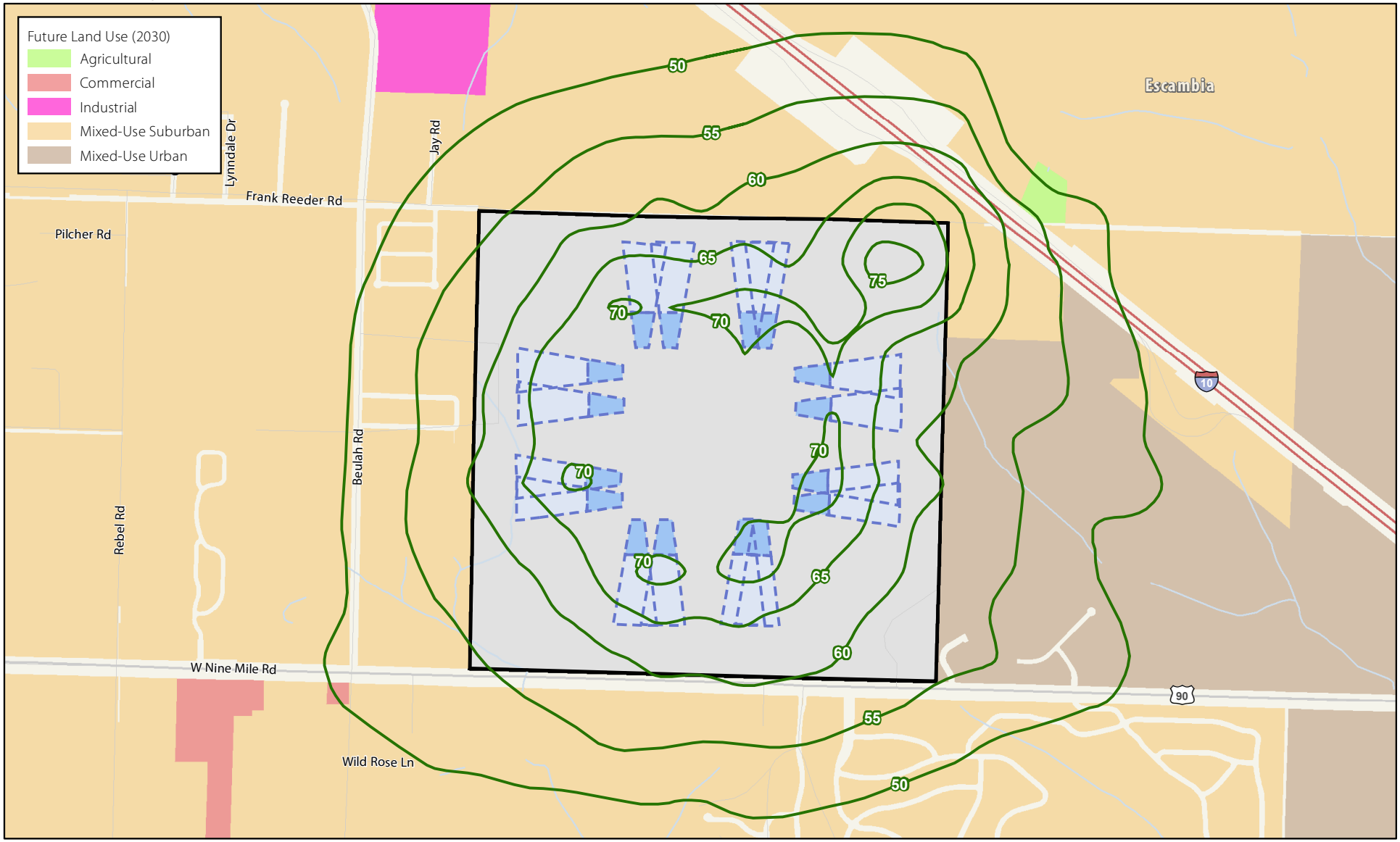
SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Escambia County 2015; Ecology and Environment, Inc. 2016.

Interstate
Major Highway
Other Major Road
Local Road
2015 AICUZ Noise Contours

Legend
NOLF Site 8 Boundary
Air Influence Planning District (AIPD) 1
Air Influence Planning District (AIPD) 2
Accident Potential Zone (2015)
Clear Zone
APZ I

Figure 7.9-10
2015 Composite AICUZ Map, Existing Zoning, NOLF Site 8
Escambia County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-11_2015_AICUZ_Footprint_Future_LU_NOLF_Site8.mxd



N

SCALE
0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Site 8 Boundary

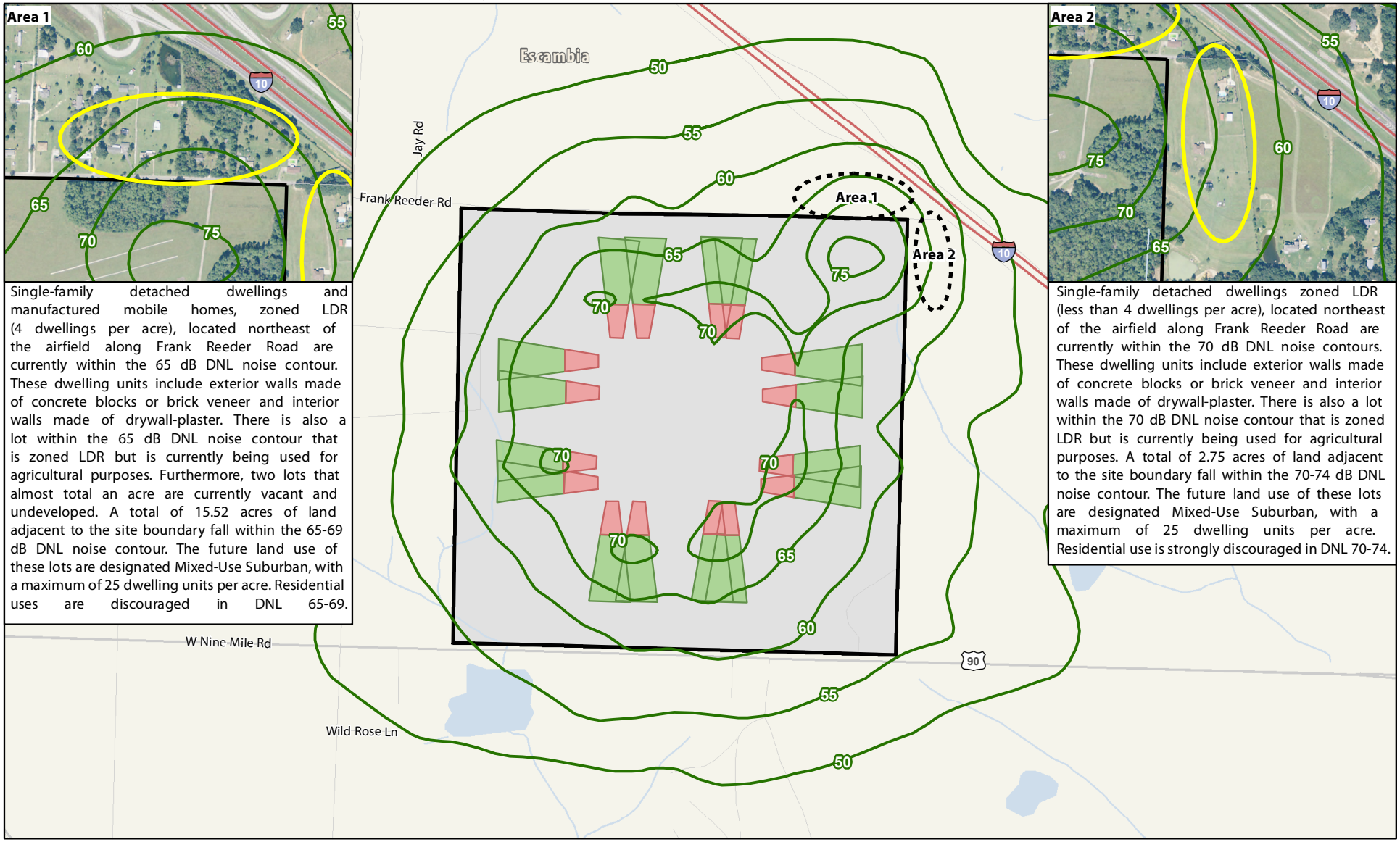
Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.9-11
2015 Composite AICUZ Map
Future Land Use,
NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015;
Escambia County 2015; Ecology and Environment, Inc. 2016.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Site_8\2016_Dec\7_9-12_Compatibility_Concerns_NOLF_Site8.mxd



Single-family detached dwellings and manufactured mobile homes, zoned LDR (4 dwellings per acre), located northeast of the airfield along Frank Reeder Road are currently within the 65 dB DNL noise contour. These dwelling units include exterior walls made of concrete blocks or brick veneer and interior walls made of drywall-plaster. There is also a lot within the 65 dB DNL noise contour that is zoned LDR but is currently being used for agricultural purposes. Furthermore, two lots that almost total an acre are currently vacant and undeveloped. A total of 15.52 acres of land adjacent to the site boundary fall within the 65-69 dB DNL noise contour. The future land use of these lots are designated Mixed-Use Suburban, with a maximum of 25 dwelling units per acre. Residential uses are discouraged in DNL 65-69.

Single-family detached dwellings zoned LDR (less than 4 dwellings per acre), located northeast of the airfield along Frank Reeder Road are currently within the 70 dB DNL noise contours. These dwelling units include exterior walls made of concrete blocks or brick veneer and interior walls made of drywall-plaster. There is also a lot within the 70 dB DNL noise contour that is zoned LDR but is currently being used for agricultural purposes. A total of 2.75 acres of land adjacent to the site boundary fall within the 70-74 dB DNL noise contour. The future land use of these lots are designated Mixed-Use Suburban, with a maximum of 25 dwelling units per acre. Residential use is strongly discouraged in DNL 70-74.

SCALE
0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Site 8 Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

Figure 7.9-12
Compatibility Concerns - 2015 Composite Map, NOLF Site 8
Escambia County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

NOLF PACE

SANTA ROSA COUNTY

FLORIDA

7.10 NOLF PACE COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Pace. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Pace Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Pace, Santa Rosa County, Florida	Figure 7.10-1
Representative Flight Tracks, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-2
NOISE CONTOURS	
2015 Noise Contours, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-3
2015 Noise Gradients, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-4
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-5
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-6
Comparison of 1990 and 2015 AICUZ APZs, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-7
COMPOSITE MAP	
2015 Composite AICUZ Footprint, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-8
LAND USE	
2015 AICUZ Footprint with Existing Land Use, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-9
2015 AICUZ Footprint with Existing Zoning, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-10
2015 AICUZ Footprint with Future Land Use, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-11
Compatibility Concerns - 2015 AICUZ Footprint, NOLF Pace, Santa Rosa County, Florida	Figure 7.10-12

AIRFIELD OPERATIONS

NOLF Pace is a rotary-wing training airfield located approximately 6 miles north of the community of Pace in Santa Rosa County, Florida (Figure 7.10-1). This NOLF is used for helicopter training operations, including arrivals and departures, standard patterns, 180-degree autorotation patterns, and 90-degree autorotation patterns. NOLF Pace is a grass airfield with no paved helipads or runways. There is a small structure located in the southeast corner of the airfield that is used by the "crash crew" and for crew changes.

As a planning document, AICUZ studies account for future missions and operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The number of aircraft operations at NOLF Pace has varied over time, as shown in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs. At NOLF Pace, the highest number of operations occurred in 2009, totaling 209,824, and the lowest number occurred during the prior year (2008), with 71,387 operations.

The baseline aircraft operations used for comparison in this AICUZ Study are from the 1990 AICUZ Study, which totaled 21,522 operations; however, it should be noted that this number depicts a period when NOLF Pace experienced an abnormally low amount of operations and was also closed for construction around that same timeframe. The number of airfield operations in CY2025 is projected to reach 184,781. This projected amount is in line with the amount of recent years' operations at NOLF Pace, as noted in Section 3.2. Table 7.10-1 shows the modeled distribution of the projected annual airfield operations for NOLF Pace.

TABLE 7.10-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF PACE

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	4,400
Arrival	4,400
Standard Pattern	140,785
180° Autorotation	17,598
90° Autorotation	17,598
TOTAL	**184,781**
1990 AICUZ Total	**21,522**

Sources: BRRC 2015; NAS Whiting Field 2010

FLIGHT TRACKS

The primary aircraft operating at NOLF Pace is the TH-57. The field is not equipped for nighttime use; therefore, all operations are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.). There is a maximum of eight aircraft allowed to operate at NOLF Pace at one time, with four aircraft permitted on each side of the airfield. The field is divided into identical left and right sides by a centerline based on the course in use. Each side is divided into three lanes. All departures take place from the southeast corner of the field. Operations are prohibited south of the access road located along the eastern field boundary and in the northwest corner of the field. Figure 7.10-2 depicts flight tracks for NOLF Pace.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section illustrates the 2015 AICUZ noise contours for NOLF Pace and describes the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ (1990) and the 2015 AICUZ noise contours. This comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. The comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NOLF Pace's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The noise models are based on TH-57 aircraft operations for NOLF Pace. The majority of the noise contours are concentrated within, and overlay the area in the immediate vicinity of, the NOLF boundary (Figure 7.10-3). Of the noise contours located outside the NOLF boundary, most are within the 50 to 55 dB DNL, 55 to 60 dB DNL, and 60 to 65 dB DNL noise contours. These 2015 AICUZ noise contours extend farther outside NOLF Pace's boundaries when compared to the 1990 AICUZ noise contours; however, all of these noise contours are within Noise Zone 1 (area of low or now impact). The 65 to 70 dB DNL noise contour extends slightly outside of the NOLF boundary in the northern and western portions of the airfield. While this contour is within Noise Zone 2 (area of moderate impact), the land is forested and has no structures. Figure 7.10-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over the surrounding land area.

The 2015 AICUZ noise contours for NOLF Pace are different in size, shape, and location when compared to the 1990 AICUZ noise contours (Figure 7.10-5). Changes between the 1990 and 2015 AICUZ noise contours are attributed to several factors, including:

- ☐ Changes in operational levels (the number of operations has increased from the 1990 to the 2015 AICUZ studies);
- ☐ Changes in operational location (course utilization depends on airfield conditions); and

☐ Improved noise mapping techniques (discussed in Section 1.4).

When comparing impacts between the 1990 and 2015 AICUZ noise contours (both on- and off-station), noise contours have increased by 633 acres, with the majority of increased acreage located within Noise Zone 1. Of the off-station areas within the 2015 AICUZ noise contours, only 4 acres are located in the 65 to 70 dB DNL noise contour (Noise Zone 2). Table 7.10-2 provides acreages of land areas within specific noise contours at NOLF Pace; acreages for off-station impacts are also provided.

TABLE 7.10-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF PACE

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	264	144	457	457
55-60 dB DNL	58	2	248	244
60-65 dB DNL	11	0	134	55
65-70 dB DNL	0	0	82	4
70-75 dB DNL	0	0	36	0
>75 dB DNL	0	0	9	0
TOTAL AREA	**333**	**146**	**966**	**760**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours.

IMAGINARY SURFACES

As noted in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the landing area and corresponding flight path and become less restrictive as the distance from the landing area increases. Imaginary surface data were unavailable for rotary-wing airfields at the NAS Whiting Field Complex; therefore, they were not analyzed as part of this study for NOLF Pace.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based on analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NOLF Pace (Figure 7.10-6), including an analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ Study APZs (Figure 7.10-7). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and assists in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NOLF Pace are provided and discussed in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all VFR landing areas, and APZ I is required for all landing areas that support daily training and operational missions. A comparison of the 1990 and 2015 AICUZ Clear Zones and APZ I shows a total decrease in coverage by approximately 40 acres. This decrease in coverage is primarily associated with changes in the types and locations of annual operations conducted at NOLF Pace. Approximately 67 acres of off-station lands are impacted by

APZ I; however, the majority of the land use in these areas is agriculture or silviculture. No off-station land is impacted by the Clear Zone. Table 7.10-3 compares the 1990 and 2015 AICUZ acreages within the Clear Zones and APZ I for NOLF Pace.

TABLE 7.10-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZ I (ACRES), NOLF PACE

DATA	LOCATION	CLEAR ZONE		APZ I		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	58	0	13	0	71
	Off-Station	0	0	93	0	93
	TOTALS	58	0	106	0	**164**
		58		**106**		
2015 AICUZ	On-Station	32	0	25	0	57
	Off-Station	0	0	67	0	67
	TOTALS	32	0	92	0	**124**
		32		**92**		

Notes:
[1] Acreage data calculated in 2016 in coordination with the development of the 2015 AICUZ Study.
[2] No waterbodies are located within 2015 APZs.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Pace. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Pace, presented on Figure 7.10-8, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study were presented in Section 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

Santa Rosa County Residential Densities

- Agriculture/Rural Residential: 1 du/acre
- Agriculture: 1 du/15 acres
- Rural Residential Single-Family: 2 du/acre
- Mixed Residential Subdivision: 4 du/acre
- Single-Family Residential: 4 du/acre

Land use is a term given to describe the management of land and the extent to which it has been modified and utilized. Typical land cover types include agricultural, residential, recreational, commercial, industrial, and conservation areas. Patterns of land use arise naturally in communities, but are guided by regulations and development codes from local government. Figure 7.10-9 illustrates existing land uses surrounding NOLF Pace. Land use surrounding NOLF Pace features low-intensity development with mostly agriculture, silviculture, and publically owned recreational space. Land to the west of the airfield is used for silviculture, which has limited residential land use. Agriculture use is predominant along the north, east, and south airfield boundaries, with a small pocket of agricultural homestead use. These uses are designed to provide suitable areas for agricultural and silviculture endeavors. According to Santa Rosa County, permitted uses surrounding NOLF Pace include detached single-family residential structures and manufactured homes, as well as accessory structures, facilities, and uses customarily found on farms and used expressly for activities conducted in connection with farming operations. Farther from the boundary, there are single-family residential uses to the northeast of the airfield along the northeast side of Chumuckla Highway.

Overall, the land use around NOLF Pace reveals a pattern of very low-density development, with an abundance of undeveloped/vacant lands surrounding the airfield. Future development of these vacant lands could directly impact the AICUZ footprint at NOLF Pace. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.10-10 illustrates existing zoning surrounding NOLF Pace. In general, much of the land surrounding NOLF Pace remains undeveloped or vacant, with the primary zoning consisting of agriculture/rural residential (AG-RR). Land to the west of the airfield has a zoning designation of agriculture (AG). To the north, east, and south of the airfield, the land is zoned as

Zoning District Classifications

AG-RR: Agriculture/ Rural Residential

AG: Agriculture

RR-1: Rural Residential Single-Family

R-1M: Mixed Residential Subdivision

R-1: Single-Family Residential

MAZ: Military Airport Zone

Source: City's Land Use and Development Ordinance

agriculture/rural residential. Other zoning in proximity to the airfield is a small pocket of rural residential (RR-1) to the southeast and a mixed residential subdivision (R-1M) to the northeast. Both are on the opposite side of Chumuckla Highway and do not pose any present incompatibility concerns. Existing zoning adjacent to the airfield indicates the potential for growth around the NOLF within the agriculture/rural residential and agriculture zones.

Per Santa Rosa County's Comprehensive Plan 2008-2025, a military airport zone (MAZ) overlay district extending approximately 0.5 mile from the perimeter of the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Pace. This was instituted as part of the JLUS adopted by the County in 2005 to prevent negative impacts to current and long-term viable use of the airfield, and to promote the health and welfare of citizens living in proximity of the airfield by limiting incompatible land uses and allowing compatible land uses within the area. Figure 7.10-10 also illustrates the land area designated as a MAZ that extends over the NOLF and encompasses the AICUZ footprint and noise zones for NOLF Pace. In addition to these zoning designations, there are also areas surrounding the airfield with an APZ designation associated with their zoning use. An example is the "agriculture-APZ" designation, which is based on the 1990 baseline APZs that were recognized by the County in their Comprehensive Plan 2008-2025. The MAZ district, along with the zoning classifications with "APZ" added to them, are regulatory designations intended to implement specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations.

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.10-11 illustrates the future land uses surrounding NOLF Pace. The future land use pattern around NOLF Pace is consistent with current development trends, with the majority of future land use being agriculture, conservation/recreation, and military designations. The publicly owned property to the east of the field has a future land use designation of conservation/recreation. Pockets of single-family residential land use remain at both the northeast and southeast corners of the airfield. However, they are not within any APZs or noise zones of concern, and they are located on the opposite side of

Chumuckla Highway. There are ongoing efforts to work cooperatively with local and regional governments to ensure compatibility.

Any future development in those areas around NOLF Pace will most likely result in an increase in population density. Overall, the land use around the airfield is a mixture of agriculture and low-density residential areas. Future land use indicates the potential for growth around the NOLF within the agriculture and single-family residential areas. Therefore, future land uses within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Pace is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Pace's noise zones, Clear Zones, and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Pace, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County parcel data, land use classification, and zoning district information. The evaluation was performed at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 provides a breakdown of land use compatibility for noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. There are 2015 AICUZ noise contours for NOLF Pace that extend off-station. The impact areas off-station are primarily in the 50 to 65 dB DNL noise contour, which is within Noise Zone 1 (area of low to no impact). Limited areas of off-station lands are within the 65 to 70 dB DNL noise contour on the north and west field boundary; this contour is within Noise Zone 2 (area of moderate impact). However, the off-station areas within Noise Zone 2 are currently used as timberlands and agricultural land and have no development.

Based on the data, there are no incompatible land uses within any of the Clear Zones associated with NOLF Pace, since the land under the Clear Zones are on-station. However, there is a potential incompatible land use and concern for off-station land within APZ I related to designated zoning. As illustrated on Figure 7.10-12, APZs have the potential to impact the off-

station areas, primarily along the boundary where the APZs extend from the airfield. The areas impacted are zoned low-density residential and are described below.

- ☐ Area 1: Agriculture/silviculture use parcels located on the western and northern boundaries are within the 65 to 70 dB DNL noise contour (Noise Zone 2). There are no residential dwellings within this noise contour, though current and future land use allows for them. Residences are discouraged within Noise Zone 2.

- ☐ Area 2: There are agriculture/rural residential parcels located within APZ I emanating from the airfield's four corners. There are no residential dwellings within APZ I, though current and future land use allows for them. Residential uses within APZ I are an incompatible land use.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF PACE

The land uses around NOLF Pace that are identified in this section are generally compatible with air station activities, but have the potential to become compatibility concerns. The Navy and Santa Rosa County should continue to monitor these land uses, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Pace. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones, APZs, and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly agricultural and residential, which could possibly pose compatibility concerns in the future. The County's Comprehensive Plan provides a MAZ overlay district around the airfield and encompassing the AICUZ footprint for NOLF Pace. The Santa Rosa County Planning and Zoning Commission should update their MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study. Additionally, the County and NAS Whiting Field should continue to work together to fully implement the MAZ district with development restrictions for

areas inside and outside the established APZs at NOLF Pace that have been identified as current compatibility concerns or are most likely to present compatibility issues in the future.

As mentioned in Article Eleven of the County's Land Development Code, no structure will be constructed within the Clear Zones, and there will be a height restriction of 35 feet for single-family residential and non-residential structures within APZ I. Multiple family residential, water towers, communication towers/radio or TV transmission towers, and regional electric transmission lines are incompatible structures within APZ I. Article Eleven also states that any contract for the sale of residential property that is located in whole or part within a Military Airport Notification Zone shall include, as an attachment to the contract of sale, a Military Airport Disclosure Notice, in a form approved by Santa Rosa County. Furthermore, the County, as stated in the 2003 JLUS, should require that subdivision plans delineate boundaries of all current APZs and noise contours, or indicate whether the entire property occurs within such zones.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Pace and OPNAVINST 11010.36C. This update will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Pace.

MONITOR AREAS OF POTENTIAL CONCERN

There are some vacant lands zoned agriculture and agriculture/rural residential surrounding NOLF Pace that are within APZ I and the 65 to 70 dB DNL noise contour (Noise Zone 2). These areas should be continuously monitored for changes to the development density, and the Navy should communicate with the planning authorities to discuss concerns regarding incompatible land uses. These areas will become a compatibility concern, per AICUZ criteria, if residential development is allowed.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. The Navy should continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals, especially within APZ I. In addition, Santa Rosa County should continue Policy 2.1.B.1 of the Comprehensive Plan to pursue the purchase of land surrounding NOLF Pace for the purposes of protecting these bases from encroachment and to attract complementary business uses. If it is not possible to purchase development rights and/or property, then the County should approach property owners for potential partnering to ensure compatible land uses. Whether accomplished by the Navy or the County, such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

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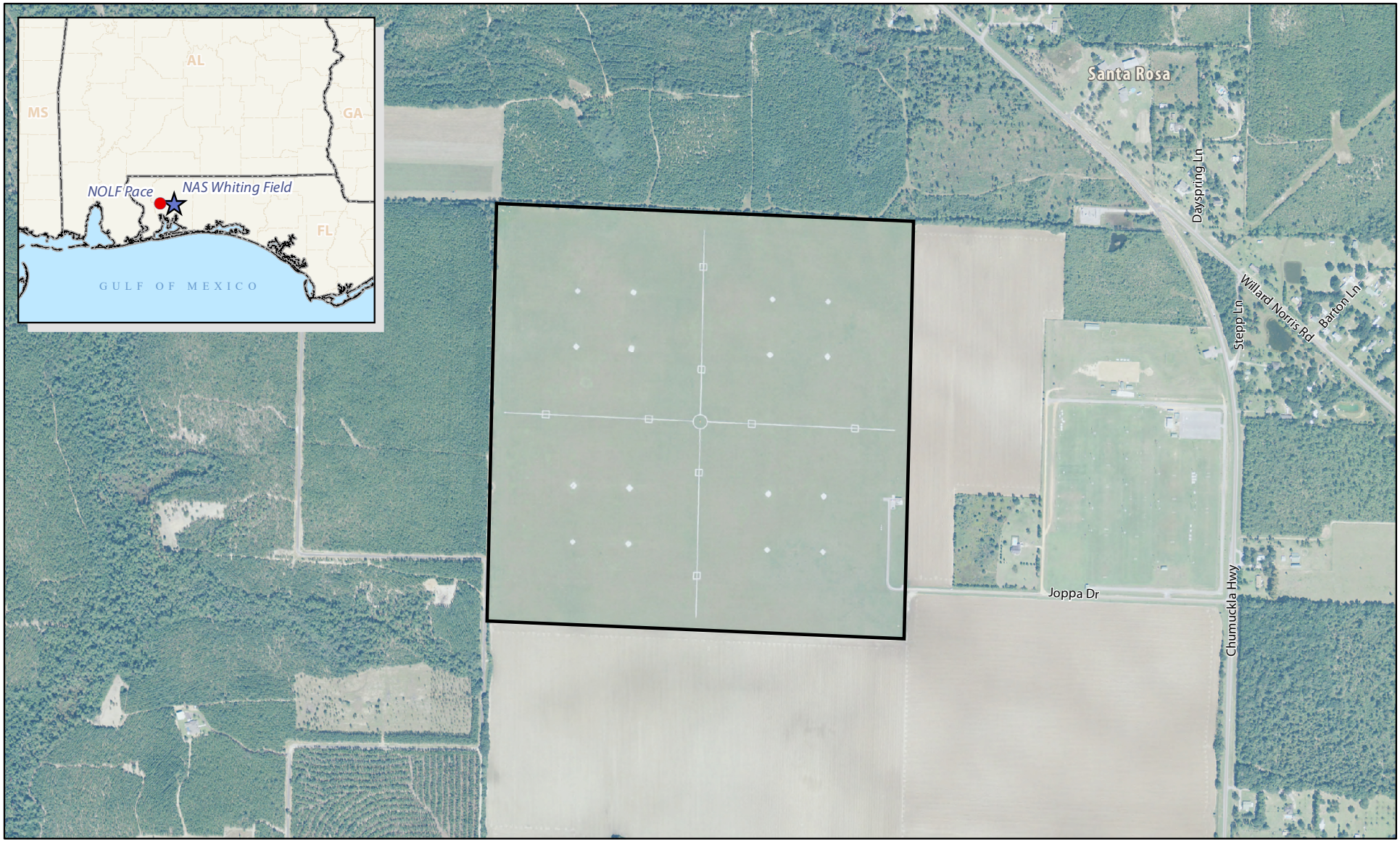


N

SCALE

0 0.1 0.2 Miles

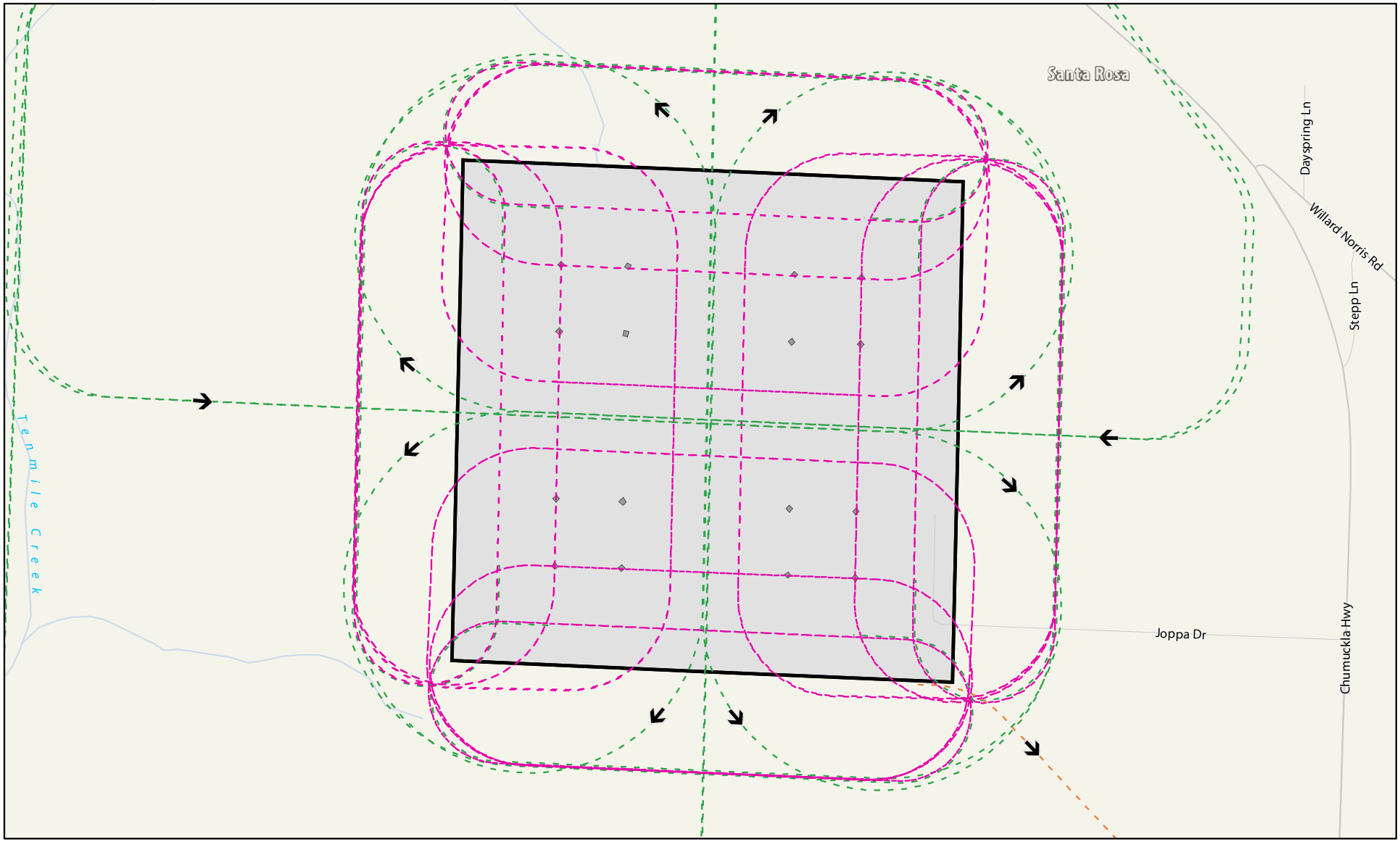
Legend

- Major Road
- Local Road
- NOLF Pace Boundary

Figure 7.10-1
NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-2_Representative_Flight_Tracks_NOLF_Pace.mxd



N

SCALE

0 0.1 0.2 Miles

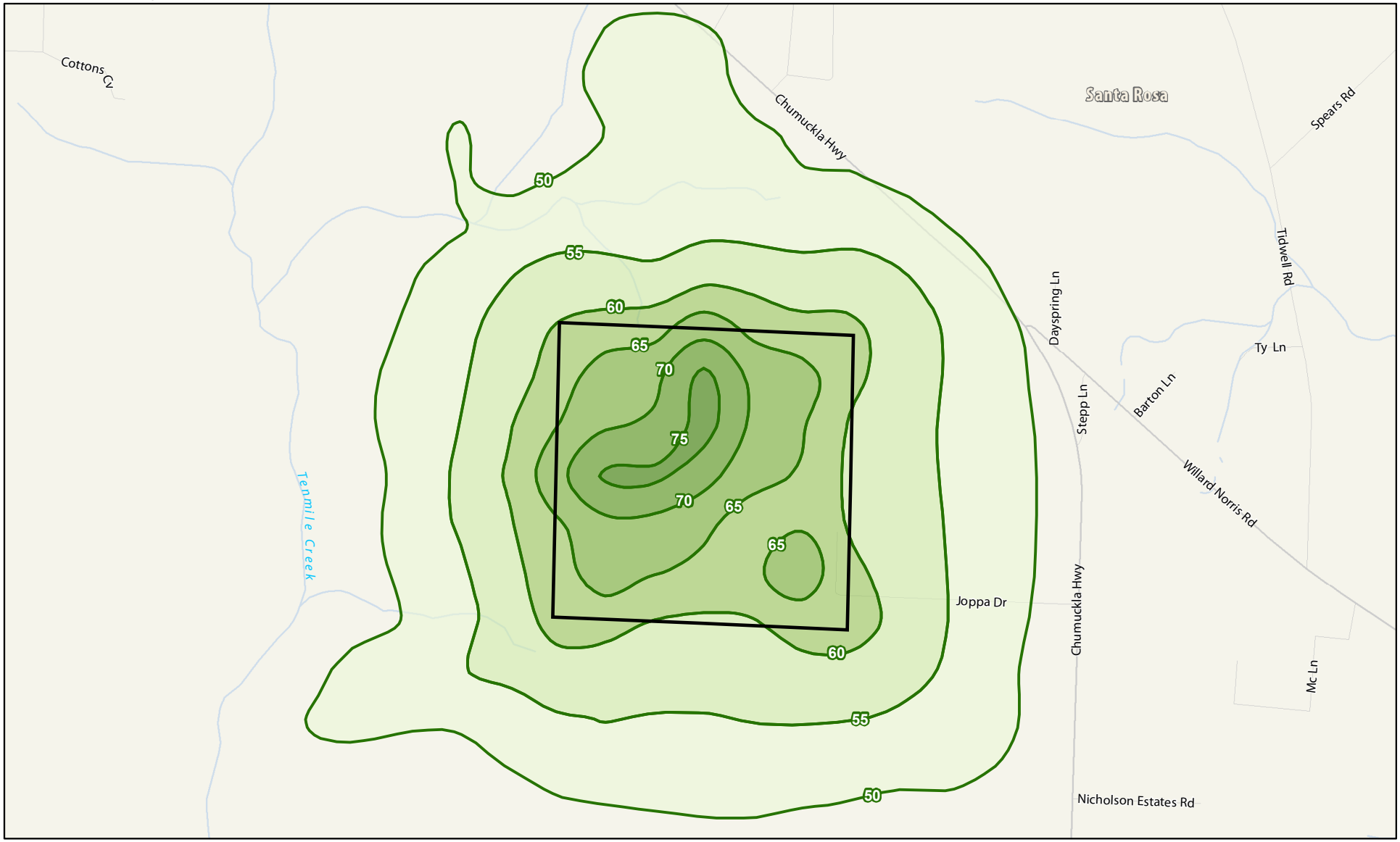
Legend

- Major Road
- Local Road
- Helipad
- NOLF Pace Boundary
- Arrival
- Closed Pattern
- Departure

Figure 7.10-2
Representative Flight Tracks, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-3_2015_AICUZ_Noise_Contours_NOLF_Pace.mxd



SCALE

0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- NOLF Pace Boundary

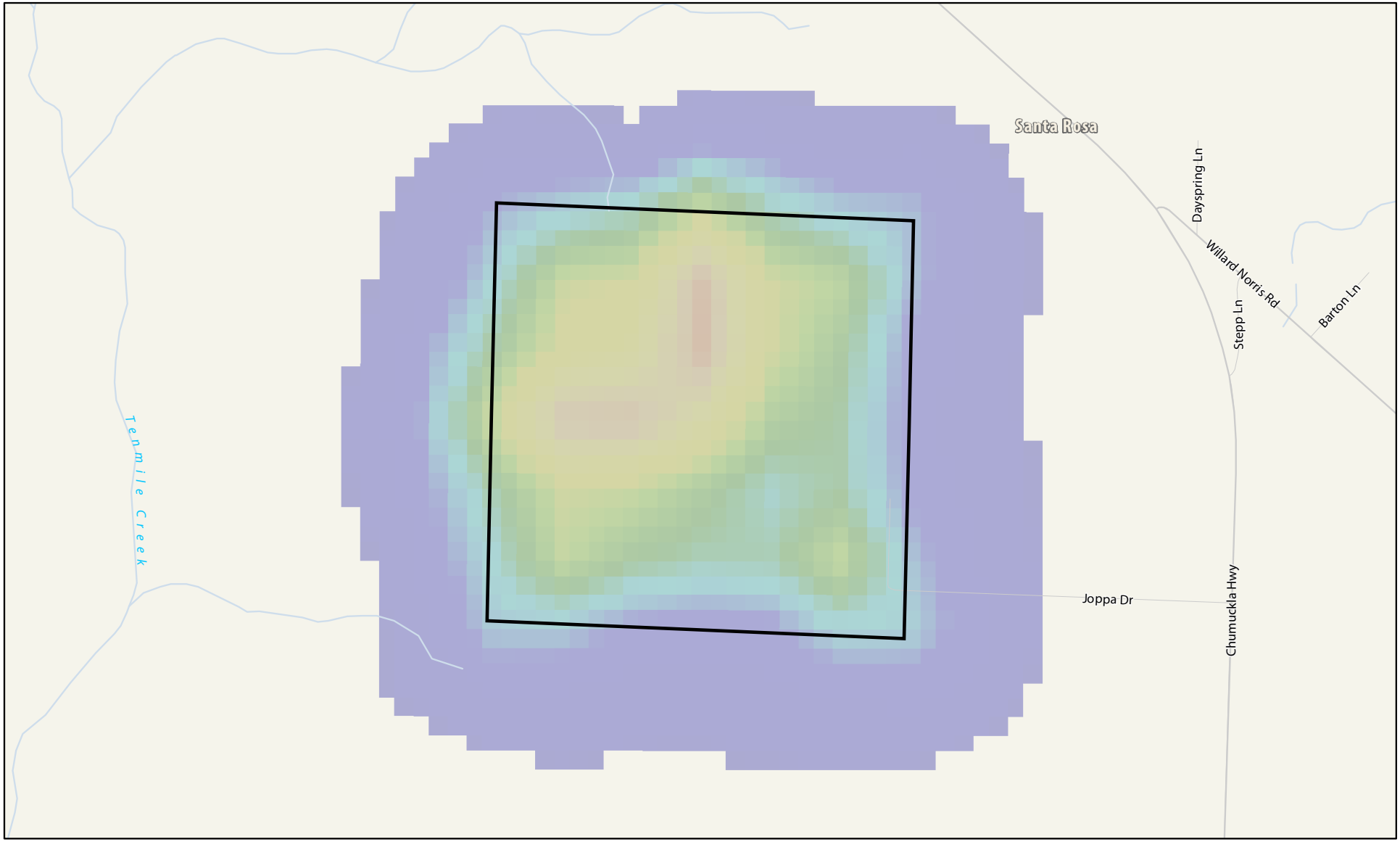
dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.10-3
2015 AICUZ Noise Contours, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-4_2015_AICUZ_Noise_Gradients_NOLF_Pace.mxd



SCALE
0 0.1 0.2 Miles

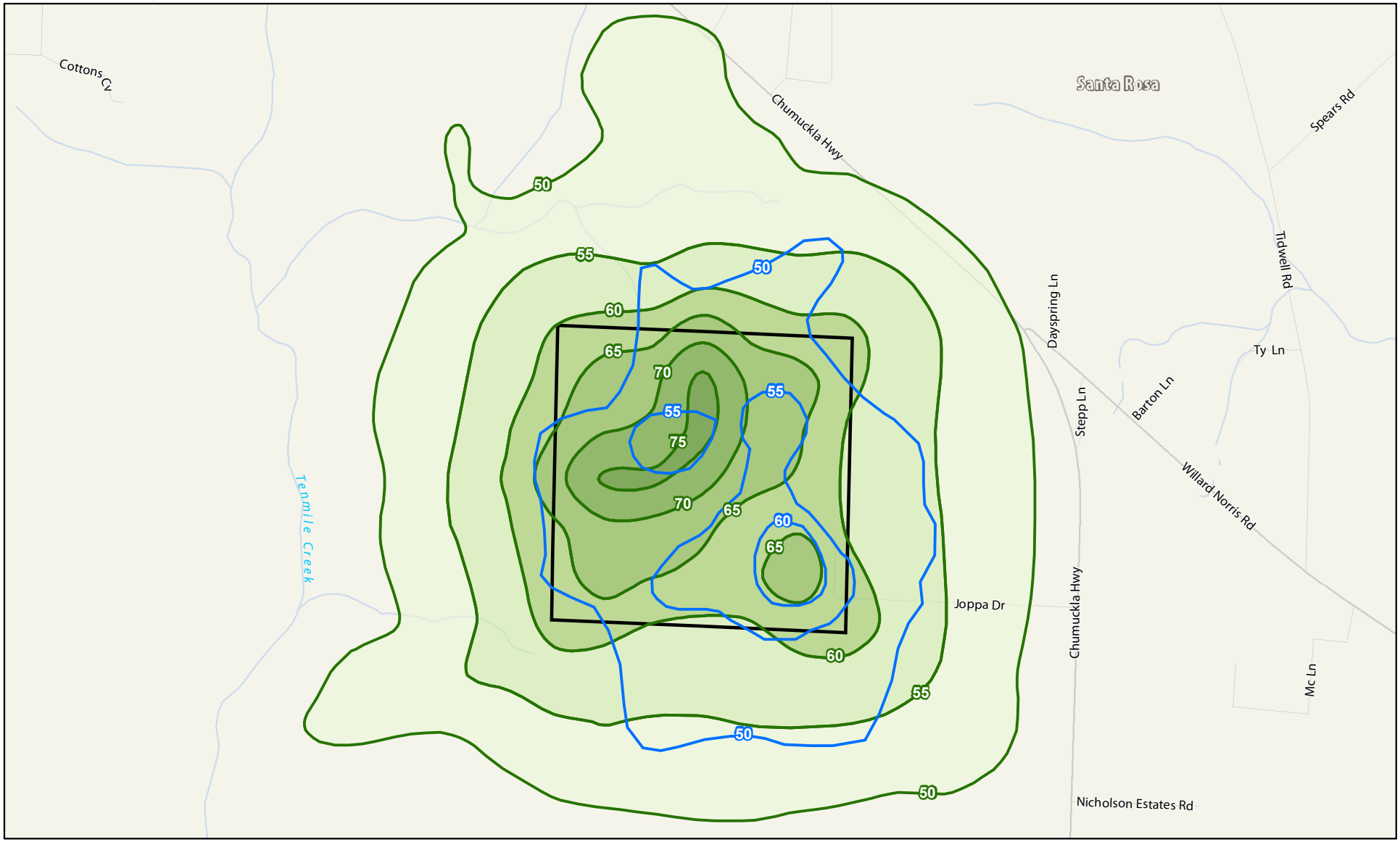
Legend
Major Road
Local Road
NOLF Pace Boundary

Noise Gradient (dB DNL)
55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.10-4
2015 Noise Gradients, NOLF Pace
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-5_AICUZ_Noise_Contours_Comparison_NOLF_Pace.mxd



SCALE

0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- 1990 AICUZ Noise Contours
- NOLF Pace Boundary

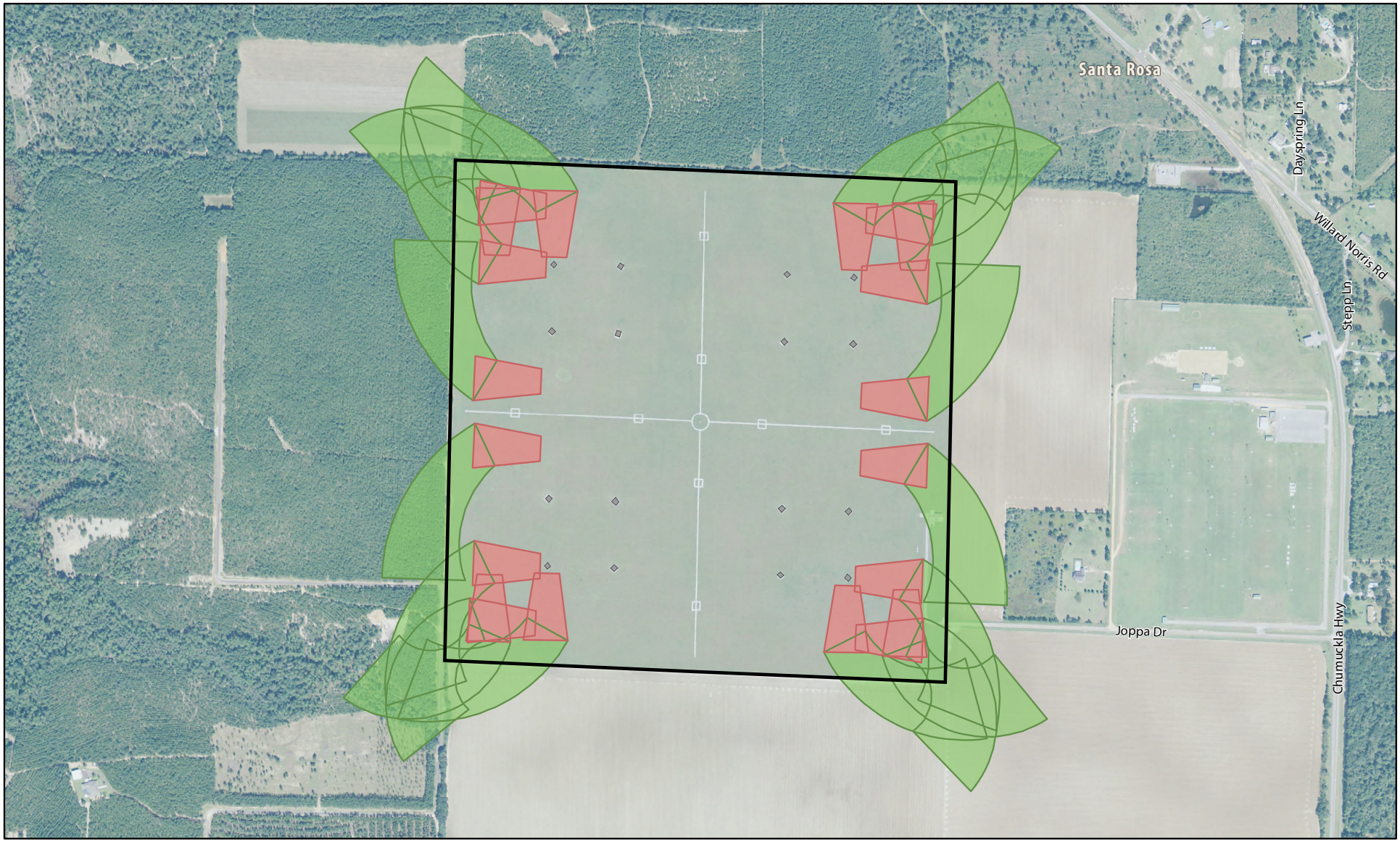
2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL

Figure 7.10-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-6_2015_AICUZ_APZs_NOLF_Pace.mxd



SCALE
0 0.1 0.2 Miles

Legend

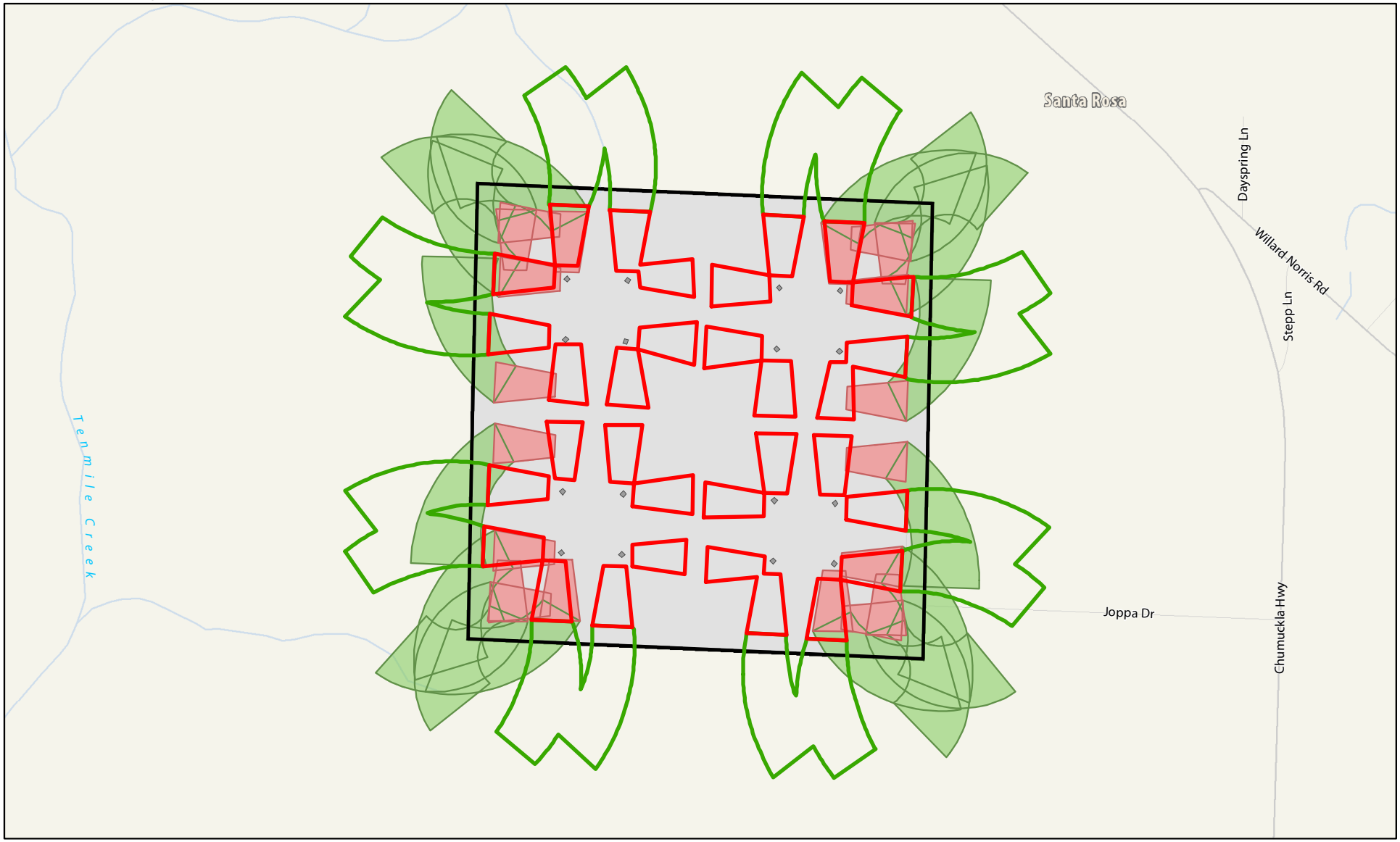
- Major Road
- Local Road
- Helipad
- NOLF Pace Boundary

Accident Potential Zone (2015)
- Clear Zone
- APZ I

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2016; NAIP 2013.

Figure 7.10-6
2015 AICUZ APZs, NOLF Pace
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-7_AICUZ_APZs_Comparison_NOLF_Pace.mxd



SCALE
0 0.1 0.2 Miles

Legend

- Major Road
- Local Road
- Helipad
- NOLF Pace Boundary

Accident Potential Zone (2015)
- Clear Zone
- APZ I

Accident Potential Zone (1990)
- Clear Zone
- APZ I

Figure 7.10-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-8_2015_AICUZ_Footprint_NOLF_Pace.mxd



Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Helipad
- NOLF Pace Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

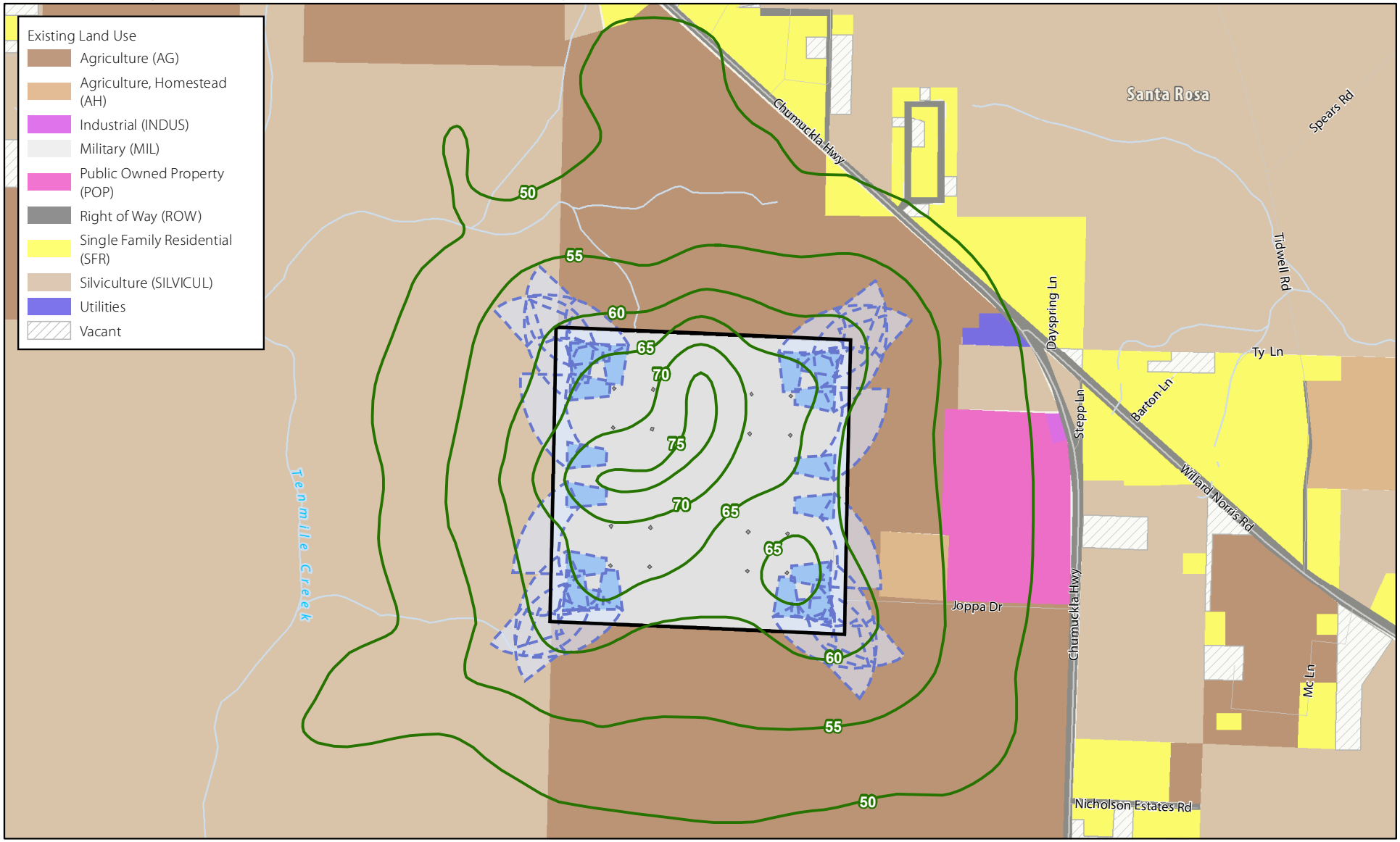
SCALE

0 0.2 0.4 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.10-8
2015 AICUZ Footprint, NOLF Pace
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-9_2015_AICUZ_Footprint_Existing_LU_NOLF_Pace.mxd



SCALE

0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Helipad
- NOLF Pace Boundary

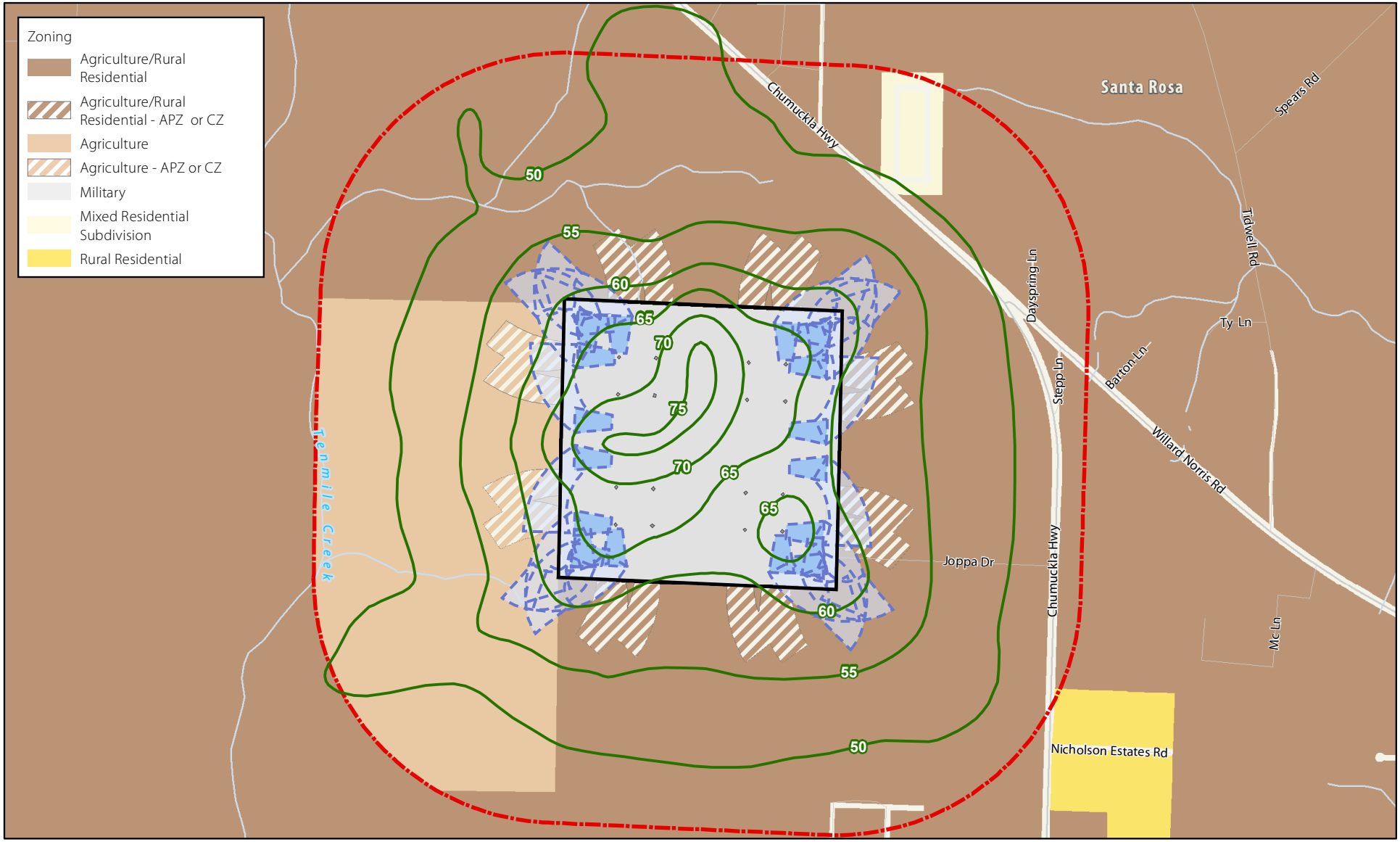
Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.10-9
2015 Composite AICUZ Map, Existing Land Use, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-10_2015_AICUZ_Footprint_Existing_Zoning_NOLF_Pace.mxd



SCALE

0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Helipad
- Military Airport Zone
- NOLF Pace Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.10-10
2015 Composite AICUZ Map, Existing Zoning, NOLF Pace
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

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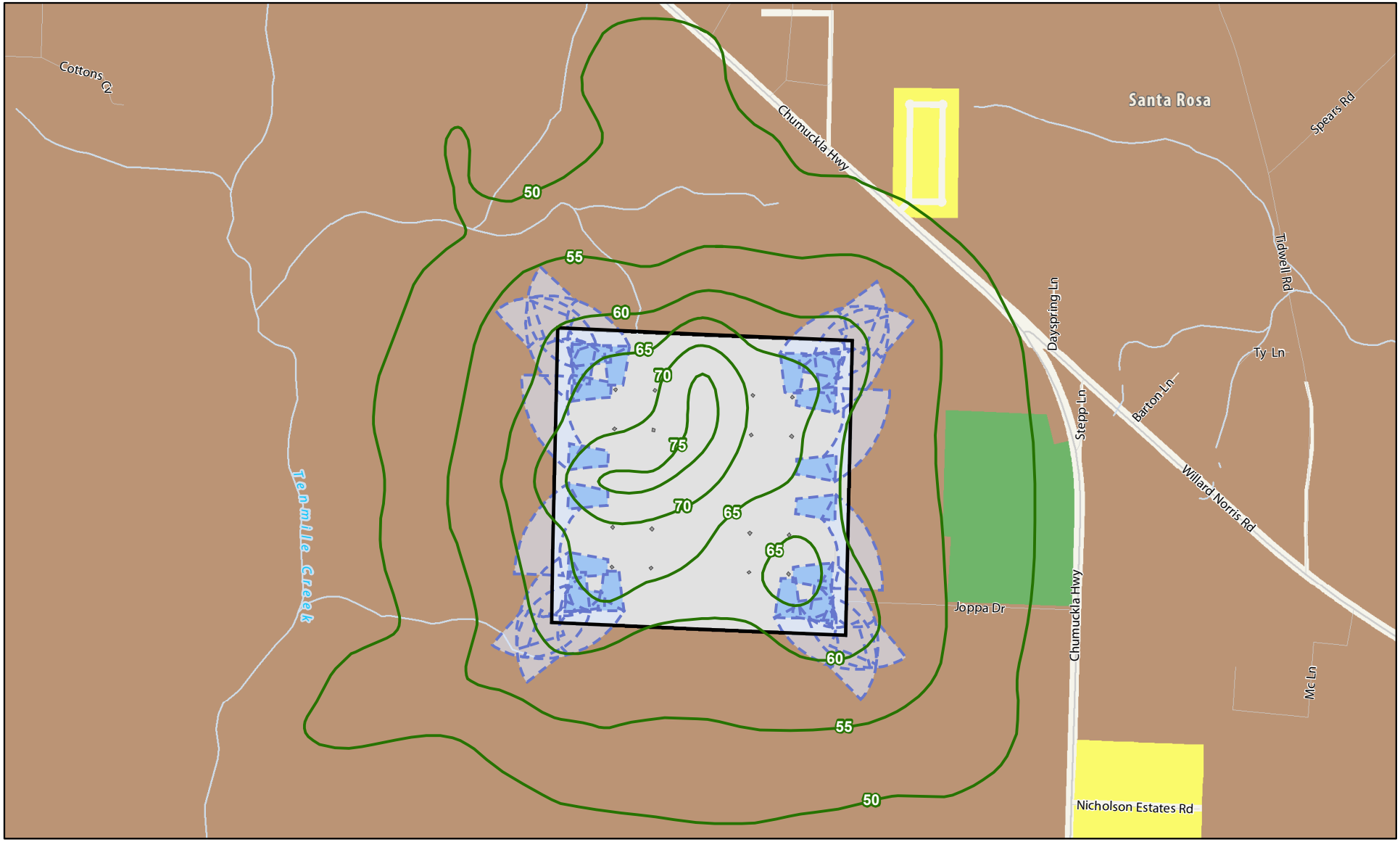

SCALE

0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Helipad
- NOLF Pace Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

Future Land Use

- Agriculture (AG)
- Single Family Residential (SFR)
- Conservation/Recreation (CON/REC)
- Military (MIL)

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.10-11
2015 AICUZ Footprint with Future Land Use, NOLF Pace
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Pace\2016_Dec\7_10-12_Compatibility_Concerns_NOLF_Pace.mxd



Agricultural/silviculture use parcels located on the western and northern boundary fall within the 65-70 dB DNL (Noise Zone 2). There are no residential dwellings within the noise zones, though current and future land use allows for them. Residences are discouraged within Noise Zone 2.

There are agriculture and rural residential parcels located within the APZ I emanating from the airfield's four corners. There are no residential dwellings within any of the APZ I, though current and future land use allows for them. Residential uses within APZ I are an incompatible land use.

SCALE
0 0.2 0.4 Miles

Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Helipad
- NOLF Pace Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.10-12
Compatibility Concerns - 2015 Composite Map, NOLF Pace
Santa Rosa County, Florida

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NOLF SPENCER

SANTA ROSA COUNTY

FLORIDA

7.11 NOLF SPENCER COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Spencer. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Spencer Comprehensive Evaluation.]

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Compatibility Concerns - 2015 AICUZ Footprint, NOLF Spencer, Santa Rosa County, Florida	Figure 7.11-12

AIRFIELD OPERATIONS

NOLF Spencer is a rotary-wing training airfield located approximately 9 miles southwest of NAS Whiting Field, in Santa Rosa County, Florida (Figure 7.11-1). This NOLF is used for helicopter training operations, including arrivals and departures, standard patterns, auto-rotations, tail rotor, and boost-offs. NOLF Spencer is predominantly covered in grass, with a few landing pad areas and refueling facilities located toward the center of the airfield.

As a planning document, AICUZ studies account for future missions and operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. The number of aircraft operations at NOLF Spencer has varied over time, as shown in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs. At NOLF Spencer, the highest number of operations occurred in 2008, totaling 353,273, and the lowest number occurred during 2013, with 228,432 operations.

The number of airfield operations at NOLF Spencer is projected to reach 385,290 by CY2025. This is a 2.3 percent decrease from the 394,395 operations reported for this NOLF in the baseline 1990 AICUZ Study. Table 7.11-1 shows the modeled distribution of the projected annual airfield operations for NOLF Spencer.

TABLE 7.11-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF SPENCER

OPERATION TYPE	NUMBER OF OPERATIONS
Departure	9,174
Arrival	9,174
Standard Pattern	256,860
180° Autorotation	36,694
90° Autorotation	36,694
Tail Rotor/ Boost Off	36,694
TOTAL	**385,290**
1990 AICUZ Total	**394,359**

Sources: BRRC 2015; NAS Whiting Field 2010

FLIGHT TRACKS

The primary aircraft operating at NOLF Spencer is the TH-57. The field is not equipped for nighttime use; therefore, all operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.). The airfield has two identical sides that divide the field over the centerline aligned with the course in use; the airfield also includes a low work area, an infield, and a "no man's land." Each side of the airfield is divided into three lanes. A maximum of 14 aircraft are allowed to operate at NOLF Spencer—five in the left pattern, five in the right pattern, and four additional aircraft that may operate in the low work area of either pattern (Figure 7.11-2). These restrictions do not include aircraft refueling or aircraft entering the patterns to depart. All courses on the airfield require the aircraft to depart from the northeast or southeast corners.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section illustrates the 2015 AICUZ noise contours for NOLF Spencer and describes the noise

environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ (1990) and the 2015 AICUZ noise contours. This comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. The comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NOLF Spencer's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The noise models for NOLF Spencer are based on TH-57 aircraft operations. In general, the noise contours are concentrated within and in the immediate vicinity of the NOLF boundary (Figure 7.11-3). The majority of the noise contours located outside of the NOLF boundary are the 50 to 55 dB DNL, 55 to 60 dB DNL, and 60 to 65 dB DNL, all of which are within Noise Zone 1 (area of low or no impact). The 2015 AICUZ shows these noise contours closer to the NOLF boundary when compared to the 1990 AICUZ noise contours. The 65 to 70 dB DNL noise contour, which is within Noise Zone 2 (area of moderate impact), extends slightly outside the NOLF boundary in the northern and western portions of the NOLF; these areas are forested and have no structures. Figure 7.11-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over the surrounding land area.

The 2015 AICUZ noise contours for NOLF Spencer are different in size, shape, and location when compared to the 1990 AICUZ noise contours (Figure 7.11-5). Changes between the 1990 and 2015 AICUZ noise contours are attributed to several factors, including:

- ☐ Changes in operational levels (number of operations has decreased from the 1990 to the 2015 AICUZ studies);
- ☐ Changes in operational location (course utilization depends on airfield conditions); and
- ☐ Improved noise mapping techniques (discussed in Section 1.4).

When comparing impacts between the 1990 and 2015 AICUZ noise contours (both on- and off-station), noise contours have decreased by 199 acres. Of the off-station areas within the 2015 AICUZ noise contours, only 4 acres are located in the 65 to 70 dB DNL noise contour. While this noise contour is within Noise Zone 2, the off-station land within this noise contour is

forested and has no structures. All other off-station areas within noise contours are in Noise Zone 1. Table 7.11-2 provides acreages of land areas within specific noise contours at NOLF Spencer; acreages for off-station impacts are also provided.

TABLE 7.11-2 AREAS WITHIN NOISE CONTOUR (DNL), NOLF SPENCER

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	832	832	723	723
55-60 dB DNL	625	520	521	508
60-65 dB DNL	681	211	469	129
65-70 dB DNL	56	0	197	4
70-75 dB DNL	0	0	53	0
>75 dB DNL	0	0	32	0
TOTAL AREA	**2,194**	**1,563**	**1,995**	**1,364**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours.

IMAGINARY SURFACES

The FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions, as noted in Section 5.3. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the runway and corresponding flight path and become less restrictive as the distance from the runway increases. Imaginary surface data were unavailable for rotary-wing airfields at the NAS Whiting Field Complex; therefore, they were not analyzed as part of this study for NOLF Spencer.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NOLF Spencer (Figure 7.11-6), including an analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ Study APZs (Figure 7.11-7). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and assist in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NOLF Spencer are provided in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all VFR landing areas, and APZ I is required for all landing areas that support daily training and operational missions. Approximately 122 acres of off-station lands are impacted by APZ I, as calculated by the 2015 AICUZ. The majority of the land use in this area is agriculture, residential, and vacant land. Overall, the total area impacted has increased by approximately 25 acres from 1990 to 2015. This increase in coverage is primarily associated with changes in types, locations, and number of annual operations conducted at NOLF Spencer. Table 7.11-3 compares the 1990 and 2015 AICUZ acreages within the Clear Zones and APZ I for NOLF Spencer.

TABLE 7.11-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZ I (ACRES), NOLF SPENCER

DATA	LOCATION	CLEAR ZONE		APZ I		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	60	0	124	0.22	184.22
	Off-Station	0	0	88	0	88
	TOTALS	60	0	212	0.22	272.22
		60		212.22		
2015 AICUZ	On-Station	76	0	99	0	175
	Off-Station	0	0	122	0	122
	TOTALS	76	0	221	0	297
		76		221		

Notes:
[1] Acreage data calculated in 2015 in coordination with the development of the 2015 AICUZ Study.
[2] No waterbodies are located within 2015 APZs.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Spencer. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Spencer, presented on Figure 7.11-8, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study were presented in Section 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

Santa Rosa County Residential Densities

- Agriculture/Rural Residential: 1 du/acre
- Rural Residential Single-Family: 2 du/acre
- Single-Family Residential: 4 du/acre
- Multi-Family Residential Subdivision: 4 du/acre
- Mixed Residential/Commercial: 30 du/acre
- Neighborhood Commercial: 8 du/acre

Land use is a term given to describe the management of land and the extent to which it has been modified. Typical land cover types include developed land, agricultural areas, residential, recreational, industrial, and forested areas. Patterns of land use arise naturally in communities, but are guided by regulations and designations from local government. Figure 7.11-9 illustrates existing land uses surrounding NOLF Spencer. Land use surrounding NOLF Spencer features medium- to high-intensity development with mostly residential, agricultural, institutional, and vacant land. A large amount of the developed area surrounding NOLF Spencer is single- and multi-family residential use. According to Santa Rosa County, uses within the single-family residential category include single-family homes, group homes, institutional uses, and public and private utilities. However, based on parcel description, the limited designations located around NOLF Spencer are mostly single-family homes. Throughout the residential uses, there are pockets of vacant, institutional, commercial, and agriculture land uses along the perimeter of the airfield. Institutional uses include the Pace Community Church, located along the northwest border of the airfield, and the Trinity by the Fields Anglican Church, located along the southwest border of the airfield. Pace High School is located approximately 0.5 mile off the southwest corner of the airfield and is outside of the APZ I and noise zones.

Overall, the land use around NOLF Spencer reveals varied medium- to high-intensity development, with an abundance of undeveloped/vacant lands surround the airfield. Future development of these vacant lands could directly impact the AICUZ footprint at NOLF Spencer. From a land use compatibility standpoint, some of the existing land uses surrounding NOLF Spencer are incompatible within certain noise zones and APZs. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.11-10 illustrates existing zoning surrounding NOLF Spencer. In general, much of the land surrounding NOLF Spencer

remains vacant, with the primary zoning consisting of agriculture/rural residential (AG-RR), single-family residential (R-1), rural residential single family (RR-1), and mixed residential subdivision (R-1M), with pockets of neighborhood commercial (NC) and highway commercial development (HCD). It is also important to note that the vacant lands identified in the existing land use figure (Figure 7.11-9), are mostly zoned for rural, single family, and mixed residential uses. Existing zoning adjacent to the airfield indicates the potential for growth around NOLF Spencer within the various residential and agriculture zoning classifications.

Zoning District Classifications

AG-RR: Agriculture/ Rural Residential

RR-1: Rural Residential Single-Family

R-1: Single-Family Residential

R-1M: Mixed Residential Subdivision

NC: Neighborhood Commercial

HCD: Highway Commercial Development

Per Santa Rosa's Comprehensive Plan 2008-2025, a military airport zone (MAZ) overlay district extending approximately 0.5 mile from the perimeter of the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Spencer. This was instituted as part of the JLUS adopted by the County in 2005 to prevent negative impacts to current and long-term viable use of the airfield, and to promote the health and welfare of citizens living in proximity of the airfield by limiting incompatible land uses and allowing compatible land uses within the area. Figure 7.11-10 also illustrates the land area designated as a MAZ that extends over the NOLF and encompasses the AICUZ footprint and noise zones for NOLF Spencer. In addition to these zoning designations, there are also areas surrounding the airfield with an APZ designation associated with their zoning use. An example is the "agriculture-APZ" designation, which is based on the 1990 baseline APZs that were recognized by the County in their Comprehensive Plan 2008-2025. The MAZ district, along with the zoning classifications with "APZ" added to them are regulatory designations intended to implement specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations.

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.11-11 illustrates the future land uses surrounding NOLF Spencer. The future land use pattern around NOLF Spencer is consistent with current development trends, with the majority of future land use being agriculture, residential, and commercial uses. Any future development in these areas will most likely result in an increase in population density; however, there are ongoing efforts to work cooperatively with local and regional governments to ensure compatibility.

Overall, the land use around the airfield is a mixture of medium- to high-density residential, institutional, and commercial areas, with areas of agriculture and vacant lands. Future land use indicates the potential for growth around the NOLF within single-family residential and commercial areas. Therefore, future land uses within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Spencer is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Spencer's noise zones, Clear Zones, and APZs, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Spencer, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County parcel data, land use classifications, and zoning district information. The evaluation was performed at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 provides a generalized breakdown of land use compatibility for noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. While there are 2015 AICUZ noise contours for NOLF Spencer that extend off-station, the impacted areas off-station are primarily in the 50 to 60 dB DNL noise contour, which is within Noise Zone 1 (area of low or now impact). There are also limited areas (4 acres) off-station within the 65 to 70 dB DNL noise contour on NOLF Spencer's northern and western perimeters. This contour is within Noise Zone 2 (area of moderate impact).

Based on the data, there are no incompatible land uses within any of the Clear Zones associated with NOLF Spencer, since all land under the Clear Zones is on-station. However, there are potential incompatible land uses and concerns within APZ I related to designated zoning. As illustrated on Figure 7.11-12, APZs and noise zones have the potential to impact off-station areas, primarily near the corners of the airfield boundary. The areas impacted range from low-density residential areas to medium- to high-density commercial, residential, and institutional uses. These areas are described below.

- ☐ Area 1: Parcels are located within APZ I emanating from the northwest corners of the airfield. Current uses of these parcels are vacant land, residential, commercial, and mixed residential/commercial dwellings, and agriculture/silviculture. A portion of the Pace Community Church is also located in APZ I. Noise-sensitive and people-intensive uses, such as churches or commercial and residential dwellings, within APZs are incompatible.

  There are also parcels located on the western boundary that contain residential dwellings, including manufactured homes, that are within the 65 to 70 dB DNL noise contour, with a small portion in the 70 to 75 dB DNL noise contour (both within Noise Zone 2). Residences are discouraged within Noise Zone 2.

- ☐ Area 2: Parcels are located within APZ I emanating from the northeast corners of the airfield. Current uses of these parcels are vacant land, residential dwellings, publically owned property, conservation/recreation, and agriculture/silviculture uses. Residential uses within an APZ are incompatible.

  Parcels in the Thomastown Estates, located on the northern boundary of the airfield, are within the 65 to 70 dB DNL noise contour (Noise Zone 2) and contain residential dwellings. Residences are discouraged within Noise Zone 2.

- ☐ Area 3: Parcels are located within APZ I emanating from the southeast corners of the airfield. Current uses are vacant land, agriculture, and single-family residential units in the Plantation Creek Subdivision and along both South and East Spencer Fields Road. Residential uses within APZs are incompatible.

- ☐ Area 4. Parcels are located within APZ I emanating from the southwest corners of the airfield. Current uses are vacant land, agriculture, and single-family and medium-density residential dwellings located in the northern portion of Spencer Oaks Landing Subdivision and at Condor Estates, located west of West Spencer Field Road. The Trinity by the Fields Anglican Church is also located in the APZ I. Noise-sensitive and people-intensive uses, such as churches or commercial and residential dwellings, are incompatible within APZs.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF SPENCER

The neighborhoods and land uses identified in this section are, and continue to be, compatibility concerns in the area around NOLF Spencer. The Navy and Santa Rosa County should continue to monitor these as areas of incompatible land uses, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Spencer. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones, APZs, and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly residential, commercial, and institutional, and pose compatibility concerns. The County's Comprehensive Plan provides a MAZ overlay district around the airfield and encompassing the AICUZ footprint and noise zones for NOLF Spencer. The Santa Rosa County Planning and Zoning Commission should update their MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study. Additionally, the County and NAS Whiting Field should continue to work together to fully implement the MAZ district with development restrictions for areas inside and outside the established APZ at NOLF Spencer that have been identified as current compatibility concerns or are most likely to present compatibility issues in the future.

As mentioned in Article Eleven of the County's Land Development Code, no structure will be constructed within the Clear Zones, and there will be a height restriction of 35 feet for single-family residential and non-residential structures within APZ I. Multiple family residential, water towers, communication towers/radio or TV transmission towers, and regional electric transmission lines are incompatible structures within APZ I. Article Eleven also states that any contract for the sale of residential property that is located in whole or part within a Military Airport Notification Zone shall include, as an attachment to the contract of sale, a Military Airport Disclosure Notice, in a form approved by Santa Rosa County. Furthermore, the

County, as stated in the 2003 JLUS, should require that subdivision plans delineate boundaries of all current APZs and noise contours, or indicate whether the entire property occurs within such zones.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Spencer and OPNAVINST 11010.36C. This update will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Spencer.

MONITOR AREAS OF POTENTIAL CONCERN

There are some vacant lands zoned agriculture and agriculture/rural residential surrounding NOLF Spencer that are within APZ I and within 65 to 70 dB DNL noise contour (Noise Zone 2). These areas should be continuously monitored for changes to the development density, and the Navy should communicate with the planning authorities to discuss concerns regarding incompatible land uses. These areas will become a compatibility concern, per the AICUZ criteria, if residential development is allowed.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. The Navy should continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals, especially within APZ I. In addition, Santa Rosa County should continue Policy 2.1.B.1 of the Comprehensive Plan to pursue the purchase of land surrounding NOLF Spencer for the purposes of protecting these bases from encroachment and to attract complementary business uses. If it is not possible to purchase development rights and/or property, then the County should approach property owners for potential partnering to ensure compatible land uses. Whether accomplished by the Navy or the County, such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

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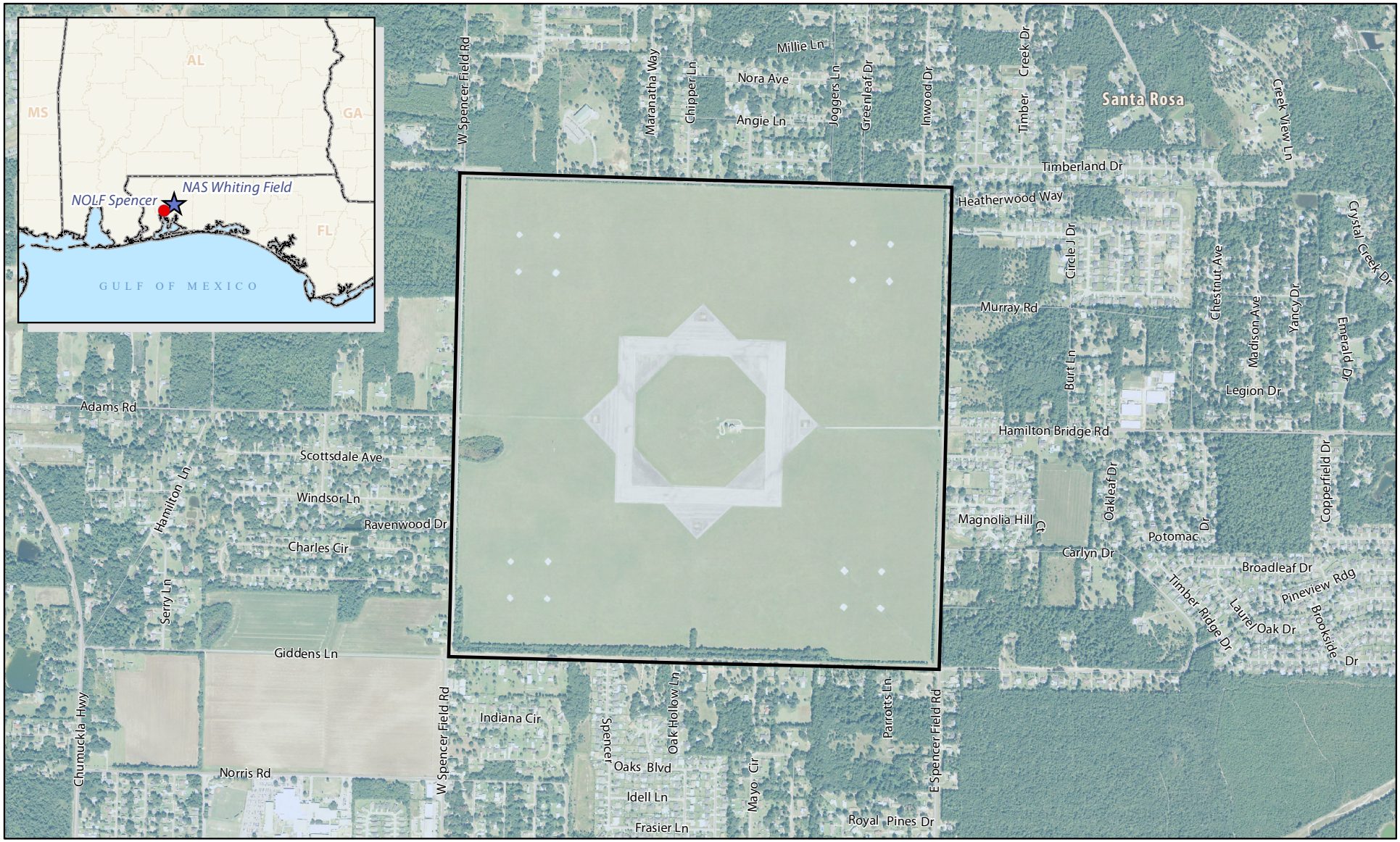

N

SCALE

0 0.1 0.2 Miles

Legend

- Major Road
- Local Road
- NOLF Spencer Boundary

Figure 7.11-1
NOLF Spencer
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

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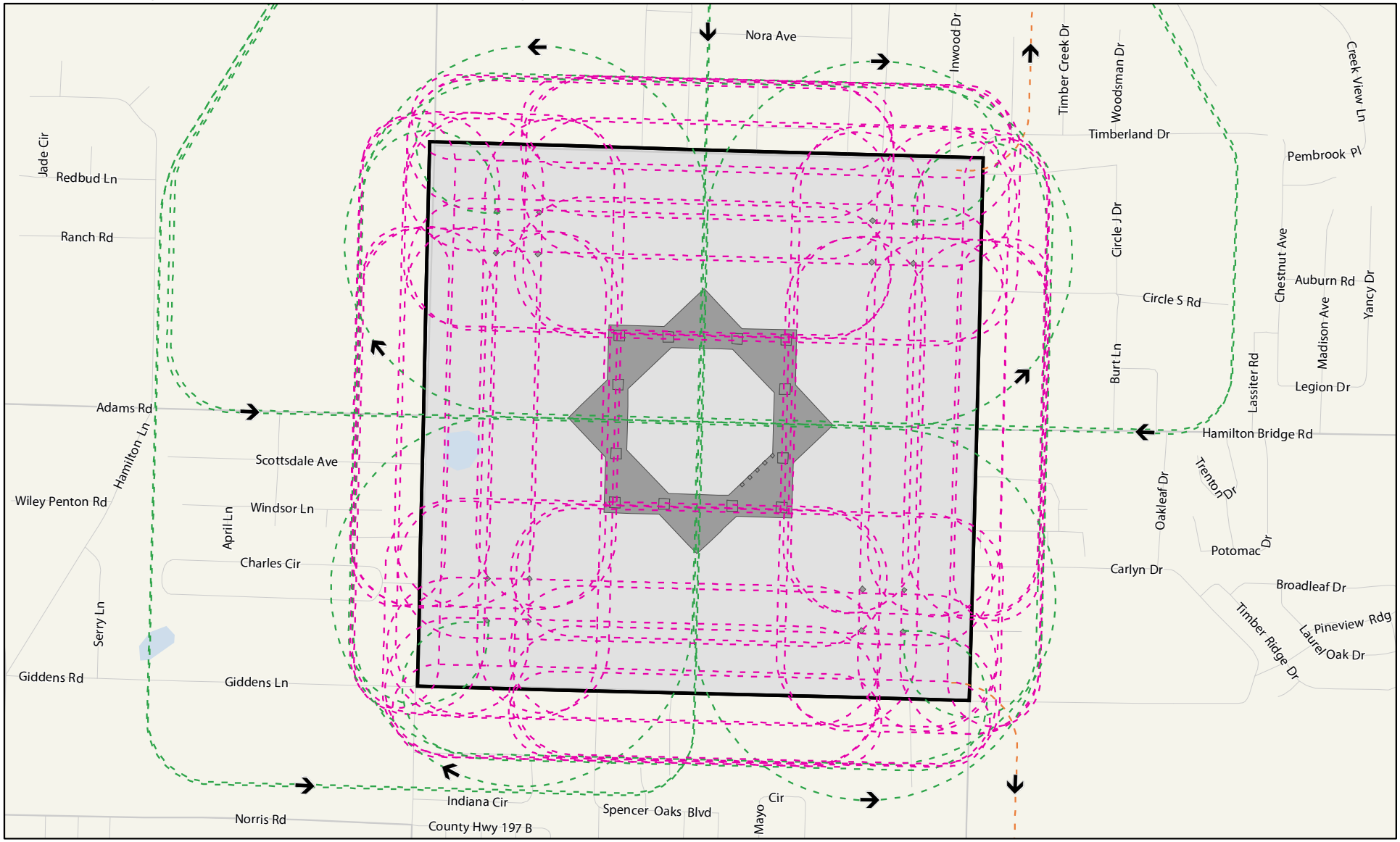


Legend

- Major Road
- Local Road
- Helipad
- NOLF Spencer Boundary
- Arrival
- Closed Pattern
- Departure

SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.11-2
Representative Flight Tracks, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-3_2015_AICUZ_Noise_Contours_NOLF_Spencer.mxd



Legend

- Major Road
- Local Road
- NOLF Spencer Boundary

dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL

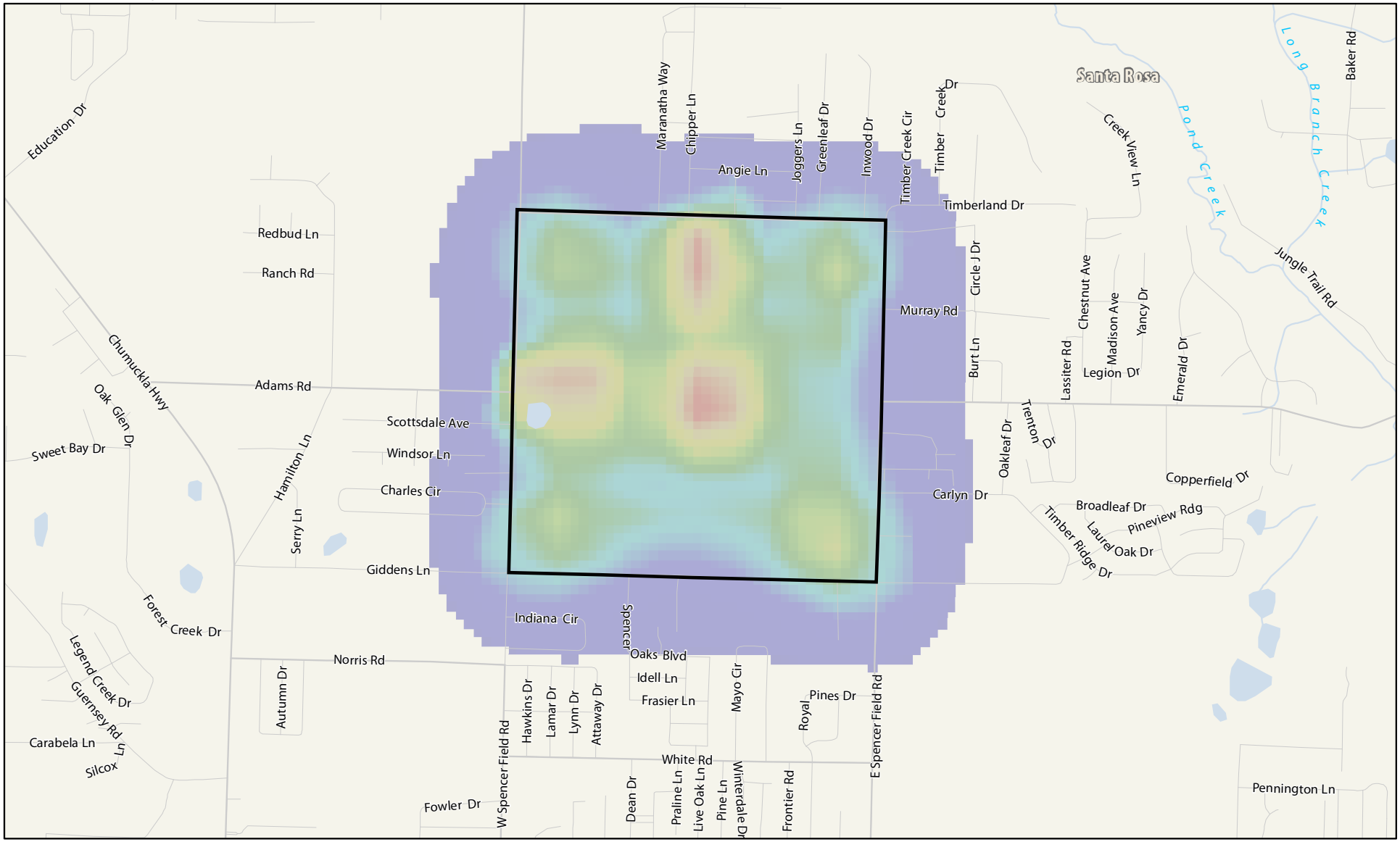
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.11-3
2015 AICUZ Noise Contours, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-4_2015_AICUZ_Noise_Gradients_NOLF_Spencer.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

Major Road

Local Road

NOLF Spencer Boundary

Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.11-4
2015 Noise Gradients, NOLF Spencer
Santa Rosa County, Florida

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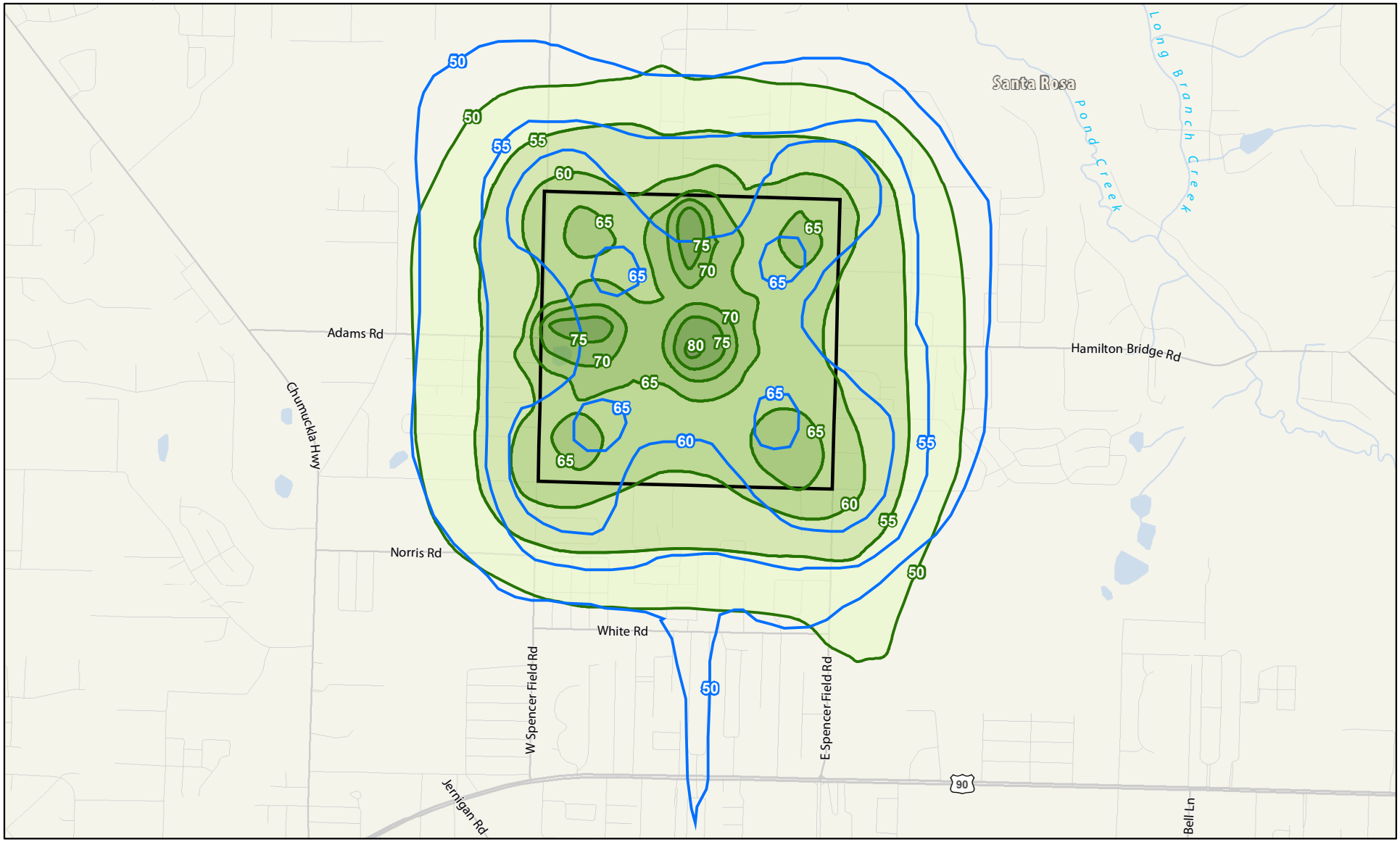


N

SCALE

0 0.2 0.4 Miles

Legend

- Major Highway
- Major Road
- Local Road
- 1990 AICUZ Noise Contours
- NOLF Spencer Boundary

2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.11-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-6_2015_AICUZ_APZs_NOLF_Spencer.mxd



Legend

- Major Road
- Local Road
- NOLF Spencer Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

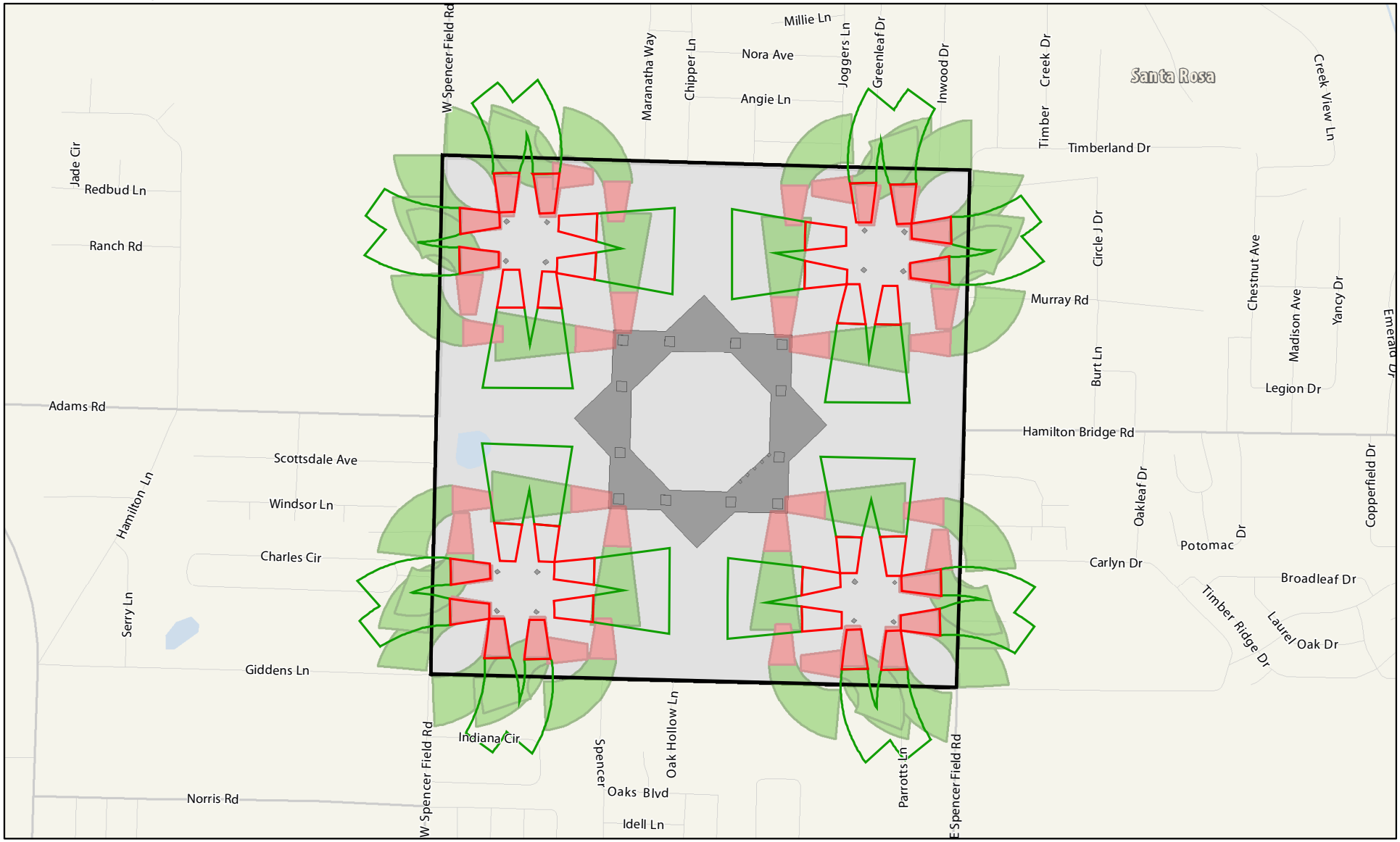
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2016, NAIP 2013.

Figure 7.11-6
2015 AICUZ APZs, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-7_AICUZ_APZs_Comparison_NOLF_Spencer.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Major Road
- Local Road
- Helipad
- NOLF Spencer Boundary

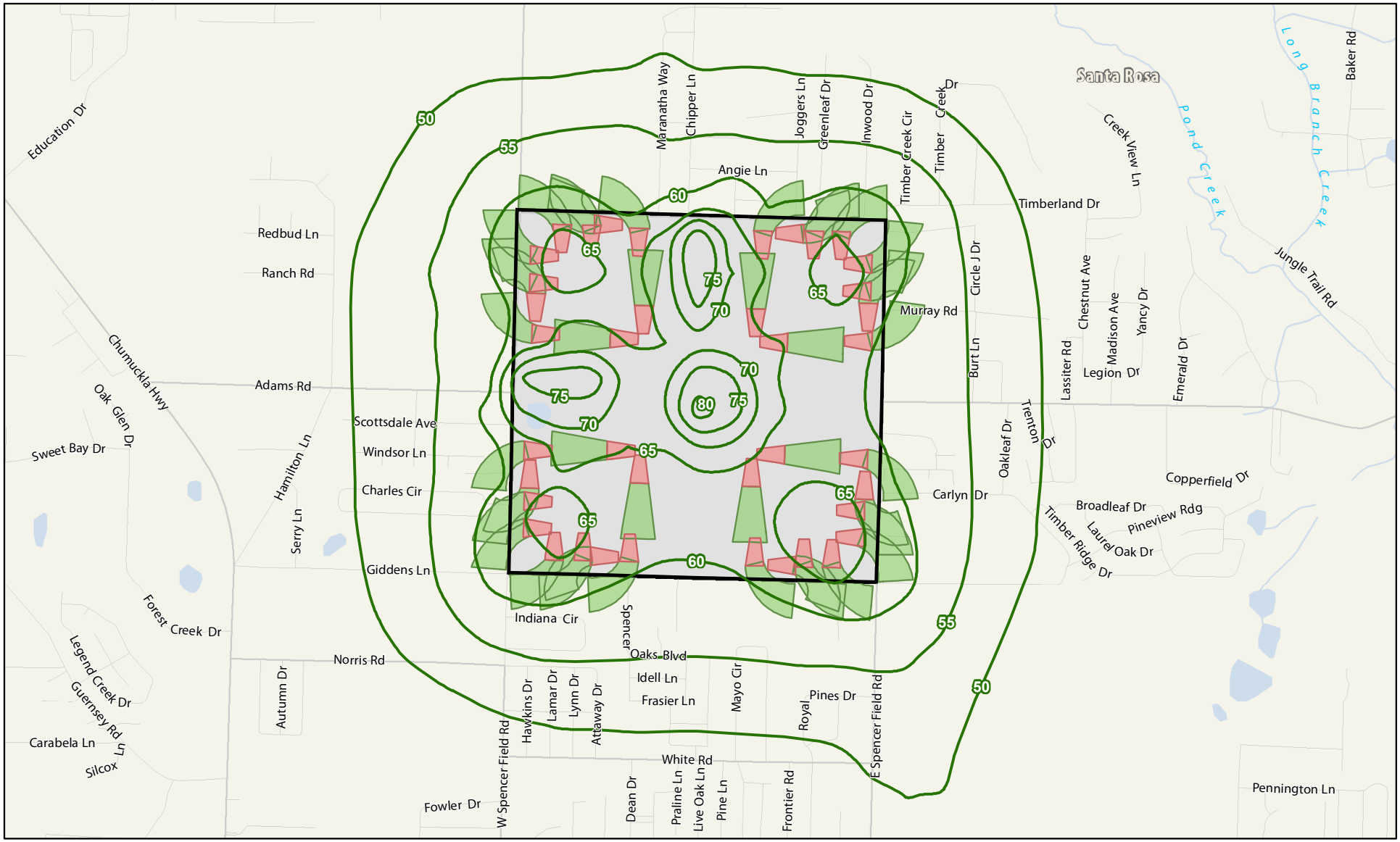
Accident Potential Zone (2015)
- Clear Zone
- APZ I

Accident Potential Zone (1990)
- Clear Zone
- APZ I

Figure 7.11-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Spencer
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-8_2015_AICUZ_Footprint_NOLF_Spencer.mxd



Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Spencer Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

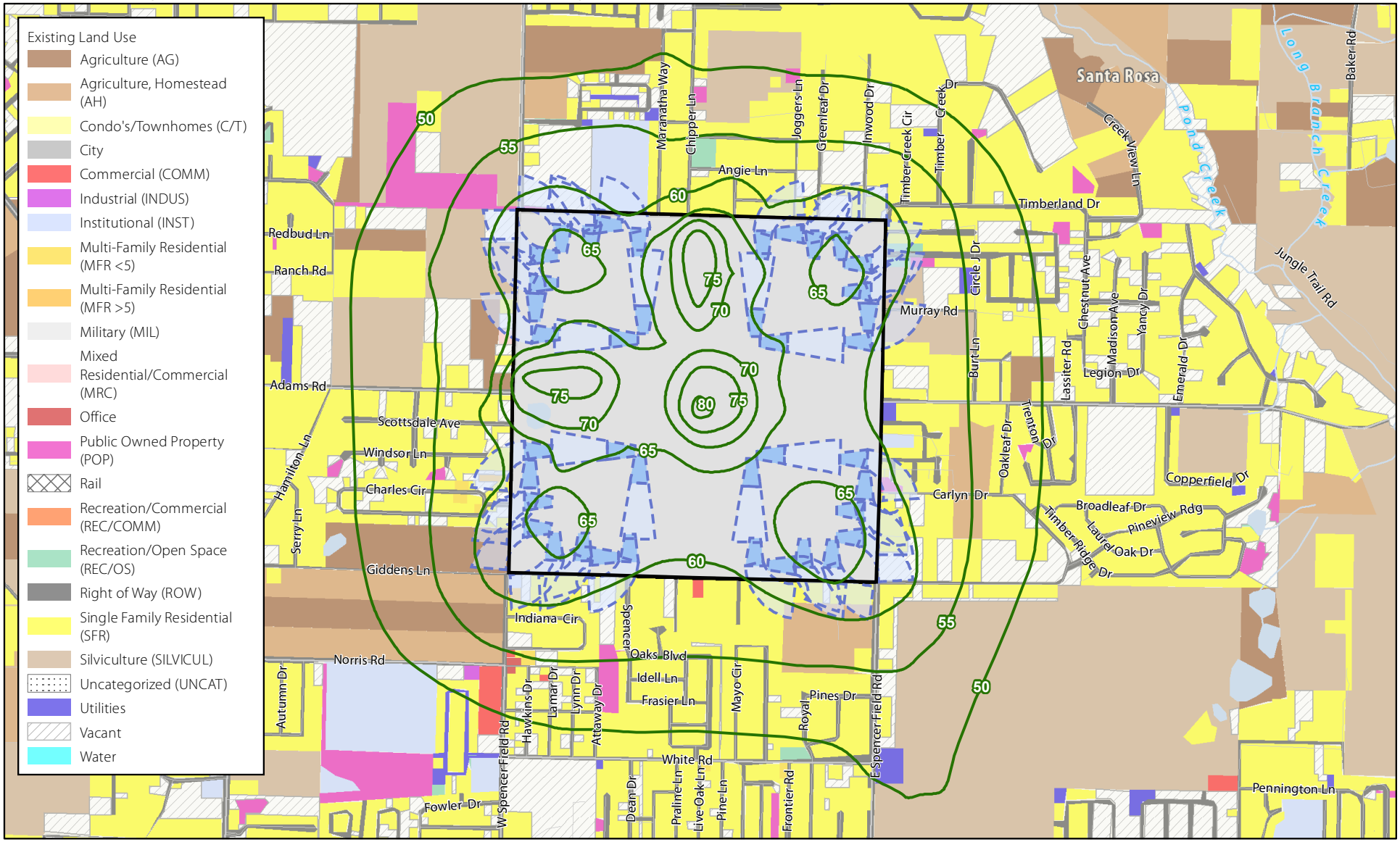
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.11-8
2015 AICUZ Footprint, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-9_2015_AICUZ_Footprint_Existing_LU_NOLF_Spencer.mxd



Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Spencer Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

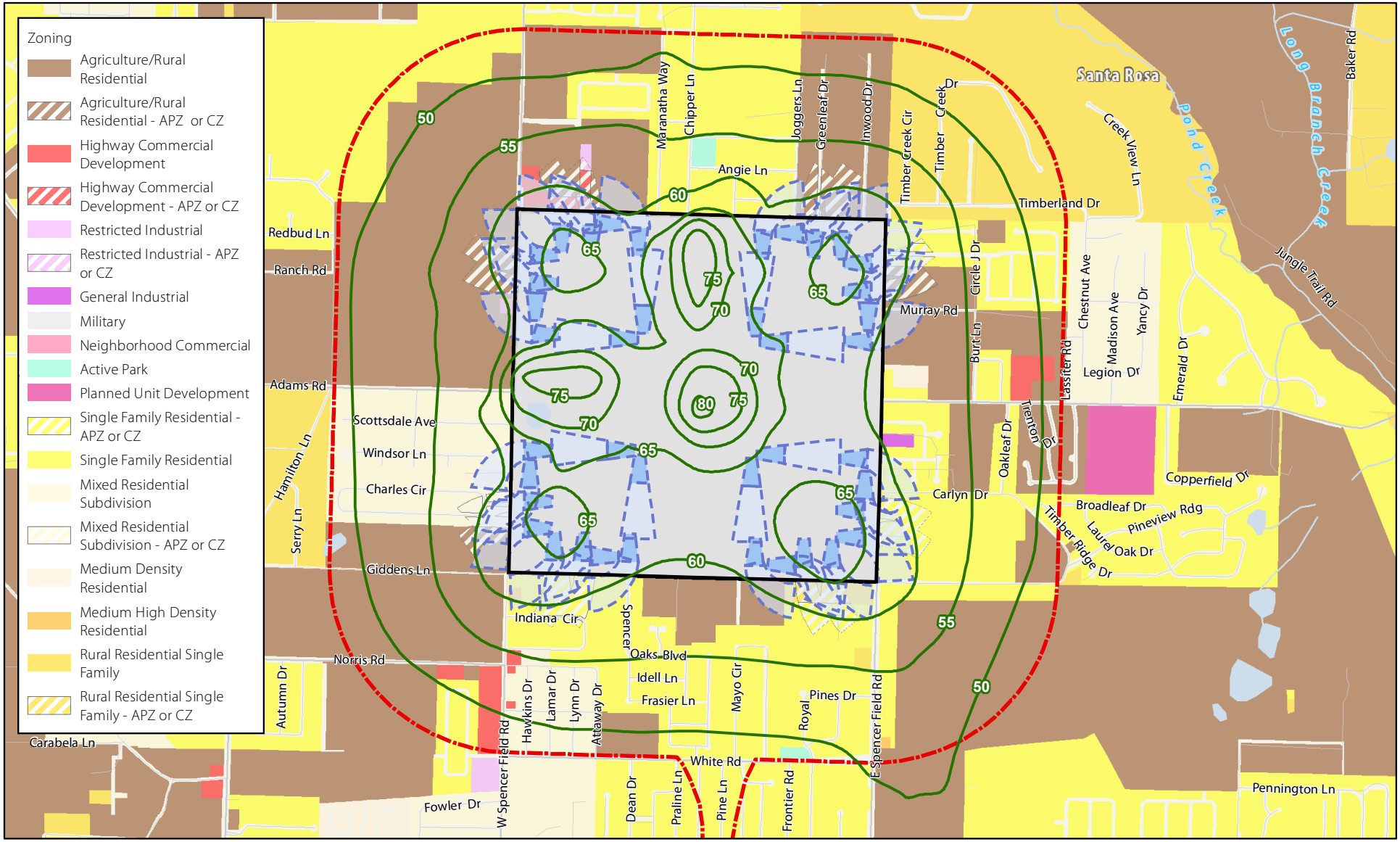
SCALE

0 0.1 0.2 Miles

Figure 7.11-9
2015 Composite AICUZ Map, Existing Land Use, NOLF Spencer
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2016.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-10_2015_AICUZ_Footprint_Existing_Zoning_NOLF_Spencer.mxd



SCALE
0 0.1 0.2 Miles

Legend

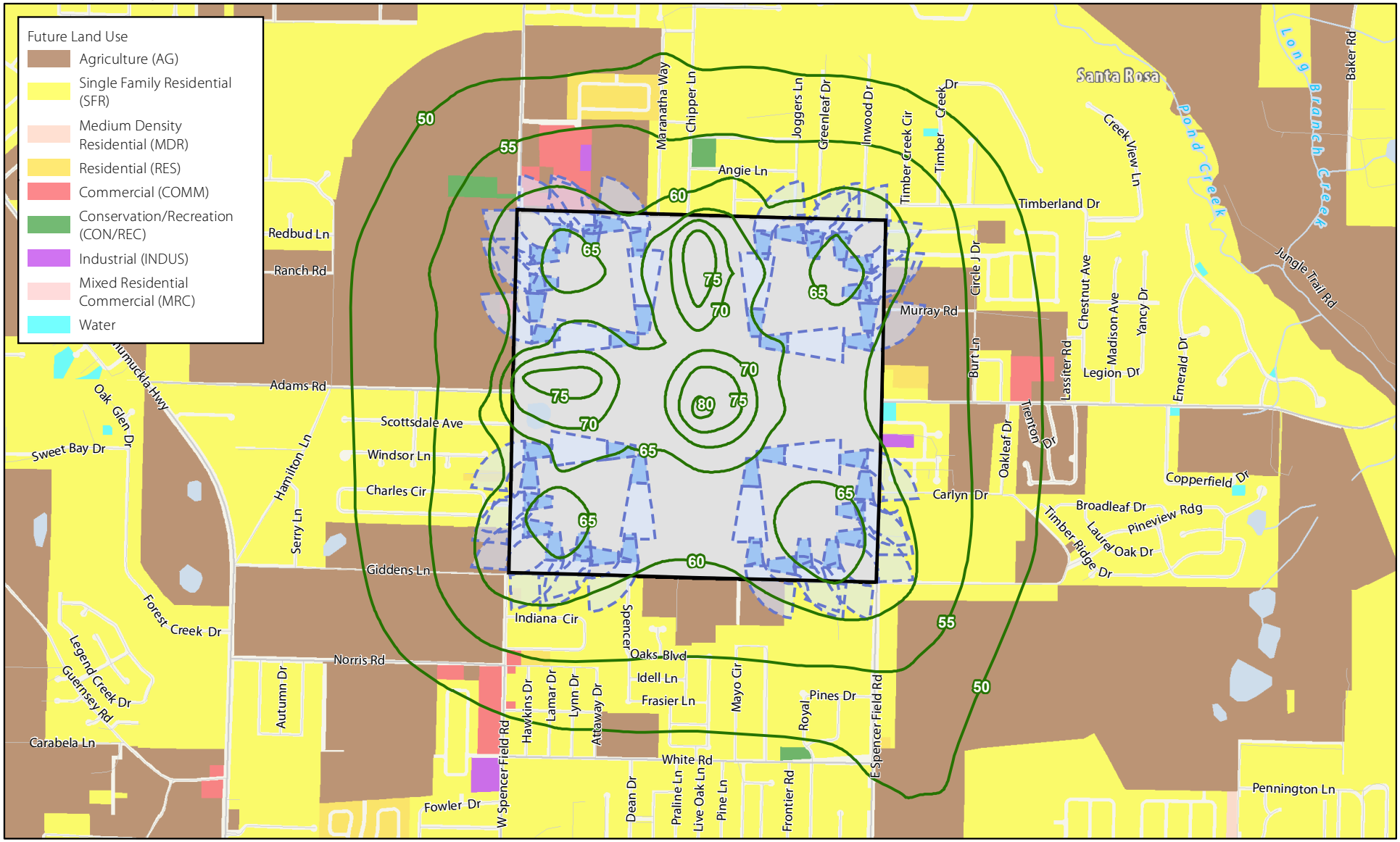
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Military Airport Zone
- NOLF Spencer Boundary

Accident Potential Zone (2015)
- Clear Zone
- APZ I

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2016.

Figure 7.11-10
2015 Composite AICUZ Map, Existing Zoning, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-11_2015_AICUZ_Footprint_Future_LU_NOLF_Spencer.mxd



Legend

- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Spencer Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

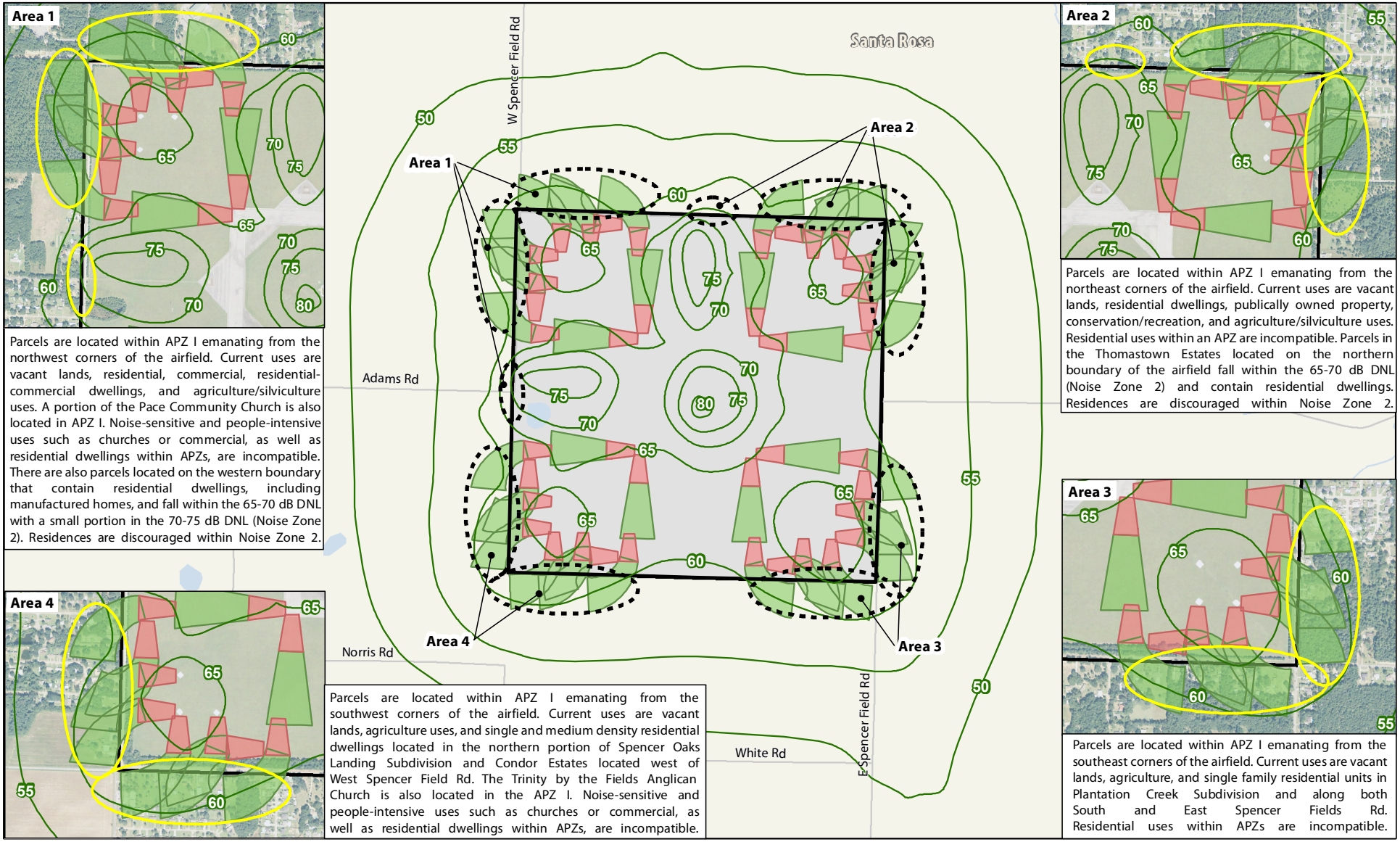
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2016.

Figure 7.11-11
2015 AICUZ Footprint with Future Land Use, NOLF Spencer
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Spencer\2016_Dec\7_11-12_Compatibility_Concerns_2015_AICUZ_Footprint_NOLF_Spencer.mxd



Parcels are located within APZ I emanating from the northwest corners of the airfield. Current uses are vacant lands, residential, commercial, residential-commercial dwellings, and agriculture/silviculture uses. A portion of the Pace Community Church is also located in APZ I. Noise-sensitive and people-intensive uses such as churches or commercial, as well as residential dwellings within APZs, are incompatible. There are also parcels located on the western boundary that contain residential dwellings, including manufactured homes, and fall within the 65-70 dB DNL with a small portion in the 70-75 dB DNL (Noise Zone 2). Residences are discouraged within Noise Zone 2.

Parcels are located within APZ I emanating from the northeast corners of the airfield. Current uses are vacant lands, residential dwellings, publically owned property, conservation/recreation, and agriculture/silviculture uses. Residential uses within an APZ are incompatible. Parcels in the Thomastown Estates located on the northern boundary of the airfield fall within the 65-70 dB DNL (Noise Zone 2) and contain residential dwellings. Residences are discouraged within Noise Zone 2.

Parcels are located within APZ I emanating from the southwest corners of the airfield. Current uses are vacant lands, agriculture uses, and single and medium density residential dwellings located in the northern portion of Spencer Oaks Landing Subdivision and Condor Estates located west of West Spencer Field Rd. The Trinity by the Fields Anglican Church is also located in the APZ I. Noise-sensitive and people-intensive uses such as churches or commercial, as well as residential dwellings within APZs, are incompatible.

Parcels are located within APZ I emanating from the southeast corners of the airfield. Current uses are vacant lands, agriculture, and single family residential units in Plantation Creek Subdivision and along both South and East Spencer Fields Rd. Residential uses within APZs are incompatible.

SCALE
0 0.1 0.2 Miles

Legend

- Major Road
- 2015 AICUZ Noise Contours
- NOLF Spencer Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

Figure 7.11-12
Compatibility Concerns - 2015 Composite Map, NOLF Spencer
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

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NOLF HAROLD

SANTA ROSA COUNTY

FLORIDA

7.12 NOLF HAROLD COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Harold. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Harold Comprehensive Evaluation.]

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AIRFIELD OPERATIONS

NOLF Harold is a rotary-wing training airfield located 9 miles east of NAS Whiting Field, in Santa Rosa County, Florida (Figure 7.12-1). NOLF Harold is grassed, and does not have any paved runways or helipads. There is one small structure located at the airfield that is used by "crash crews" and for crew change. NOLF Harold operates according to one of four courses, depending on airfield conditions. The field is divided into two sides, depending on the course in use. A majority of operations at this NOLF are conducted during acoustic daytime hours (7:00 a.m. to 10:00 p.m.). In addition, some NVG operations take place during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.).

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. Flight operations at NOLF Harold have fluctuated over time, ranging from a peak of 180,525 in 2008 to a low of 100,528 operations in 2013. Historical operations at NOLF Harold are presented in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs.

The Navy forecasts approximately 190,757 annual flight operations at NOLF Harold in CY2025. This will represent a 43 percent increase in annual flight operations relative to the 133,487 operations reported for NOLF Harold in the baseline 1990 AICUZ Study. Table 7.12-1 shows the modeled distribution of these annual airfield operations for NOLF Harold.

TABLE 7.12-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF HAROLD

OPERATION TYPE	NUMBER OF OPERATIONS
Arrival	6,081
Departure	6,081
Standard Pattern	116,523
180 degree Autorotation	14,566
90 degree Autorotation	14,566
Tactical pattern	18,300
Confined Area Landing	4,880
External Load	4,880
Pinnacle	4,880
TOTAL	**190,757**
1990 AICUZ Total	**133,487**

Sources: BRRC 2015; NAS Whiting Field 2010

NOLF Harold is not commonly used by civilian aircraft, although, on occasions, NAS Whiting Field grants authorization for use of NOLF Harold to model aircraft enthusiasts and clubs for special events.

FLIGHT TRACKS

Existing military operations at NOLF Harold are performed by TH-57 helicopters, and include standard patterns, 180-degree and 90-degree autorotation patterns, tactical patterns, external load patterns, pinnacle patterns, and confined area landing patterns (Figure 7.12.2). A maximum of 11 aircraft may operate at NOLF Harold during the daytime hours, and four aircraft may conduct operations during nighttime hours.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section illustrates the 2015 AICUZ noise contours for NOLF Harold and describes the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ (1990) and the 2015 AICUZ noise contours. The comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. The comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NOLF Harold's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The only noise sources considered for the NOLF Harold noise model were TH-57 aircraft operations. The 2015 noise contours for NOLF Harold overlay the area in the immediate vicinity of the airfield, with a majority of the noise contours concentrated within the NOLF boundary (Figure 7.12-3). The 65 to 70 dB DNL noise contour, which is within Noise Zone 2 (area of moderate impact), does not extend outside of the NOLF boundary. The outermost 60 to 65 dB DNL noise contour, which is within Noise Zone 1 (area of low or no impact), is centered along the standard and autorotation pattern lanes, located along the grassy "T" area. The features of the 60 to 65 dB DNL noise contour are driven by the confluence of arrivals and pattern work. The 60 to 65 dB DNL noise contour extends beyond the NOLF boundary near the northeast corner, which contains a commercial lot, and to the southeast where single-family/mobile home residences are located. The DNL noise levels are greater on the eastern side of the NOLF because the courses in this area are utilized more often. Figure 7.12-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over the surrounding land area.

The 2015 AICUZ noise contours are relative in size and location when compared to noise contours in the 1990 AICUZ (Figure 7.12-5); however, the off-station noise impact has been reduced from 1990 to 2015. The slight changes between the 1990 and 2015 AICUZ noise contours are attributed to:

- ☐ Changes in operational levels (the number of operations has slightly increased from the 1990 to the 2015 AICUZ studies);

- ☐ Changes in operational location (the number of operations on the western portion of the field has been reduced from the 1990 to the 2015 AICUZ studies); and

- ☐ Improved noise mapping techniques (discussed in Section 1.4).

When comparing impacts between the 1990 and 2015 AICUZ noise contours (both on- and off-station), noise contours have decreased by 336 acres, with 56 acres impacted by the 65 to70 dB DNL noise contour (Noise Zone 2); however, all land within this noise contour is also within the NOLF boundary. Table 7.12-2 provides the acreages of land areas within specific noise contours at NOLF Harold; acreages for off-station impacts are also provided.

TABLE 7.12-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF HAROLD

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	791	723	650	602
55-60 dB DNL	697	442	502	278
60-65 dB DNL	320	122	320	74
65-70 dB DNL	51	3	56	0
70-75 dB DNL	5	0	0	0
>75 dB DNL	0	0	0	0
TOTAL AREA	**1,864**	**1,290**	**1,528**	**954**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours.

IMAGINARY SURFACES

As noted in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the landing area and corresponding flight path and become less restrictive as the distance from the landing area increases. Imaginary surface data were unavailable for rotary-wing airfields at the NAS Whiting Field Complex; therefore, they were not analyzed as part of this study for NOLF Harold.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NOLF Harold (Figure 7.12-6), including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ Study APZs (Figure 7.12-7). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and assists in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NOLF Harold are provided and discussed in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all VFR landing areas, and APZ I is provided for all landing areas that support daily training and operational missions. Approximately 139 acres are impacted by the 2015 AICUZ Clear Zones and APZ I at NOLF Harold. There has been a significant reduction (112 acres) in Clear Zone and APZ I impacts from the 1990 to the 2015 AICUZ. This decrease in coverage is primarily associated with changes in the types and locations of annual operations

conducted at NOLF Harold. While all Clear Zones are located within the site boundary, 27 acres of APZ I extend off-station onto mostly recreation/open space and a commercial lot. Table 7.12-3 compares the 1990 and 2015 AICUZ acreages within the Clear Zones and APZ I for NOLF Harold.

TABLE 7.12-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZ I (ACRES), NOLF HAROLD

DATA	LOCATION	CLEAR ZONE		APZ I		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	46	0	32	0	78
	Off-Station	32	0	141	0	173
	TOTALS	78	0	173	0	251
		78		173		
2015 AICUZ	On-Station	34	0	78	0	112
	Off-Station	0	0	27	0	27
	TOTALS	34	0	105	0	139
		34		105		

Notes:
[1] Acreage data calculated in 2016 in coordination with the development of the 2015 AICUZ Study.
[2] No waterbodies are located within 2015 APZs.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Harold. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Harold, presented on Figure 7.12-8, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study

were presented in Section 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

Land use is a term given to describe the management of land and the extent to which it has been modified. Typical land cover types include developed land, agricultural areas, residential, recreational, industrial, and forested areas. Patterns of land use arise naturally in communities, but are guided by regulations and designations from local government. Figure 7.12-9 illustrates existing land uses surrounding NOLF Harold. Land use surrounding NOLF Harold features low-intensity development with mostly recreational/open space, single-family residential, and silviculture. There is limited residential land use west of the airfield near the shoreline of Black Water Bay. These are single-family residential uses and, according to Santa Rosa County, uses within this category include detached single-family homes, group homes, and accessory structures and facilities. Within this category, mobile homes are prohibited. However based on parcel description, the limited designations located around NOLF Harold are strictly single-family homes and mobile homes.

Santa Rosa County Residential Densities

Agriculture/Rural Residential: 1 du/ acre

Agriculture: 1 du/15 acres

Overall, the land use around NOLF Harold reveals a pattern of very low-density development, with an abundance of undeveloped/vacant lands surround the airfield. Future development of these vacant lands could directly impact the AICUZ footprint at NOLF Harold. From a land use compatibility standpoint, some of the existing residential uses surrounding NOLF Harold are incompatible within certain APZs. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.12-10 illustrates existing zoning surrounding NOLF Harold. In general, much of the land surrounding NOLF Harold remains vacant, with the primary zoning consisting of agriculture/rural residential (AG-RR) and state land. The land areas east

and south of the airfield have a zoning district classification of predominantly agriculture/rural residential and a lot zoned as a highway commercial development (HCD) district. Land areas around the airfield, beyond the military zone, are designated as agriculture/rural residential and state land. The lands adjacent to the east are zoned agriculture/rural residential, and beyond these areas, land is zoned state land. It is also important to note that the vacant land identified in the existing land use figure (Figure 7.12-9) is mostly zoned for residential land uses. Existing zoning adjacent to the airfield indicates the potential for growth around the NOLF within the agriculture/rural residential zone.

Zoning District Classifications

AG-RR: Agriculture/ Rural Residential

AG: Agriculture

HCD: Highway Commercial Development

MAZ: Military Airport Zone

Source: City's Land Use and Development Ordinance

Per Santa Rosa's Comprehensive Plan 2008-2025, a military airport zone (MAZ) overlay district extending approximately 0.5 mile from the perimeter of the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Harold (Figure 7.12-10). This was instituted as part of the JLUS adopted by the County in 2005 to prevent negative impacts on current and long-term viable use of the airfield, and to promote health and welfare of citizens living in proximity of the airfield by limiting incompatible land uses and allowing compatible land uses within the area. Future zoning data obtained from the County indicate a MAZ that extends over the NOLF and encompasses the AICUZ footprint and noise zones for NOLF Harold. In addition, residential zones within APZs have been identified and designated as AG-RR-APZ areas. The MAZ district, along with the zoning classifications with "APZ" added to them, are regulatory designations intended to implement specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations.

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.12-11 illustrates the future land uses surrounding NOLF Harold. The future land use pattern around NOLF Harold is consistent with current development trends, with the majority of future land use being conservation/recreation and agriculture designations, with some commercial. However, there is an increase in the residential land use designation southeast of the airfield that is currently designated as publically owned property. Any future development in this area will

most likely result in an increase in population density. There are ongoing efforts to work cooperatively with local and regional governments to ensure compatibility.

Overall, the land use around the airfield is a mixture of low-density residential and conservation areas. Future land use indicates the potential for growth around the NOLF within the agriculture and conservation/recreation areas. Therefore, future land uses within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Harold is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Harold's noise zones, APZs, and Clear Zones, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land uses are compatible with aircraft operations at NOLF Harold, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County parcel data, land use classifications, and zoning district information. The evaluation was conducted at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 provides a breakdown of land use compatibility for noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. Off-station impacted areas are primarily in the 50 to 55 dB DNL noise contour, and there are limited off-station areas in the 60 to 65 dB DNL noise contour; both of these contours are within Noise Zone 1 (area of low or no impact). As there are no off-station areas within the 65+ dB DNL, no off-station areas pose existing compatibility concerns regarding noise zones.

None of the Clear Zones extend off the installation and, therefore, Clear Zones do not pose compatibility concerns. However, there are potential incompatible land uses within APZ I for NOLF Harold due to designated zoning. As illustrated on Figure 7.12-12, APZs and noise zones impact areas off-station, mainly on the eastern and western boundaries. These off-station areas are primarily zoned agriculture/rural residential and highway commercial development. These areas are described below.

- ☐ Area 1: On the northeast corner of the NOLF Harold, APZ I extends off-station. This area includes Blackwater Canoe Rentals and Sales, Inc., which is a one-story commercial store located across Deaton Bridge Road. A state-owned lot dedicated to timber is also in this area. The land within this area should be monitored to prevent incompatible development.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF HAROLD

The land uses identified in this section are generally compatible with air station operations, but have the potential to be compatibility concerns in the future. The Navy and Santa Rosa County should continue to monitor these areas, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Harold. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones, APZs, and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly rural residential and pose compatibility concerns. The County's Comprehensive Plan provides a MAZ overlay district around the airfield and encompassing the AICUZ footprint for NOLF Harold. The Santa Rosa County Planning and Zoning Commission should update their MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study. Additionally, the County and NAS Whiting Field should continue to work together to fully implement the MAZ district with development restrictions for areas inside and outside the established APZs at NOLF Harold that have been identified as current compatibility concerns or are most likely to present compatibility issues in the future.

As mentioned in Article Eleven of the County's Land Development Code, there will be a height restriction of 35 feet for single family residential and non-residential structures within APZ I. Article Eleven also states that any contract for the sale of residential property that is located in whole or part within a Military Airport Notification Zone shall include, as an attachment

to the contract of sale, a Military Airport Disclosure Notice, in a form approved by Santa Rosa County. Furthermore, the County, as stated in the 2003 JLUS, should require that subdivision plans delineate boundaries of all current APZs and noise contours, or indicate whether the entire property occurs within such zones.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Harold and OPNAVINST 11010.36C. This update will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Harold.

MONITOR AREAS OF POTENTIAL CONCERN

Blackwater Canoe Rentals and Sales, Inc., located on the northeastern corner of the NOLF boundary, is within APZ I. To the southeastern corner of the boundary, there is vacant land zoned residential. These areas should be continuously monitored for changes to the development density, and the Navy should communicate with the planning authorities to discuss concerns regarding incompatible land uses. These areas will become a compatibility concern, per the AICUZ criteria, if residential development is allowed.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. The Navy should continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals, especially within APZ I. In addition, Santa Rosa County should continue Policy 2.1.B.1 of the Comprehensive Plan to pursue the purchase of land surrounding NOLF Harold for the purposes of protecting these bases from encroachment and to attract complementary business uses. If it is not possible to purchase development rights and/or property, then the County should approach property owners for potential partnering to ensure compatible land uses. Whether accomplished by the Navy or the County, such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

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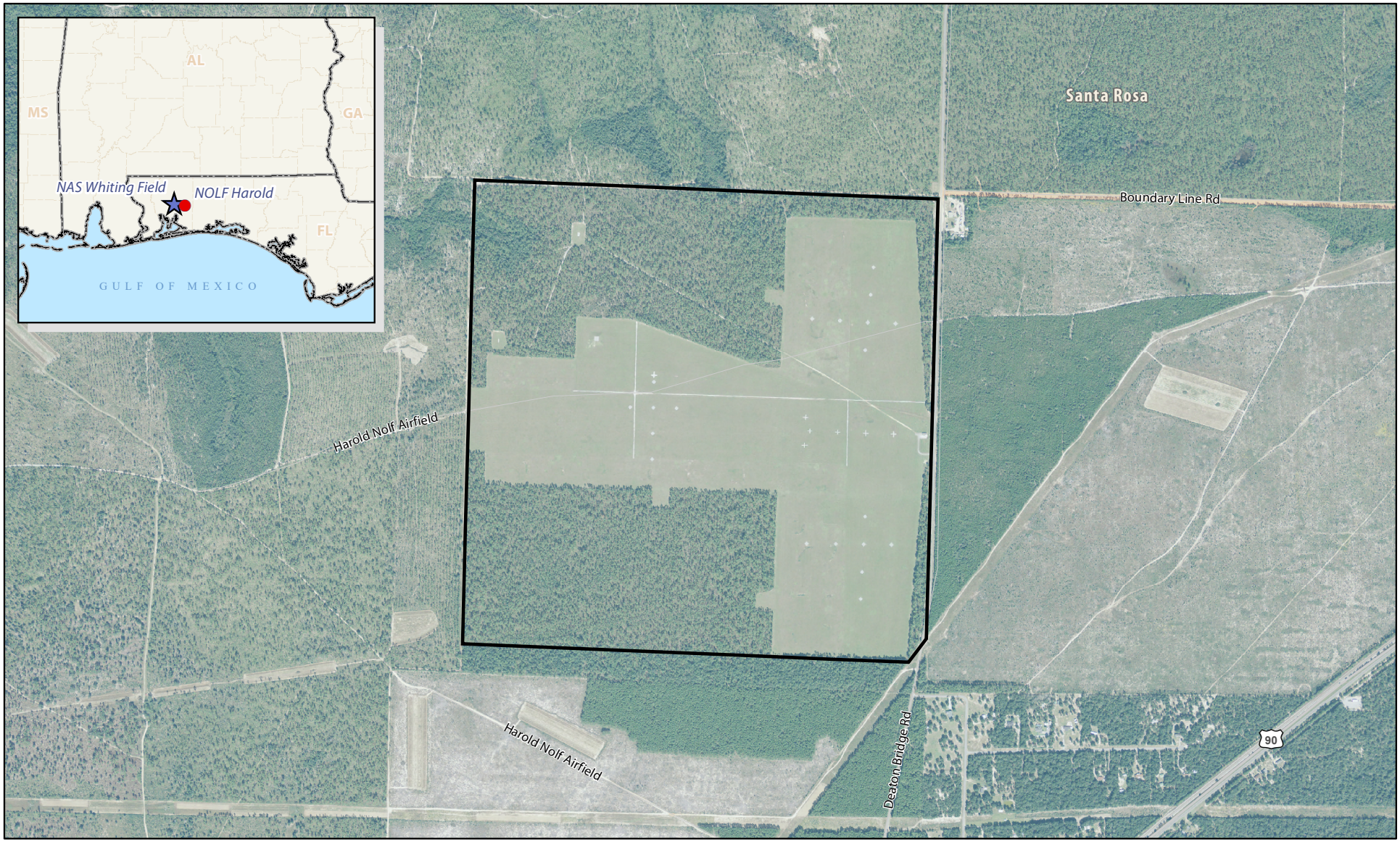

N

SCALE

0 0.1 0.2 Miles

Legend

Major Highway

Local Road

NOLF Harold Boundary

Figure 7.12-1
NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

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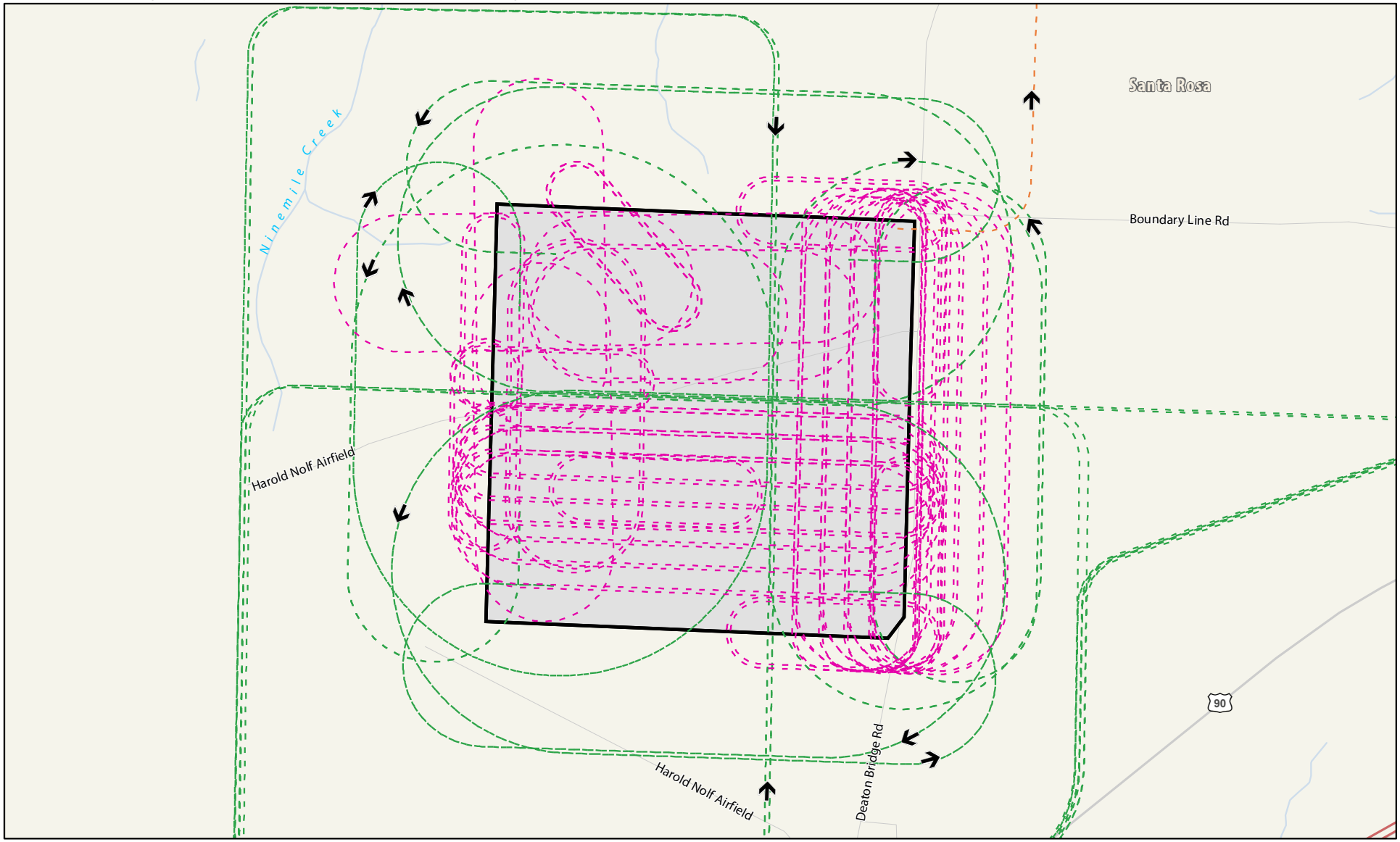

N

SCALE
0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Harold Boundary
- Arrival
- Closed Pattern
- Departure

Figure 7.12-2
Representative Flight Tracks, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

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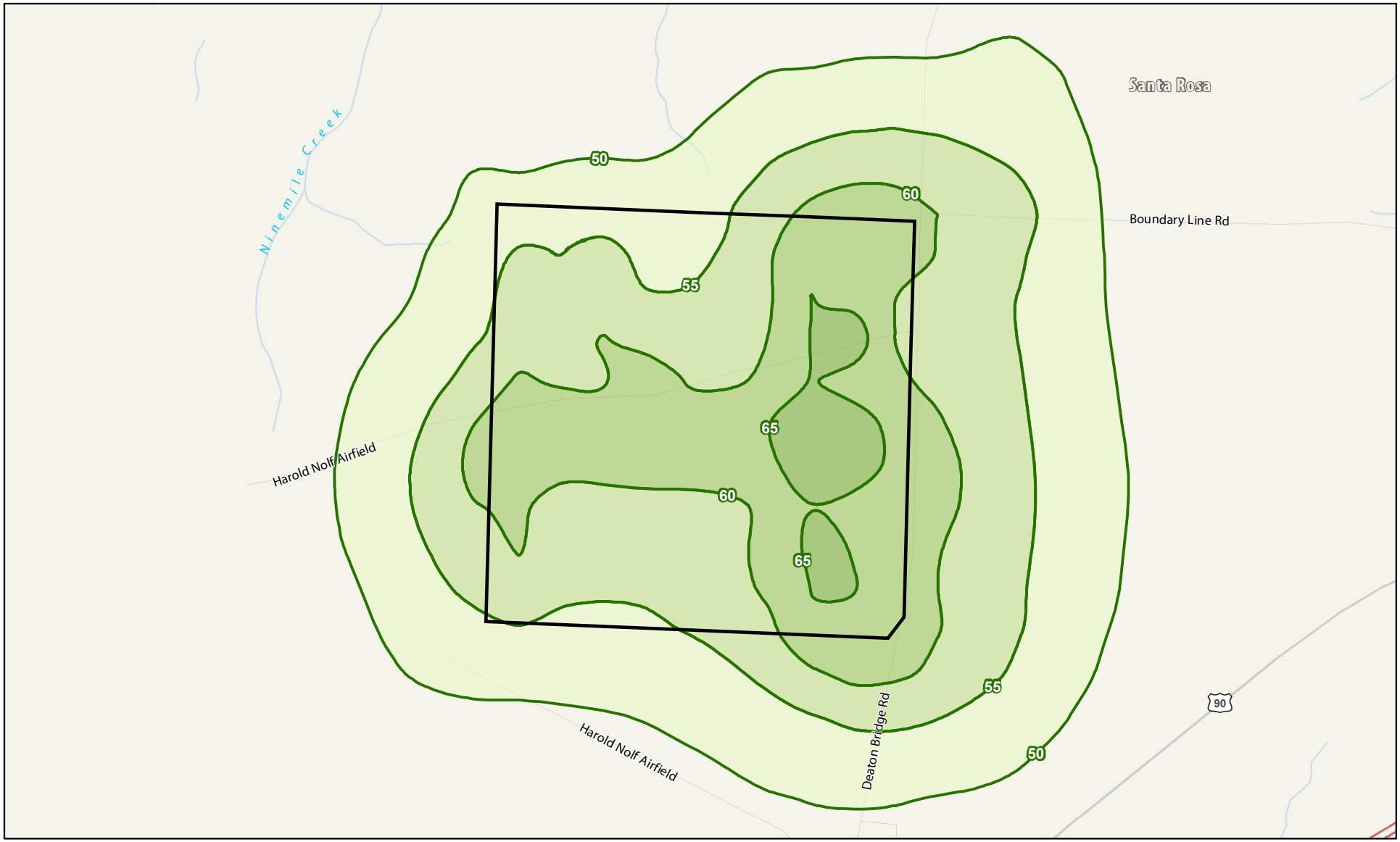

N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Highway
- Local Road
- NOLF Harold Boundary

dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.12-3
2015 AICUZ Noise Contours, NOLF Harold
Santa Rosa County, Florida

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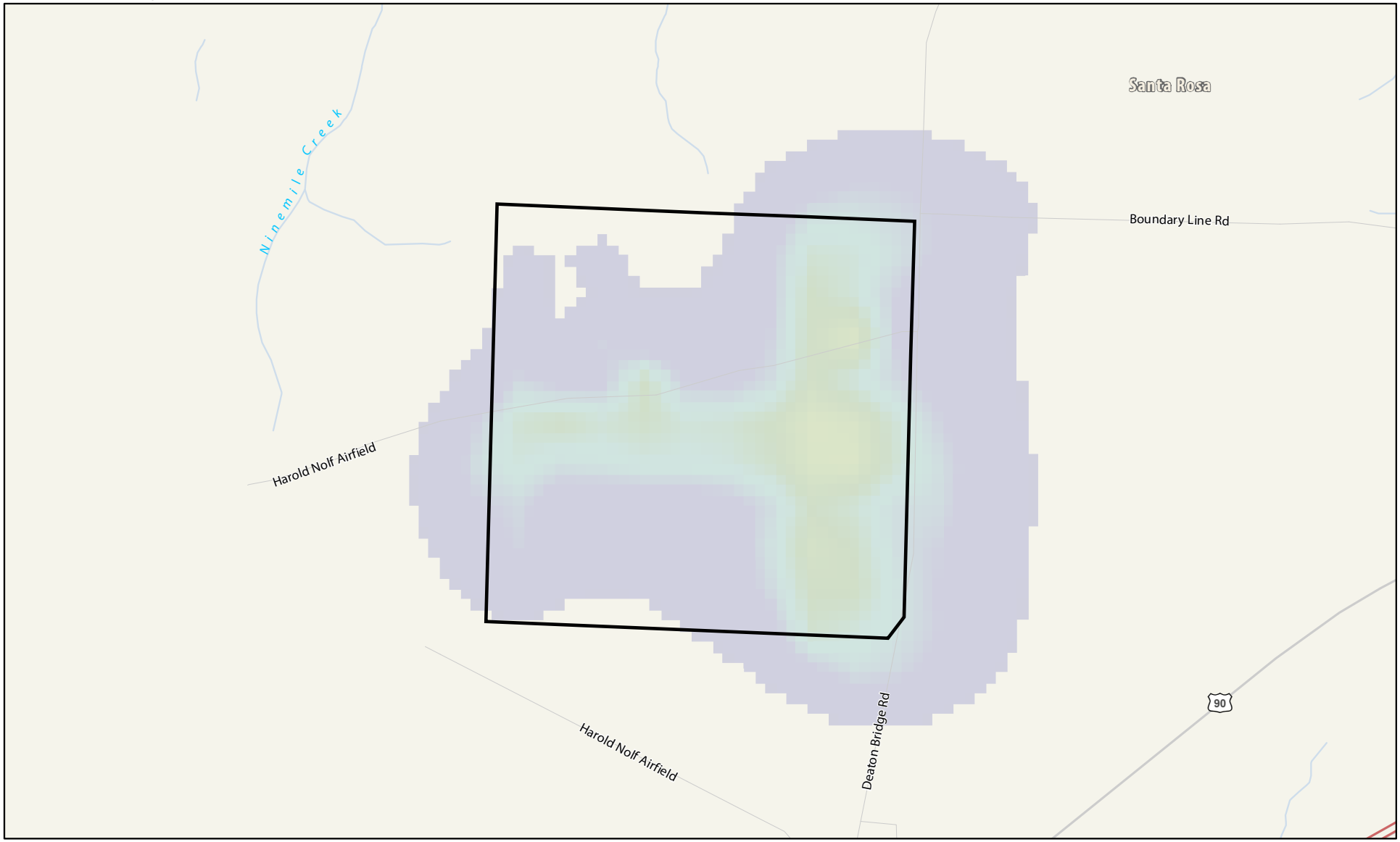

N

SCALE

0 0.1 0.2 Miles

Legend

Interstate
Local Road
Major Highway
NOLF Harold Boundary

Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.12-4
2015 AICUZ Noise Gradients, NOLF Harold
Santa Rosa County, Florida

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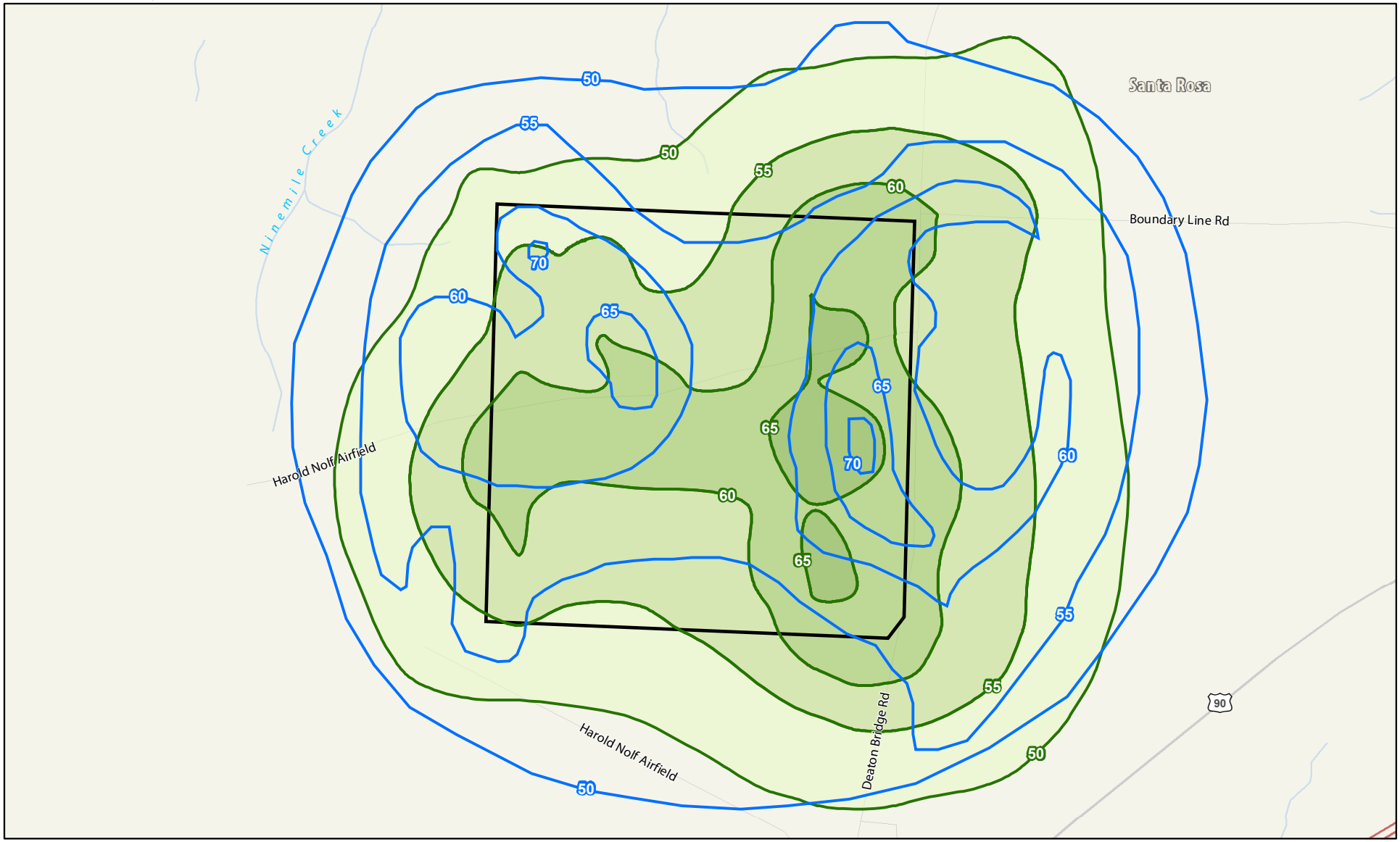

N

SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Highway
- Local Road
- 1990 AICUZ Noise Contours
- NOLF Harold Boundary

2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL

Figure 7.12-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Harold
Santa Rosa County, Florida

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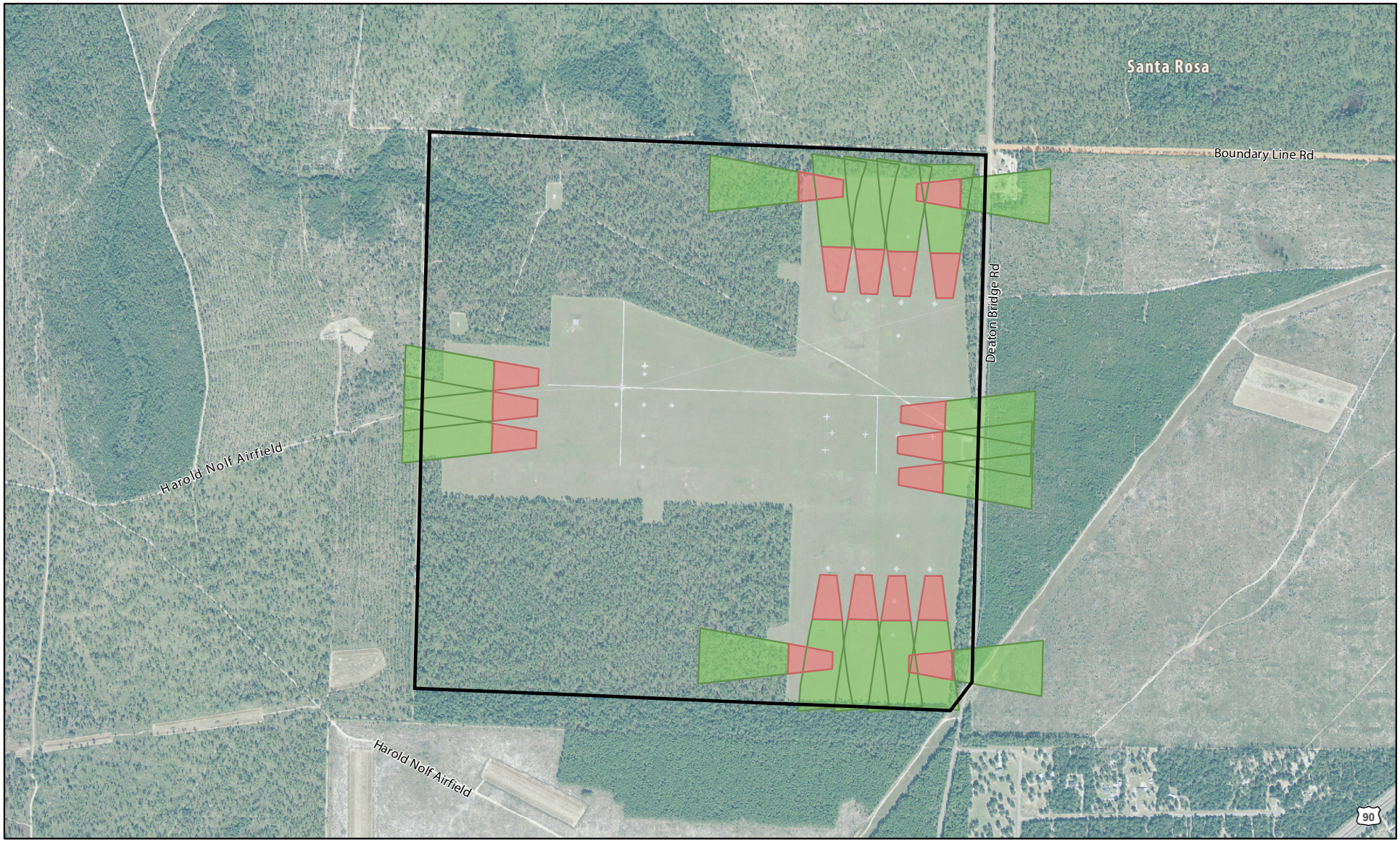

N

SCALE

0 0.1 0.2 Miles

Legend

Major Highway

Local Road

NOLF Harold Boundary

Accident Potential Zone (2015)

Clear Zone

APZ I

Figure 7.12-6
2015 AICUZ APZs, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

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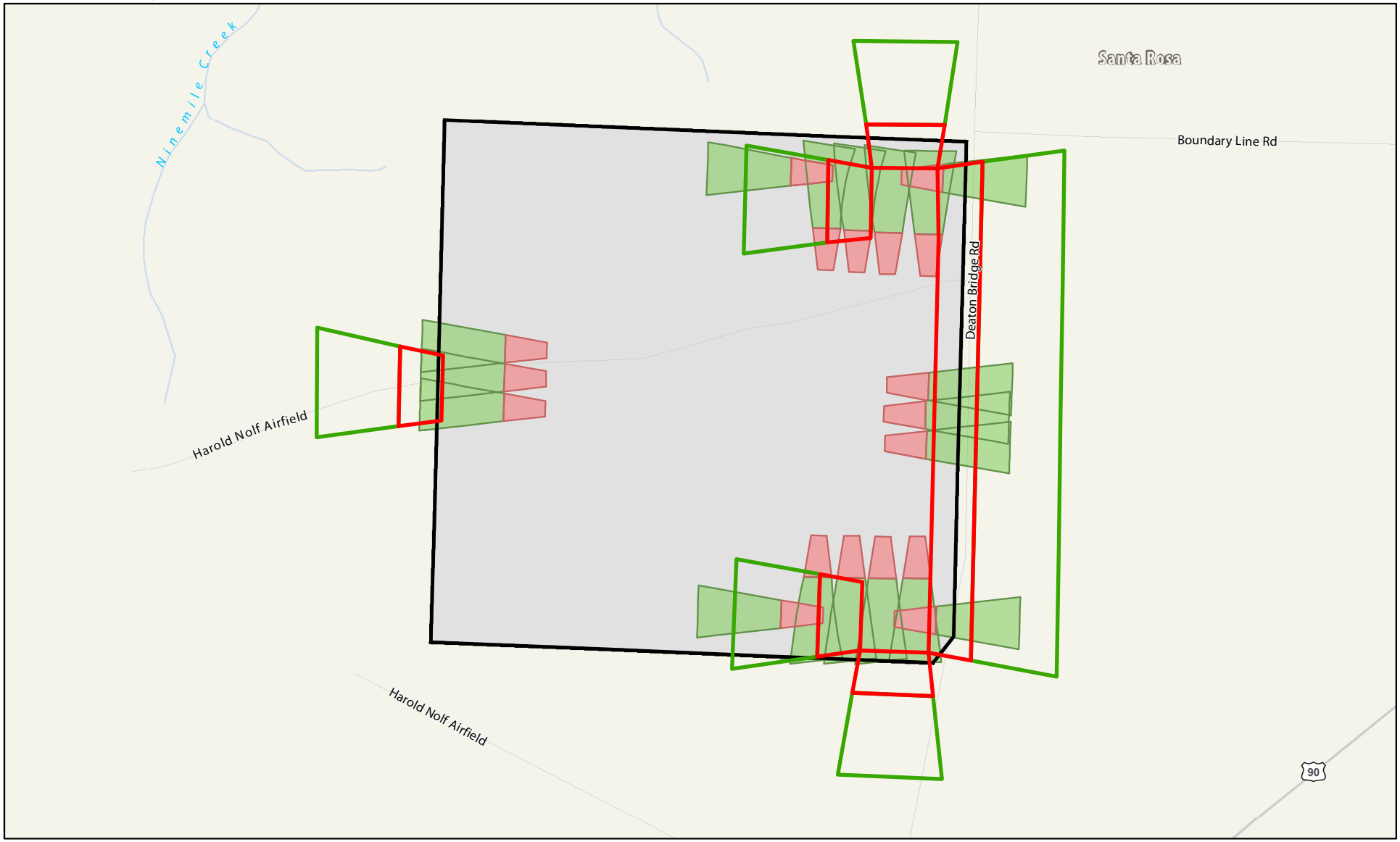

N

SCALE

0 0.1 0.2 Miles

Legend

Major Highway

Local Road

NOLF Harold Boundary

Accident Potential Zone (2015)

Clear Zone

APZ I

Accident Potential Zone (1990)

Clear Zone

APZ I

Figure 7.12-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

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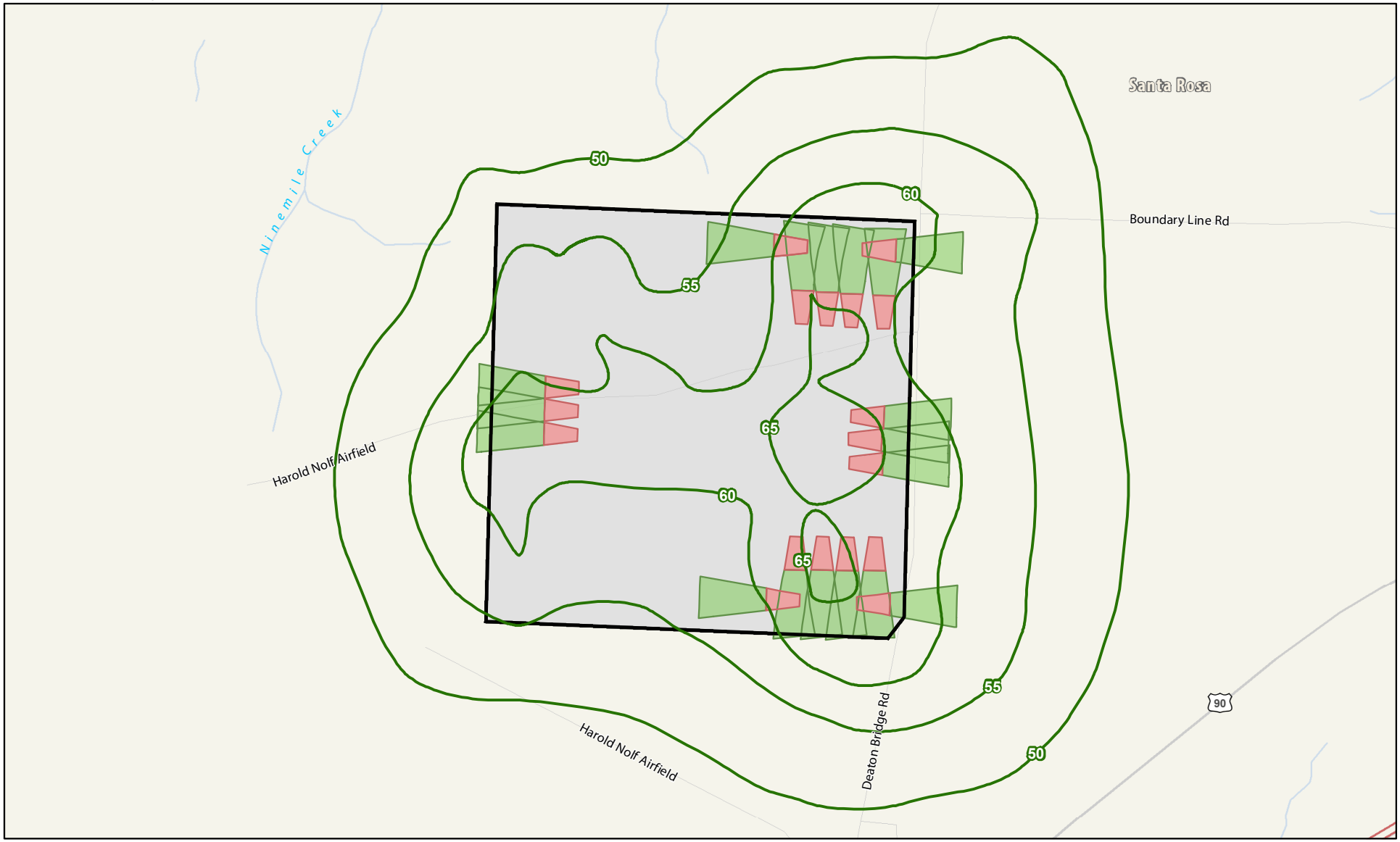


N

SCALE

0 0.1 0.2 Miles

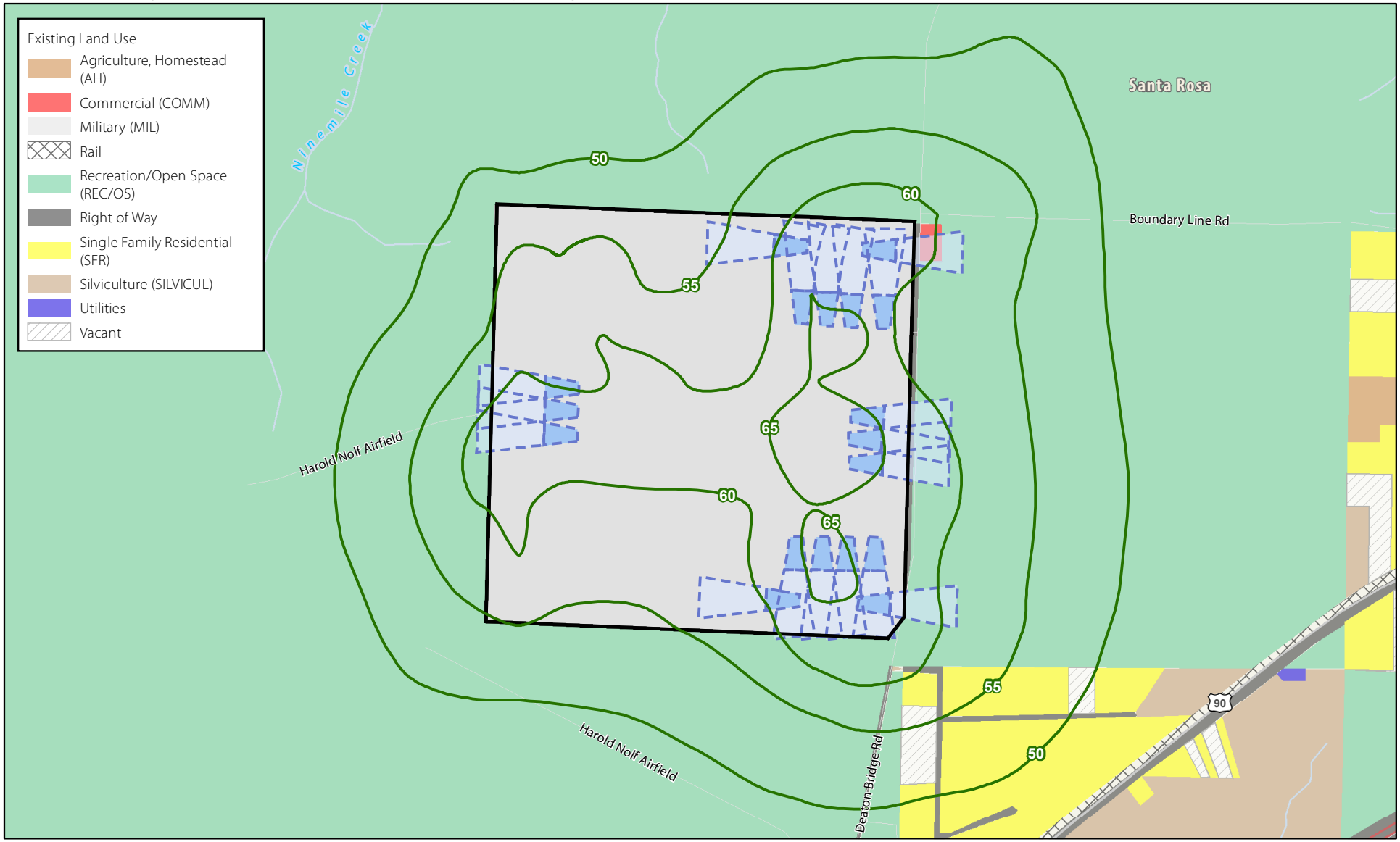
Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Harold Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I

Figure 7.12-8
2015 AICUZ Footprint, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Harold\2016_Dec\7_12-9_2015_AICUZ_Footprint_Existing_LU_NOLF_Harold.mxd



N

SCALE

0 0.1 0.2 Miles

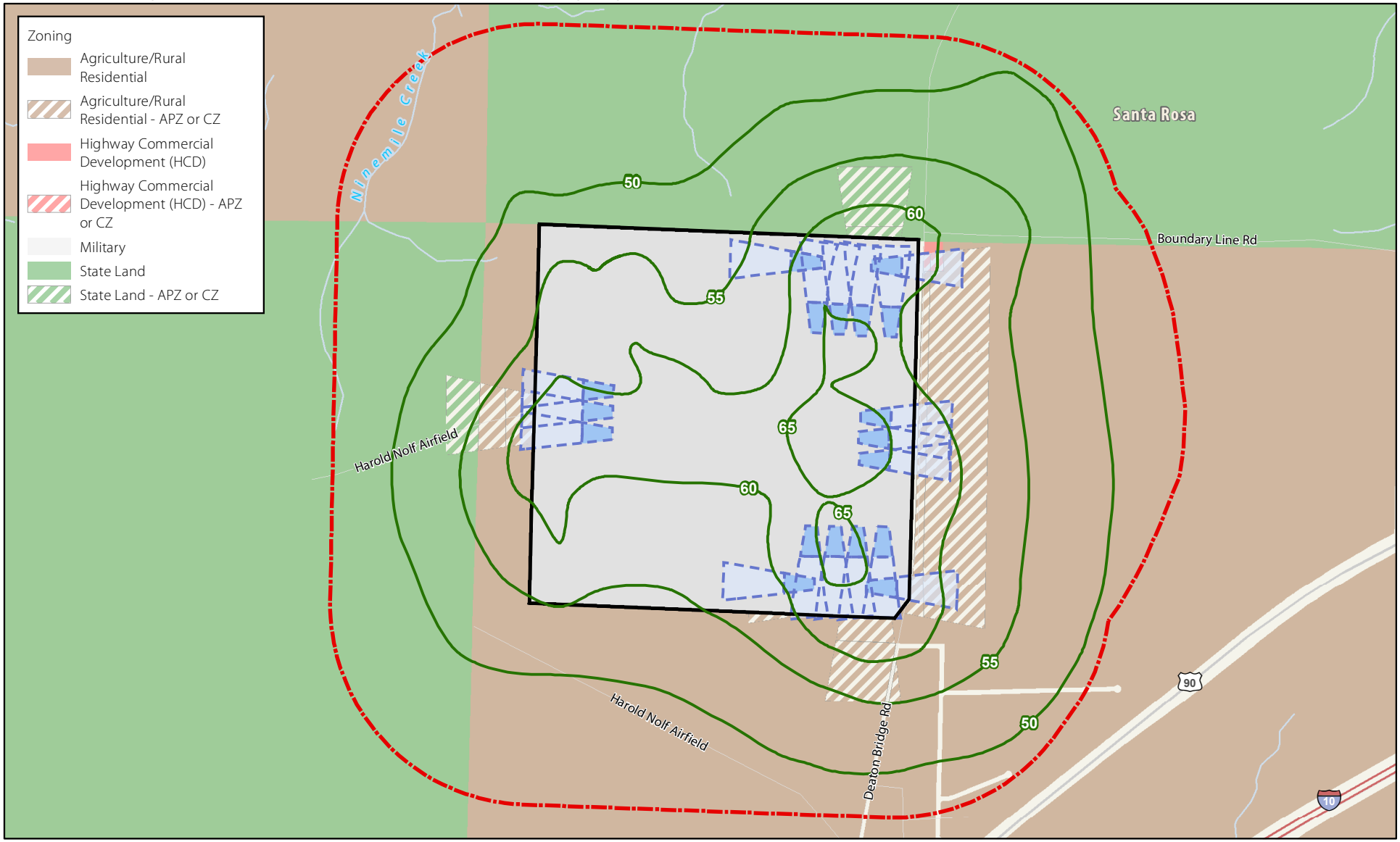
Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Harold Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I

Figure 7.12-9
2015 Composite AICUZ Map, Existing Land Use, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Harold\2016_Dec\7_12-10_2015_AICUZ_Footprint_Existing_Zoning_NOLF_Harold.mxd



SCALE
0 0.1 0.2 Miles

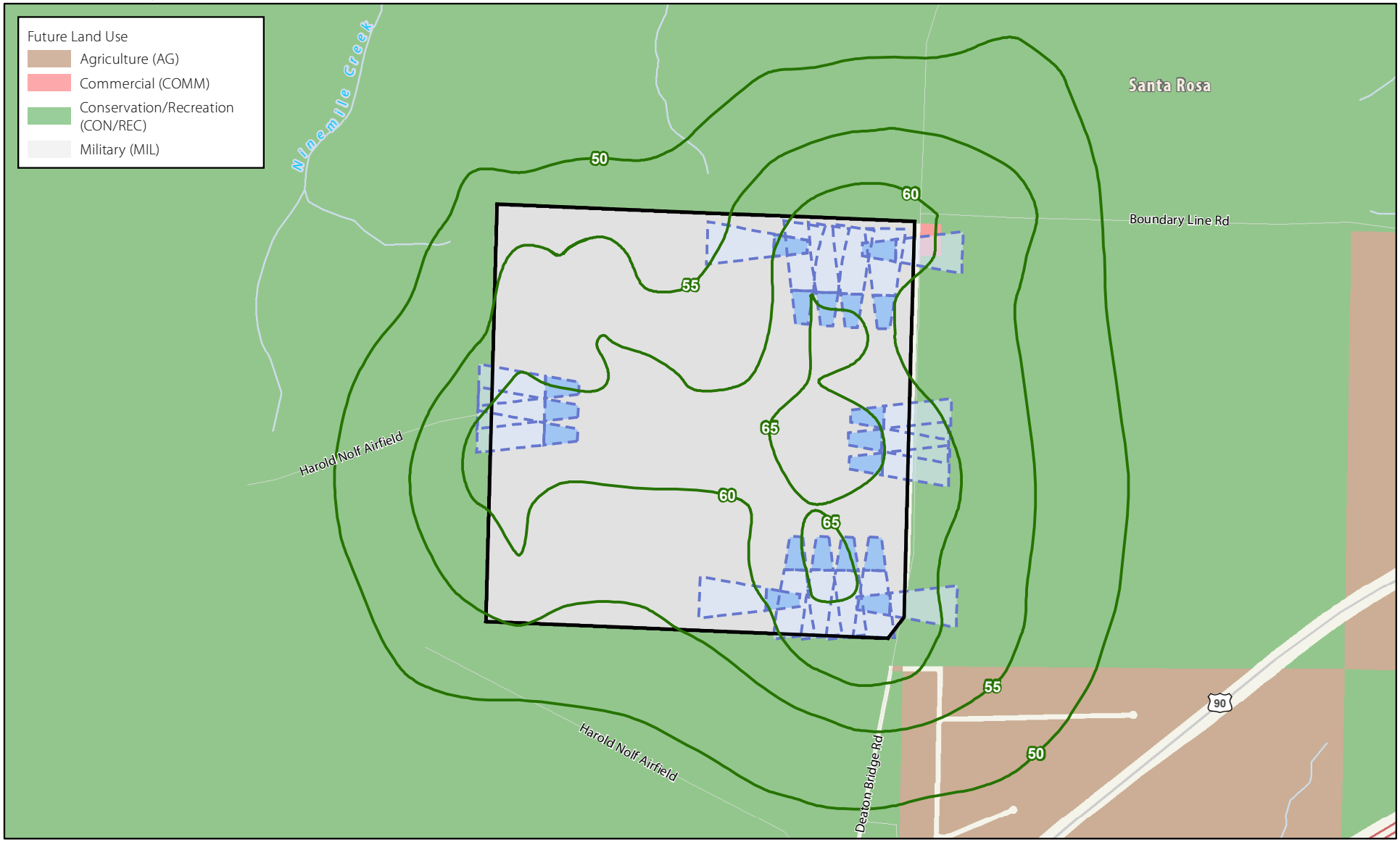
Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- Military Airport Zone
- NOLF Harold Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.12-10
2015 Composite AICUZ Map, Existing Zoning, NOLF Harold
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Harold\2016_Dec\7_12-11_2015_AICUZ_Footprint_Future_LU_NOLF_Harold.mxd



SCALE
0 0.1 0.2 Miles

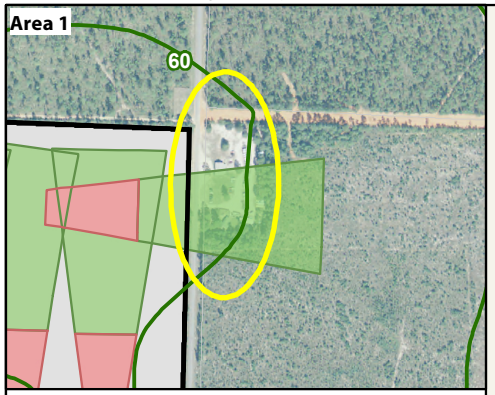
Legend

- Interstate
- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Harold Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I

Figure 7.12-11
2015 Composite AICUZ Map, Future Land Use, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Harold\2016_Dec\7_12-12_Compatibility_Concerns_2015_AICUZ_Footprint_NOLF_Harold.mxd



Blackwater Canoe Rentals and Sales Inc., a one-story commercial store located across Deaton Bridge Road on the northeastern corner of the site falls under an APZ I. Commercial districts are incompatible in APZ I.

N

SCALE

0 0.1 0.2 Miles

Legend

- Major Highway
- Local Road
- 2015 AICUZ Noise Contours
- NOLF Harold Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

Figure 7.12-12
Compatibility Concerns - 2015 Composite Map, NOLF Harold
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

NOLF SANTA ROSA

SANTA ROSA COUNTY

FLORIDA

7.13 NOLF SANTA ROSA COMPREHENSIVE EVALUATION

This section evaluates airfield operations, noise contours, APZs, and land use specific to NOLF Santa Rosa. A list of figures accompanying this section is provided below. [Note: All figures are presented at the conclusion of the NOLF Santa Rosa Comprehensive Evaluation.]

AIRFIELD OPERATIONS	
NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-1
Representative Flight Tracks, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-2
NOISE CONTOURS	
2015 Noise Contours, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-3
2015 Noise Gradients, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-4
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-5
ACCIDENT POTENTIAL ZONES	
2015 AICUZ APZs, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-6
Comparison of 1990 and 2015 AICUZ APZs, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-7
COMPOSITE MAP	
2015 Composite AICUZ Footprint, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-8
LAND USE	
2015 AICUZ Footprint with Existing Land Use, Santa Rosa County, Florida	Figure 7.13-9
2015 AICUZ Footprint with Existing Zoning, Santa Rosa County, Florida	Figure 7.13-10
2015 AICUZ Footprint with Future Land Use, Santa Rosa County, Florida	Figure 7.13-11
Compatibility Concerns - 2015 AICUZ Footprint, NOLF Santa Rosa, Santa Rosa County, Florida	Figure 7.13-12

AIRFIELD OPERATIONS

NOLF Santa Rosa is a former fixed-wing airfield that has been converted to a rotary-wing training airfield. Aircraft can perform operations during nighttime hours (10:00 p.m. to 7:00 a.m.) at the airfield. NOLF Santa Rosa is 7 miles southeast of NAS Whiting Field in Santa Rosa County (Figure 7.13-1). NOLF Santa Rosa is owned and operated by the Navy and is the second-busiest airfield in the NAS Whiting Field Complex. NOLF Santa Rosa has four paved runways/pads that are used as helicopter training aids.

As a planning document, AICUZ studies account for future missions and changes in operations. As such, this AICUZ Study provides analysis of projected CY2025 conditions and incorporates known and anticipated changes in mission and operations through CY2025. Flight operations at NOLF Santa Rosa have fluctuated over time, ranging from a peak of 345,868 in 2010 to a low of 144,813 operations in 2011. Historical operations at NOLF Santa Rosa are presented in Table 3-2, Operational Tempo for NAS Whiting Field and NOLFs.

The Navy forecasts 274,225 annual flight operations at NOLF Santa Rosa in CY2025 (Table 7.13-1). This will represent a 17 percent increase in annual flight operations relative to the 234,834 operations reported in the baseline 1990 AICUZ Study. Table 7.13-1 shows the modeled distribution of the projected annual airfield operations for NOLF Santa Rosa.

TABLE 7.13-1 PROJECTED CY2025 AIRCRAFT OPERATIONS FOR NOLF SANTA ROSA

OPERATION TYPE	NUMBER OF OPERATIONS
Arrival	6,674
Departure	6,674
Left-Hand Touch and Go	169,803
Left-Hand FCLP	24,258
Left-Hand GAIL	24,258
Right-Hand GAIL	24,258
Right-Hand Autorotation	18,300
TOTAL	**274,225**
1990 AICUZ Total	**234,834**

Sources: BRRC 2015; NAS Whiting Field 2010

FLIGHT TRACKS

Existing military operations at NOLF Santa Rosa are performed by TH-57 helicopters. A maximum of 12 aircraft may operate at NOLF Santa Rosa during acoustic daytime operations (7:00 a.m. to 10:00 p.m.) and six aircraft may conduct operations during acoustic nighttime hours (10:00 p.m. to 7:00 a.m.). The majority of operations at this NOLF are conducted during acoustic daytime hours, with some NVG operations conducted during acoustic nighttime hours. Figure 7.13-2 depicts flight tracks associated with NOLF Santa Rosa.

2015 NOISE CONTOURS

Noise contours provided in this AICUZ Study are identified as the 2015 AICUZ noise contours and represent the projected operations for CY2025. This section illustrates the 2015 AICUZ noise contours for NOLF Santa Rosa and describes the noise environment surrounding the airfield. Also provided are comparisons and figure overlays for the previous AICUZ (1990) and

the 2015 AICUZ noise contours. The comparison helps in identifying changes to noise exposure based on prospective changes in aircraft operations. This comparison also assists in formulating land use recommendations to mitigate noise impacts. Discussions on land use compatibility and land use recommendations within NOLF Santa Rosa's associated noise zones are provided in subsequent sections of this comprehensive evaluation.

The only noise sources considered for the NOLF Santa Rosa noise model are TH-57 aircraft operations. The 2015 noise contours for NOLF Santa Rosa overlay the area in the immediate vicinity of the airfield, with a majority of the noise contours concentrated within the installation's boundary (Figure 7.13-3). The 60 to 65 dB DNL noise contour, which is within Noise Zone 1 (are of low or no impact) extends outside the NOLF boundary to the northeast, northwest, southwest, south, and east. The larger noise contours are partially attributed to a higher percentage of NVG training operations that occur during the acoustic nighttime hours. The 65 to 70 dB DNL noise contour extends outside the NOLF boundary to the south, west, and the northeast corner. Also, near the northeast corner, a small portion of the 70 to 75 dB DNL noise contour extends outside of the NOLF boundary. Both of these noise contours are within Noise Zone 2 (area of moderate impact). The DNL noise levels are greater on the eastern side of the airfield because the courses in this area are utilized more often. Figure 7.13-4 provides a DNL color gradient that illustrates how the noise originating at the airfield dissipates over the surrounding land area.

The 2015 AICUZ noise contours are different in size and location when compared to the 1990 AICUZ noise contours (Figure 7.13-5). The slight changes between the 1990 and 2015 AICUZ noise contours are attributed to:

- ☐ Changes in operational levels (the number of operations has increased from the 1990 to the 2015 AICUZ studies);
- ☐ Changes in operational location (operations on the northeast portion of the field has increased from the 1990 to the 2015 AICUZ studies); and
- ☐ Improved noise mapping techniques (discussed in Section 1.4).

When comparing impacts between the 1990 and 2015 AICUZ noise contours (both on- and off-station), noise contours have increased 426 acres, with the majority of impacts occurring off-station. The increase is partially attributed to additional areas

impacted by the 60 to 65 dB DNL noise contour, which added 202 acres; however, this noise contour is within Noise Zone 1. To a lesser extent, the 65 to 70 dB DNL noise contour impacts an additional 12 acres off-station. Less than one acre of the 70 to 75 dB DNL noise contour extends off-station. Both of these noise contours are within Noise Zone 2. Table 7.13-2 provides the acreages of land areas within specific noise contours at NOLF Santa Rosa; acreages for off-station impacts are also provided.

TABLE 7.13-2 AREAS WITHIN NOISE CONTOURS (DNL), NOLF SANTA ROSA

NOISE CONTOUR	1990 AICUZ NOISE CONTOURS		2015 AICUZ NOISE CONTOURS	
	TOTAL (ACRES)	OFF STATION (ACRES)	TOTAL (ACRES)	OFF STATION (ACRES)
50-55 dB DNL	1,070	993	928	913
55-60 dB DNL	567	266	760	556
60-65 dB DNL	299	5	502	207
65-70 dB DNL	61	0	169	12
70-75 dB DNL	10	0	74	0.3
75+ dB DNL	0	0	0	0
TOTAL AREA	**2,007**	**1,264**	**2,433**	**1,688**

Notes: Acreage data calculated in coordination with the development of the 2015 AICUZ Study. Acreages estimated using standard GIS mapping tools.
Total Acres = the sum of the on- and off-station areas within noise contours

IMAGINARY SURFACES

As noted in Section 5.3, the FAA and the military define flight safety zones (imaginary surfaces) below aircraft arrival and departure flight tracks surrounding the airfield that must remain free of obstructions. These imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Restrictions are more stringent as one approaches the landing area and corresponding flight path and become less restrictive as the distance from the landing area increases. Imaginary surface

data were unavailable for rotary-wing airfields at the NAS Whiting Field Complex; therefore, they were not analyzed as part of this study for NOLF Santa Rosa.

2015 ACCIDENT POTENTIAL ZONES

As discussed in Section 5.1, APZ configurations are derived from the AICUZ Instruction (OPNAVINST 11010.36C) and follow departure, arrival, and pattern flight tracks. APZ configurations are based upon analysis of historical data and are designed to minimize the potential harm if a mishap were to occur. Although the likelihood of an accident is remote, the Navy recommends that certain land uses be avoided within APZs. APZs are used by the Navy and local planning agencies to ensure compatible development within these areas.

The following section presents the 2015 APZs for NOLF Santa Rosa (Figure 7.13-6), including a detailed analysis of areas impacted. Also provided are comparisons and figure overlays for the previous AICUZ Study (1990) and the 2015 AICUZ Study APZs (Figure 7.13-7). The comparison helps identify changes to APZs based on prospective changes in aircraft operations and assists in the identification of land use recommendations for incompatible development. Land use and recommendations within the APZs for NOLF Santa Rosa are provided and discussed in subsequent sections of this comprehensive evaluation.

The AICUZ Instruction requires Clear Zones for all VFR landing areas, and APZ I is required for all landing areas that support daily training and operational missions. Approximately 280 acres are impacted by the 2015 AICUZ Clear Zones and APZs at NOLF Santa Rosa; this is an 89-acre decrease from 1990 to 2015. This decrease in coverage is primarily associated with changes in the types and locations of annual operations conducted at NOLF Santa Rosa. Of the 280 acres, 39 acres impact off-station land categorized as homestead agriculture, publically owned property, single-family residential, industrial, and utilities. Table 7.13-3 compares the 1990 and 2015 AICUZ acreages within the Clear Zones and APZ I for NOLF Santa Rosa.

TABLE 7.13-3 COMPARISON OF LAND AND WATER AREAS IMPACTED WITHIN THE CLEAR ZONES AND APZ I (ACRES), NOLF SANTA ROSA

DATA	LOCATION	CLEAR ZONE		APZ I		TOTAL ACRES IMPACTED
		LAND	WATER	LAND	WATER	
1990 AICUZ	On-Station	111	0	203	0	314
	Off-Station	0	0	55	0	55
	TOTALS	111	0	258	0	369
		111		258		
2015 AICUZ	On-Station	66	0	175	0	241
	Off-Station	1	0	38	0	39
	TOTALS	67	0	213	0	280
		67		213		

Notes:
[1] Acreage data calculated in 2016 in coordination with the development of the 2015 AICUZ Study.
[2] No waterbodies are located within 2015 APZs.

LAND USE COMPATIBILITY ANALYSIS

This section addresses land use compatibility within the 2015 AICUZ noise contours and APZs by examining existing and planned land uses near NOLF Santa Rosa. Together, the 2015 AICUZ noise contours and APZs comprise the composite AICUZ map, also known as the "AICUZ footprint." The composite AICUZ map for NOLF Santa Rosa, presented on Figure 7.13-8, is used as the basis for the land use compatibility analysis. The land use criteria used to evaluate compatibility in this AICUZ Study were presented in Section 6, along with a description of the local planning authority. The analysis is based on the Navy's land use compatibility recommendations, which are presented in Table 6-1.

EXISTING LAND USE

Santa Rosa County Residential Densities

- Agriculture/Rural Residential: 1 du/acre
- Agriculture: 1 du/15 acres
- Single-Family Residential: 4 du/acre
- Rural Residential Single-Family: 2 du/acre
- Mixed Residential Subdivision: 4 du/acre

Land use is a term given to describe the management of land and the extent to which it has been modified. Typical land cover types include developed land, agricultural areas, residential, recreational, industrial, and forested areas. Patterns of land use arise naturally in communities, but are guided by regulations and designations from local government. Figure 7.13-9 illustrates existing land uses surrounding NOLF Santa Rosa. Land use surrounding NOLF Santa Rosa features low-intensity development with mostly vacant land, publically owned property, agriculture, homestead agriculture, silviculture, single-family residential (including mobile homes), recreation/commercial, industrial, and utilities. There are several pockets of vacant and residential land uses north, east, and southeast of the airfield. These are single-family residential uses and, according to Santa Rosa County, uses within this category include detached single-family homes, group homes, and accessory structures and facilities. Within this category mobile homes are prohibited. However, based on parcel description, the designations located around NOLF Santa Rosa are single-family and mobile homes. Overall, the land use and zoning around the NOLF reveals a pattern of very low-density development, with an abundance of undeveloped/vacant lands surrounding the airfield. Future development of these vacant lands could directly impact the AICUZ footprint at NOLF Santa Rosa. From a land use compatibility standpoint, some of the existing residential uses surrounding NOLF Santa Rosa are incompatible within certain noise zones. An evaluation of specific land use compatibility is discussed later in this section.

EXISTING ZONING

Zoning is the system used by governments to control the physical development of land and the type of uses to which each individual property may be utilized. Zoning is a term used in urban planning for a system of land use regulations. Zoning codes provide the regulatory framework to direct development and influence how the various uses interact with each other to prevent incompatible development. Zoning address not only the use of property, but the scale and intensity of the use. Figure 7.13-10 illustrates existing zoning surrounding NOLF Santa Rosa. In general, much of the land surrounding NOLF Santa Rosa remains vacant, with the primary zoning consisting of rural residential, industrial, and military districts. The land areas south, north, and east of the airfield have a zoning district classification of mostly agriculture/rural residential (AG-RR) with some single-family residential (R-1), mixed residential subdivision (R-1M), restricted industrial (M-1), and highway commercial

development (HCD). Land areas east, north, and south of the airfield, beyond the military zone, are predominantly designated an AG-RR zone. Land areas northwest, west and southwest, beyond the military zone, are designated agriculture/rural residential, single-family residential, highway commercial development, restricted industrial, general industrial (M-2), and mixed residential subdivision. The lands to the west are predominantly zoned restricted industrial, agriculture/rural residential, and with a small area of single-family residential and active park (P-2). It is also important to note that the vacant lands identified in the existing land use figure (Figure 7.13-9) are mostly zoned for residential land uses. Existing zoning adjacent to the airfield indicates the potential for growth around the NOLF within the agriculture/single-family residential and restricted industrial zones.

Per Santa Rosa's Comprehensive Plan 2008-2025, a military airport zone (MAZ) overlay district extending approximately 0.5 mile from the perimeter of the airfield and encompassing the AICUZ footprint and noise zones was established for NOLF Santa Rosa (Figure 7.13-10). This was instituted as part of the JLUS adopted by the County in 2005 to prevent negative impacts to current and long-term viable use of the airfield, and to promote the health and welfare of citizens living in proximity of the airfield by limiting incompatible land uses and allowing compatible land uses within the area. Future zoning data obtained from the County indicate a MAZ zone that extends over the NOLF and encompasses the AICUZ footprint and noise zones for NOLF Santa Rosa. In addition, residential zones within APZs have been identified and designated as AG-RR-APZ areas. The MAZ district and residential area, along with zoning classifications with "APZ" added to them, are regulatory designations that indicate specific growth management policies that guide development activities in a manner compatible with the long-term viability of military installations.

Zoning District Classifications

- AG-RR: Agriculture/Rural Residential
- AG: Agriculture
- R-1: Single-Family Residential
- RR-1: Rural Residential Single-Family
- R-1M: Mixed Residential Subdivision
- M-1: Restricted Industrial
- M-2: General Industrial
- HCD: Highway Commercial Development
- P-2: Active Park
- MAZ: Military Airport Zone

Source: City's Land Use and Development Ordinance

FUTURE LAND USE

The County's Comprehensive Plan outlines future land use within the county. In general, Comprehensive Plans and the local Land Development Code are the tools used by local governments to guide future development of land in a planned manner. Figure 7.13-11 illustrates the future land uses surrounding NOLF Santa Rosa. The future land use pattern around NOLF Santa Rosa is consistent with current development trends, with the majority of future land use being agriculture, single-family residential, commercial, industrial, and military designations. The majority of the areas used as single-family residential have a

future use of agriculture, which will reduce the density from four dwelling units per acre to one dwelling unit per 15 acres. However, there is an increase in residential and industrial land use designations around the entire airfield that is currently designated as either vacant or silviculture. Any future development in those areas around NOLF Santa Rosa will most likely result in an increase in population density. There are ongoing efforts to work cooperatively with local and regional governments to ensure compatibility.

Overall, the land use around the airfield is a mixture of low-density residential and industrial areas. Future land use indicates the potential for growth around the NOLF within the agriculture and industrial areas. Therefore, future land uses within certain zoning districts are potentially incompatible in certain noise zones and APZs. An evaluation of specific land use compatibility concerns for NOLF Santa Rosa is presented below.

COMPATIBILITY CONCERNS

In determining land use compatibility within NOLF Santa Rosa's noise zones, APZs, and Clear Zones, the Navy examined both existing and planned land uses near the airfield. To analyze whether existing land use is compatible with aircraft operations at NOLF Santa Rosa, the 2015 AICUZ noise contours, APZs, and Clear Zones were overlaid on current Santa Rosa County parcel data, land use classifications, and zoning district information. The evaluation was conducted at the land parcel level using the Navy's land use compatibility guidance. Table 6-1 provides a generalized breakdown of land use compatibility noise zones and APZs from OPNAVINST 11011.36C.

Any residential districts within 65+ dB DNL noise contours (Noise Zones 2 and 3) present compatibility concerns. There are 2015 AICUZ noise contours for NOLF Santa Rosa that extend off-station; the impacted areas off-station are primarily in the 50 to 60 dB DNL noise contour, which is within Noise Zone 1 (area of low or no impact). There are also limited off-station areas in the 65 to 70 dB DNL noise contour, which is within Noise Zone 2 (area of moderate impact).

Based on the data, there are potential incompatible land uses and concerns within certain Clear Zones and APZs associated with NOLF Santa Rosa related to designated zoning and future land use. As illustrated on Figure 7.13-12, APZs and noise

zones have the potential to impact off-station areas, primarily to the west, south, and northeast of NOLF Santa Rosa. Areas impacted are primarily zoned agriculture/rural residential and restricted industrial, as described below.

- ☐ Area 1: Located on the northwest corner of NOLF Santa Rosa, four areas of APZ I and a small portion of a Clear Zone extend over the NOLF boundary onto land zoned agriculture/rural residential and restricted industrial. The current land uses in these areas are compatible with AICUZ guidelines at this time. However, the land areas located under APZ I and the Clear Zone are a concern pursuant to the future land use and current zoning designations of restricted industrial uses. Most of the land is currently vacant, while a small portion is used as agriculture homestead. APZ I covers 10.06 acres of land adjacent to NOLF Santa Rosa. The Clear Zone encompasses a minimal area of land (0.34 acre) that is classified as restricted industrial. According to Santa Rosa County data, the land underneath this Clear Zone is owned by Vic's of Navarre, LLC. Because residential districts, as well as some manufacturing, are incompatible within APZ I, and the Navy would like to see the area under the Clear Zone remain undeveloped. It should be noted that aerial photographs do not appear to identify any structures on the land.

- ☐ Area 2: Portions of several APZ I areas and the 65 to 75 dB DNL noise contour (Noise Zone 2) extend over areas on the northeast corner of the site. There are mobile homes, single-family residential dwellings, and vacant lots located within APZ I and Noise Zone 2. The current land uses in these areas are incompatible with AICUZ guidelines at this time, and the areas located under APZ I and Noise Zone 2 are a concern pursuant to the future land use and current zoning designations of agriculture and agriculture/rural residential land uses. Residential uses within APZ I and Noise Zone 2 are incompatible and should be prohibited. Based on this and the future land use designations, these areas are a compatibility concern due to the potential for future residential development. Any future residential development in these areas would be within APZ I and Noise Zone 2 and, therefore, incompatible with airfield operations. In addition, lands located in this area are currently within the agriculture and agriculture/rural residential zoning district. A total of 8.71 acres of land adjacent to the site boundary are within APZ I. A total of 7.61 acres of land adjacent to the site boundary are within the 65 to 70 dB DNL noise contour (Noise Zone 2), and 0.30 acre is within the 70 to 75 dB DNL noise contour (Noise Zone 2). Land use within Noise Zone 2 is a concern due to the potential of future residential development pursuant to the future land use of agriculture and current zoning designations of agriculture and agriculture/rural residential.

Any future residential development in these areas would be within APZ I and Noise Zone 2 and, therefore, incompatible.

- ☐ Area 3: Three areas of APZ I, a portion of a Clear Zone, and a 65 to 70 dB DNL noise contour (Noise Zone 2) extend off-station onto vacant land zoned agriculture/rural residential and highway commercial development. A total of 11.76 acres of land that is classified as utilities and vacant are within the three off-station APZ I areas, and the Clear Zone encompasses a minimal area of off-station land (0.55 acre). While the land use within these areas is not an immediate concern, there is the potential for future incompatibilities. According to Santa Rosa County data, the land within the Clear Zone is owned by the State of Florida Department of Transportation. Residential districts and passenger terminals are incompatible within APZ I, and the Navy would like to see the area under the Clear Zone remain undeveloped. Also, 0.21 acre of land located within the 65 to 70 dB DNL noise contour (Noise Zone 2) is a concern due to the potential for future residential and commercial development pursuant to the future land use (agriculture) and current zoning designations of agriculture/rural residential and highway commercial development. The AICUZ instruction discourages residential land use within 65+ dB DNL noise contours, as well as some commercial land uses, such as nursing homes. The land within these areas should be monitored to prevent incompatible development. It should be noted that aerial photographs do not appear to identify any structures on the land under APZ I, the Clear Zone, or the 65 to 70 dB DNL.

- ☐ Area 4: A small portion of the 65 to 70 dB DNL noise contour (Noise Zone 2) extends over the NOLF boundary and onto 0.33 acre of a mobile home lot classified single-family residential. Land located within this noise zone is a concern due to the potential for future residential development pursuant to the future land use (agriculture) and current zoning designations of agriculture and agriculture/rural residential. The AICUZ instruction discourages residential land uses within 65+ dB DNL noise zones. The land within these areas should be monitored to prevent future incompatible development.

LAND USE RECOMMENDATIONS SPECIFIC TO NOLF SANTA ROSA

The land uses identified in this section are, and continue to be, compatibility concerns in the area around NOLF Santa Rosa. The Navy and Santa Rosa County should continue to monitor these areas of incompatible land use, as they could become encroachment concerns in the future. The following presents and describes land use planning tools and recommendations for implementing and achieving a successful AICUZ Program specific to NOLF Santa Rosa. Equally important, but broader, land use planning tools and recommendations are presented in Section 8 of this AICUZ Study.

FUTURE LAND USE CONSIDERATIONS

When Santa Rosa County makes land use decisions in proximity to the established AICUZ footprint, they should consider the Navy's land use compatibility recommendations for Clear Zones, APZs, and noise zones. The current and future land uses for the land immediately adjacent to the airfield are predominantly residential and industrial and pose compatibility concerns in the future. The County's Comprehensive Plan provides a MAZ overlay district around the airfield and encompassing the AICUZ footprint for NOLF Santa Rosa. The Santa Rosa County Planning and Zoning Commission should update their MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study. Additionally, the County and NAS Whiting Field should continue to work together to fully implement the MAZ district with development restrictions for areas inside and outside the established APZs at NOLF Santa Rosa that have been identified as current compatibility concerns or are most likely to present compatibility issues in the future.

As mentioned in Article Eleven of the County's Land Development Code, no structure will be constructed within the Clear Zones and there will be a height restriction of 35 feet for single family residential and non-residential structures within APZ I. Multi-family residential, water towers, communication towers/radio or TV transmission tower towers, and regional electric transmission lines are incompatible structures within APZ I. Article Eleven also states that any contract for the sale of residential property that is located in whole or part within a Military Airport Notification Zone, shall include, as an attachment to the contract of sale, a Military Airport Disclosure Notice, in a form approved by Santa Rosa County. Furthermore, the

County, as stated in the 2003 JLUS, should require that subdivision plans delineate boundaries of all current APZs and noise contours, or indicate whether the entire property occurs within such zones.

UPDATE LAND USE PLAN AND MAPS

Santa Rosa County should update its Comprehensive Plan, Horizon 2025, to reflect the 2015 AICUZ noise contours, APZs, and Clear Zones for NOLF Santa Rosa and OPNAVINST 11010.36C. This update will further aid County officials, planners, and private citizens in their decisions and policies regarding future land use development surrounding NOLF Santa Rosa.

MONITOR AREAS OF POTENTIAL CONCERN

There is a great deal of vacant land zoned for residential and industrial use surrounding NOLF Santa Rosa that is within Clear Zones, APZs, and the 65 to 70 dB DNL noise contour (Noise Zone 2). It is recommended that these areas are continuously monitored for changes to the development density, and the Navy should communicate with the planning authorities to discuss concerns regarding incompatible land uses. These areas will become a compatibility concern, per the AICUZ criteria, if residential and industrial development is allowed.

In addition to land use regulations (i.e., zoning), the Navy may periodically pursue acquisition of real estate interests in critical areas around the airfield. Acquisition may be in the form of fee simple acquisitions or restrictive use easements. It is recommended that the Navy continue its efforts to monitor potential real estate acquisitions that are in line with mission sustainment goals, especially within APZ I. In addition, Santa Rosa County should continue Policy 2.1.B.1 of the Comprehensive Plan to pursue the purchase of land surrounding NOLF Santa Rosa for the purposes of protecting these bases from encroachment and to attract complementary business uses. If it is not possible to purchase development rights and/or property, then it is recommended that the County approach property owners for potential partnering to ensure compatible land uses. Whether accomplished by the Navy or the County, such purchases can protect key Navy land assets by limiting impacts from off-station development and land use that are considered incompatible with air station activities.

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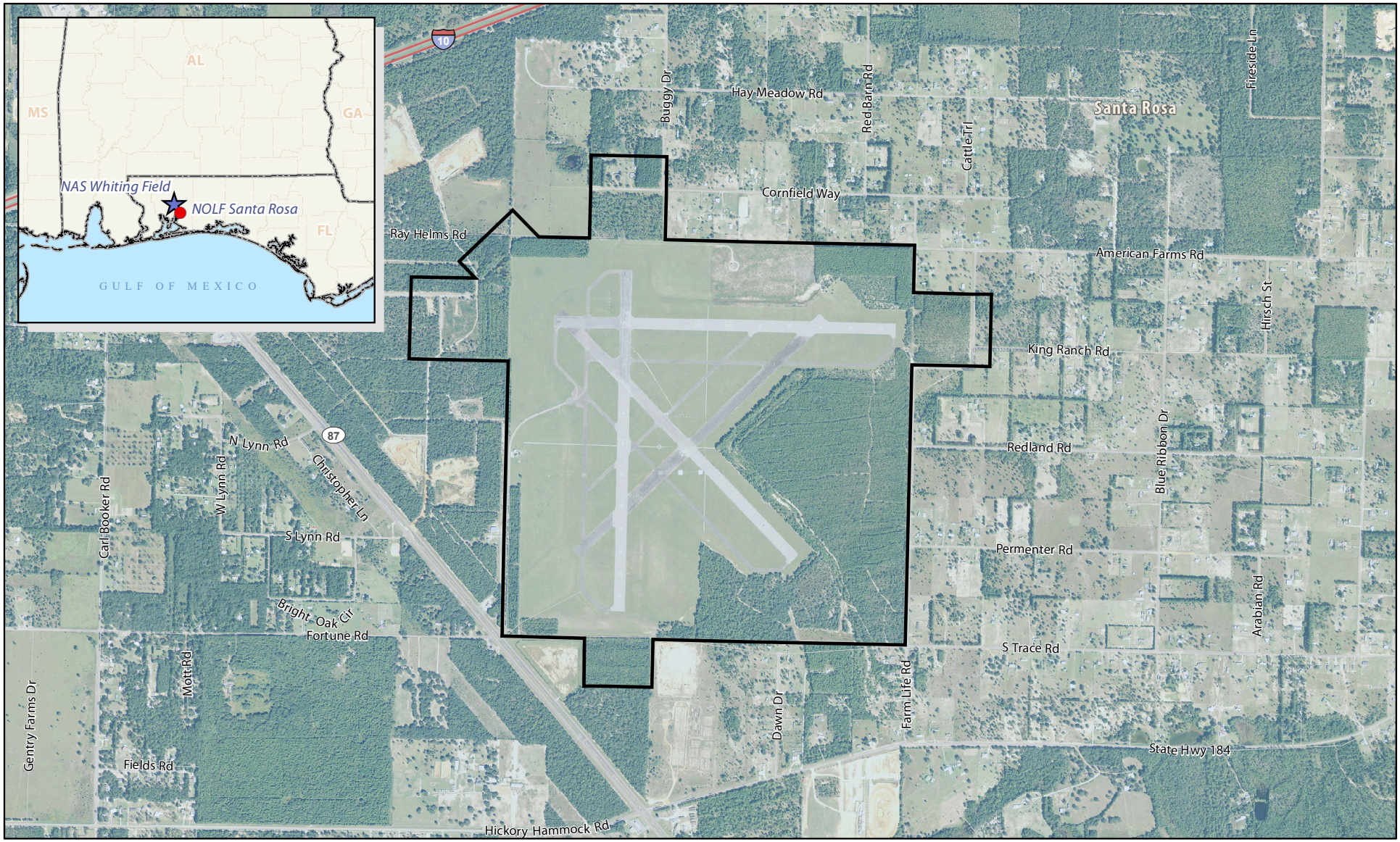


N

SCALE

0 0.1 0.2 Miles

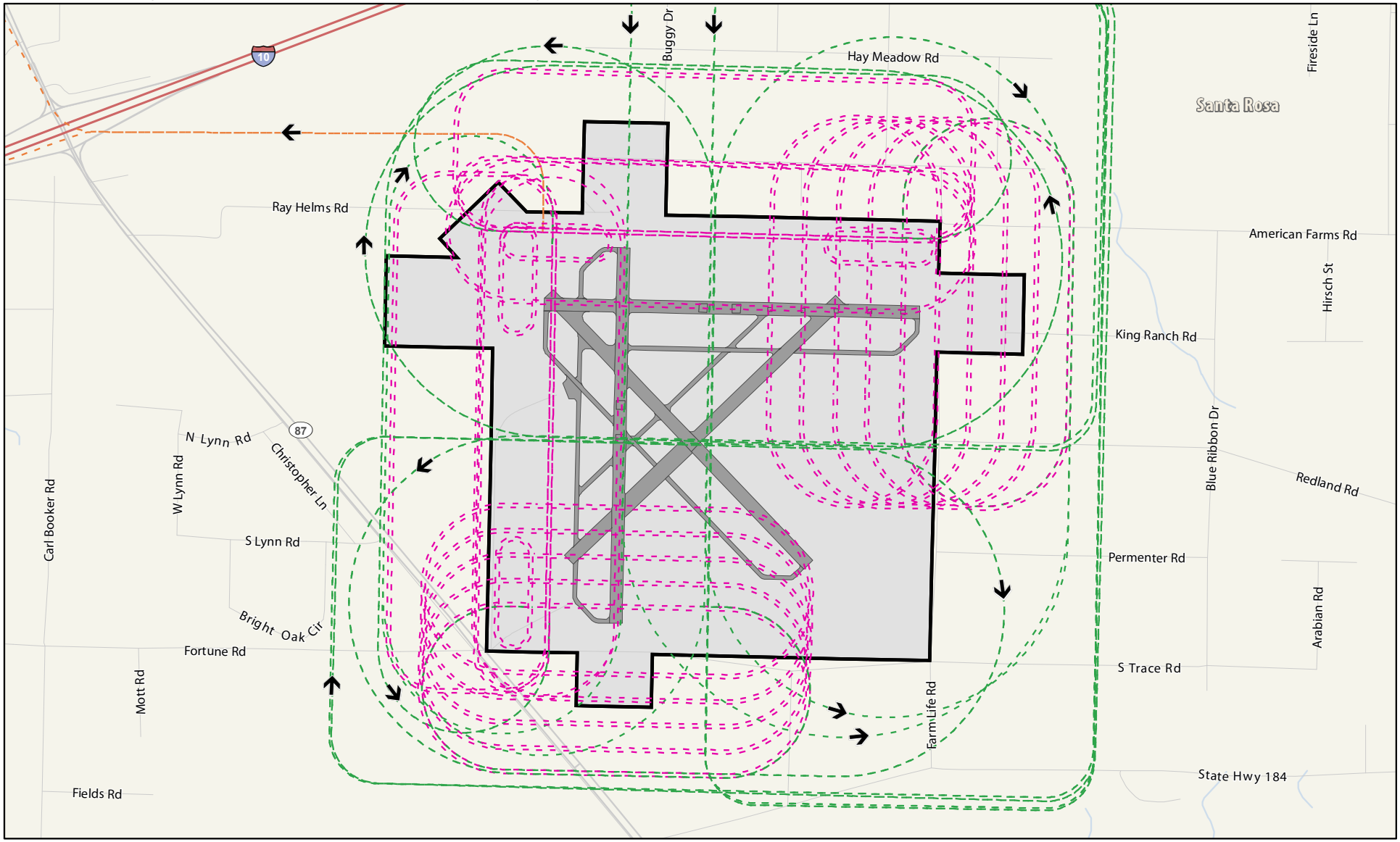
Legend

- Interstate
- Major Road
- Local Road
- NOLF Santa Rosa Boundary

Figure 7.13-1
NOLF Santa Rosa
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-2_Representative_Flight_Tracks_NOLF_SantaRosa.mxd



Legend

- Interstate
- Major Road
- Local Road
- Airfield
- NOLF Santa Rosa Boundary
- Arrival
- Closed Pattern
- Departure

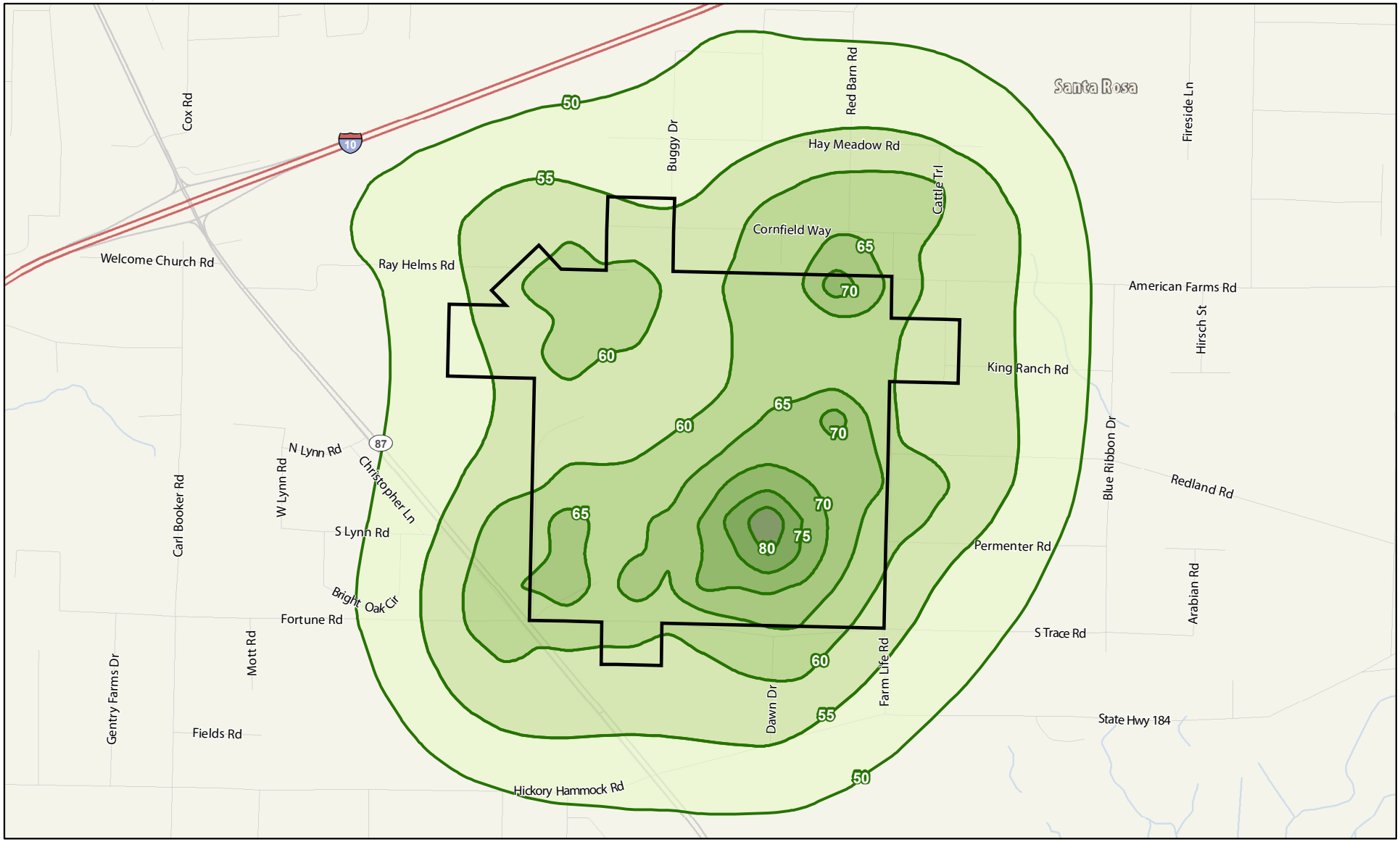
SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.13-2
Representative Flight Tracks, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-3_2015_AICUZ_Noise_Contours_NOLF_SantaRosa.mxd



SCALE
0 0.2 0.4 Miles

Legend

- Interstate
- Major Road
- Local Road
- NOLF Santa Rosa Boundary

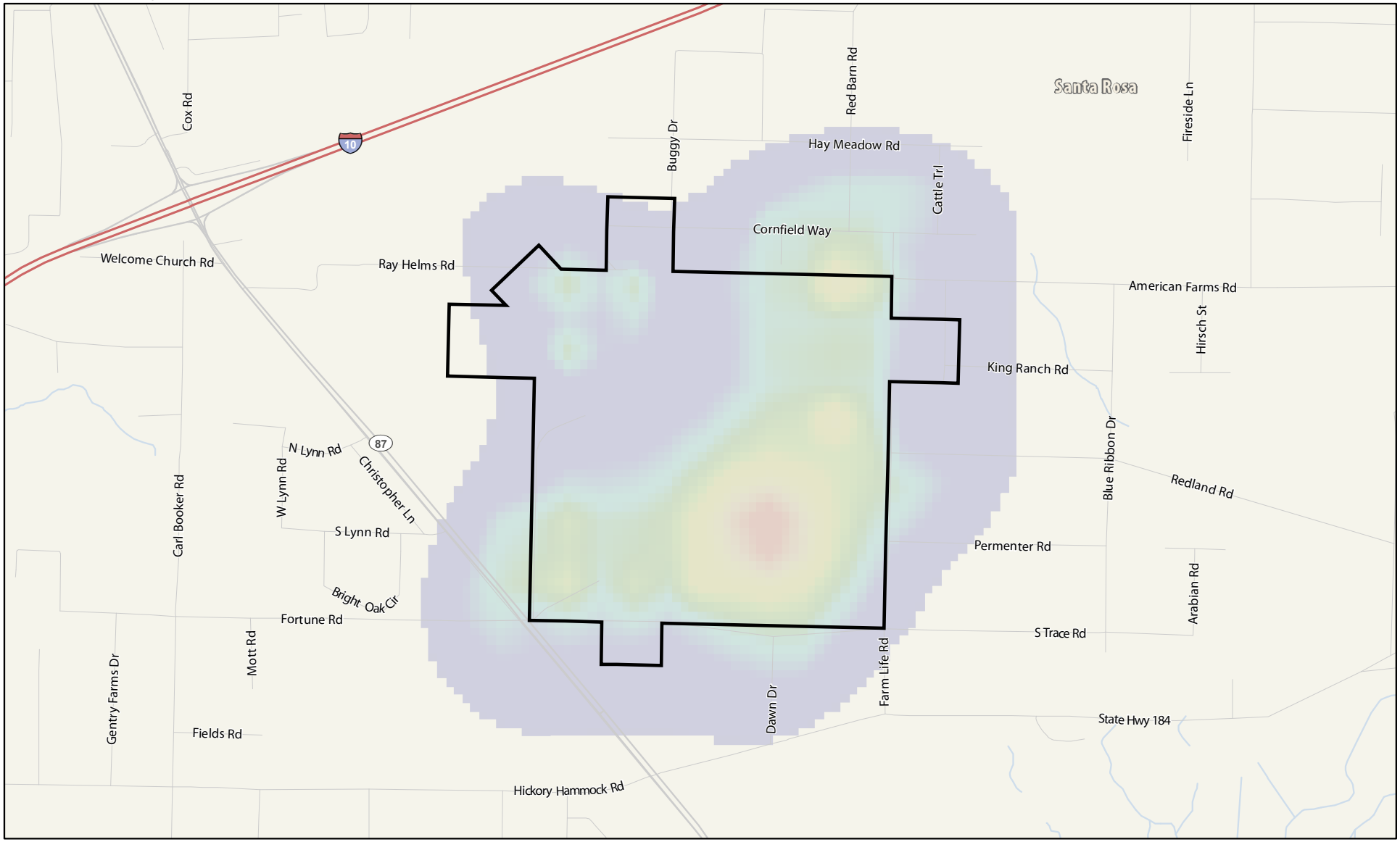
dB DNL Value

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL

Figure 7.13-3
2015 AICUZ Noise Contours, NOLF Santa Rosa
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-4_2015_AICUZ_Noise_Gradients_NOLF_SantaRosa.mxd



N

SCALE

0 0.2 0.4 Miles

Legend

Interstate

Major Road

Local Road

NOLF Santa Rosa Boundary

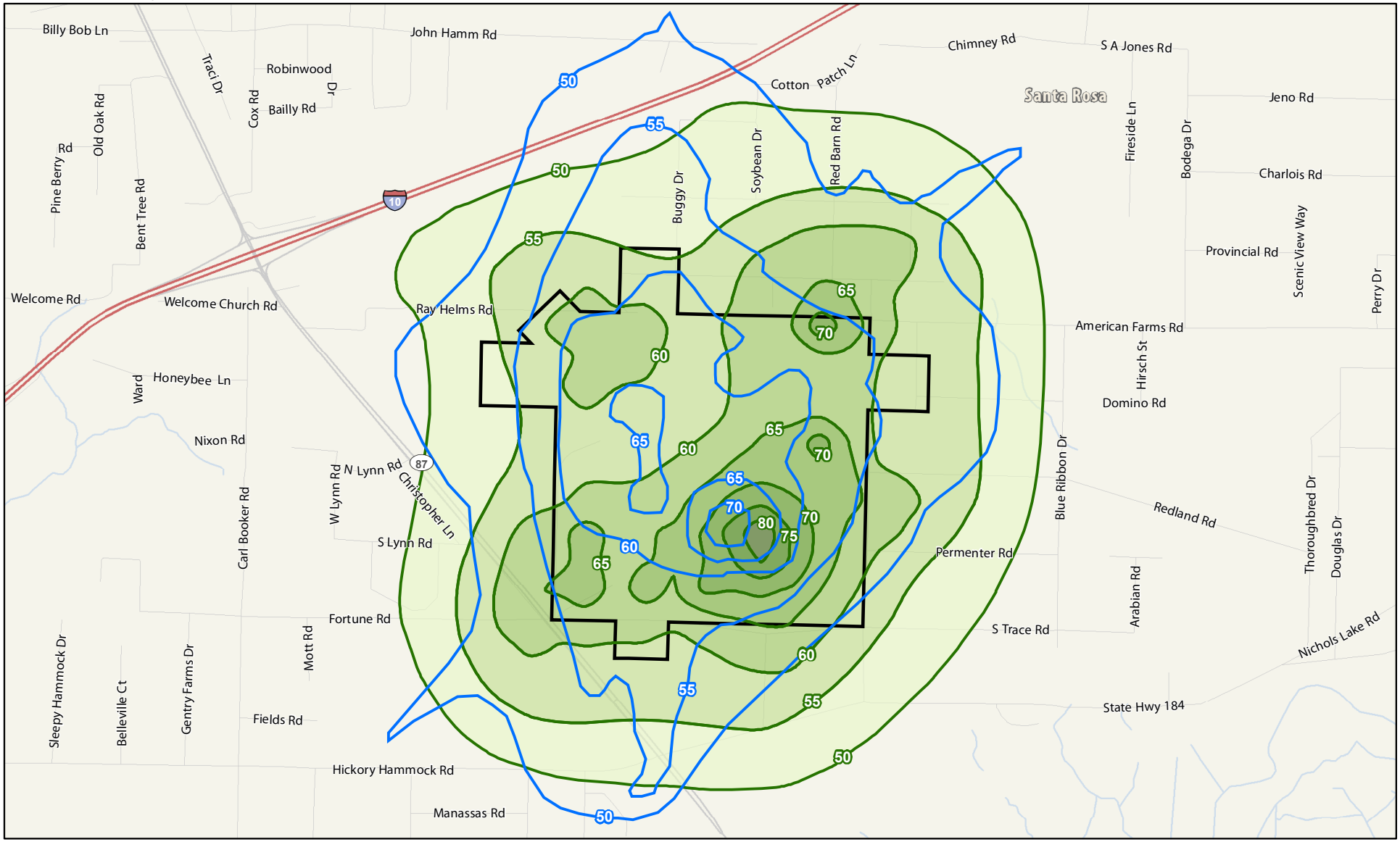
Noise Gradient (dB DNL)

55 60 65 70 75 80 85

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Figure 7.13-4
2015 AICUZ Noise Gradients, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-5_AICUZ_Noise_Contours_Comparison_NOLF_SantaRosa.mxd



SCALE

0 0.2 0.4 Miles

Legend

- Interstate
- Major Road
- Local Road
- 1990 AICUZ Noise Contours
- NOLF Santa Rosa Boundary

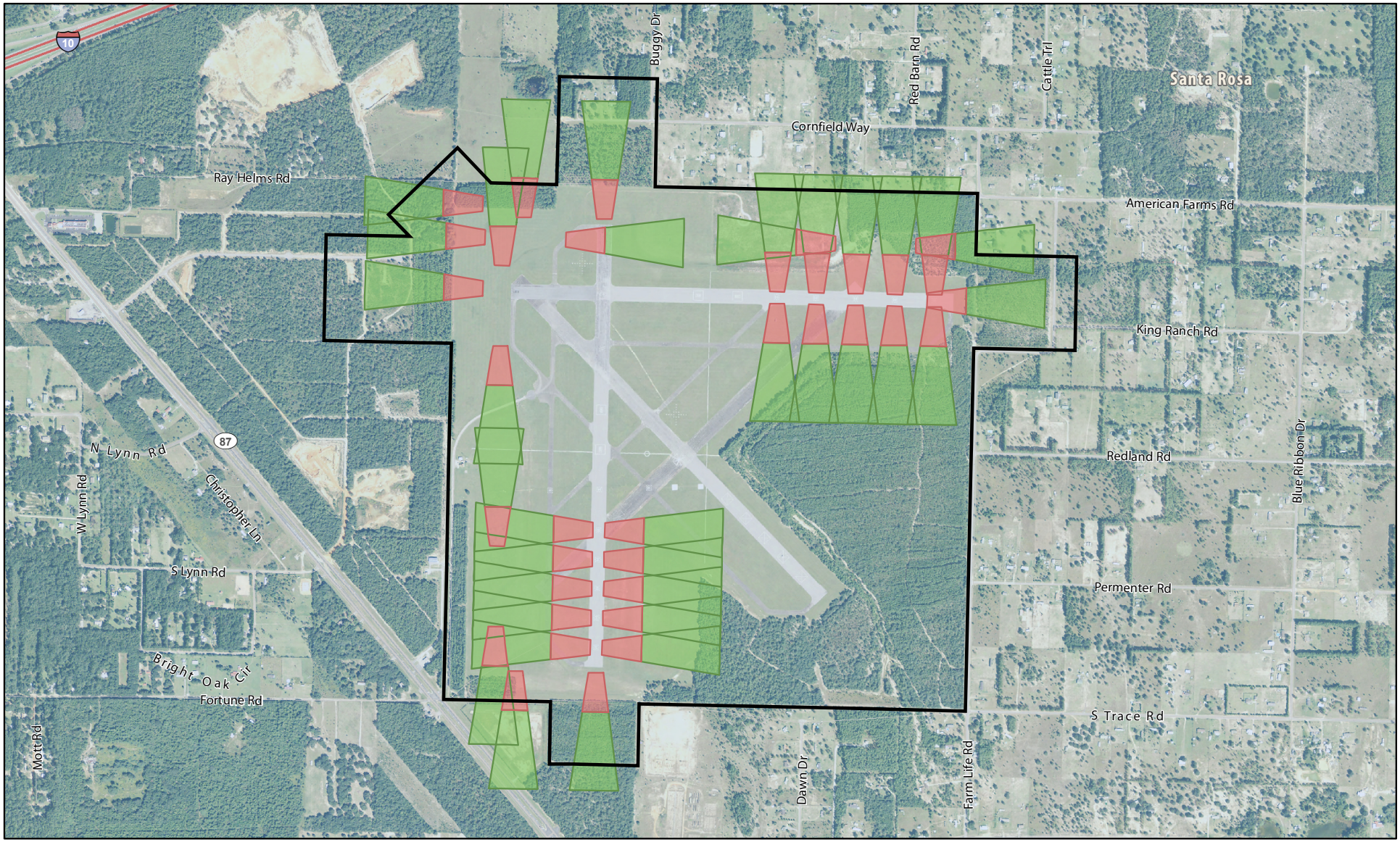
2015 AICUZ Noise Contours

- 50 dB DNL
- 55 dB DNL
- 60 dB DNL
- 65 dB DNL
- 70 dB DNL
- 75 dB DNL
- 80 dB DNL

Figure 7.13-5
Comparison of 1990 and 2015 AICUZ Noise Contours, NOLF Santa Rosa
Santa Rosa County, Florida

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-6_2015_AICUZ_APZs_NOLF_SantaRosa.mxd



N

SCALE

0 0.1 0.2 Miles

Legend

- Interstate
- Major Road
- Local Road
- NOLF Santa Rosa Boundary

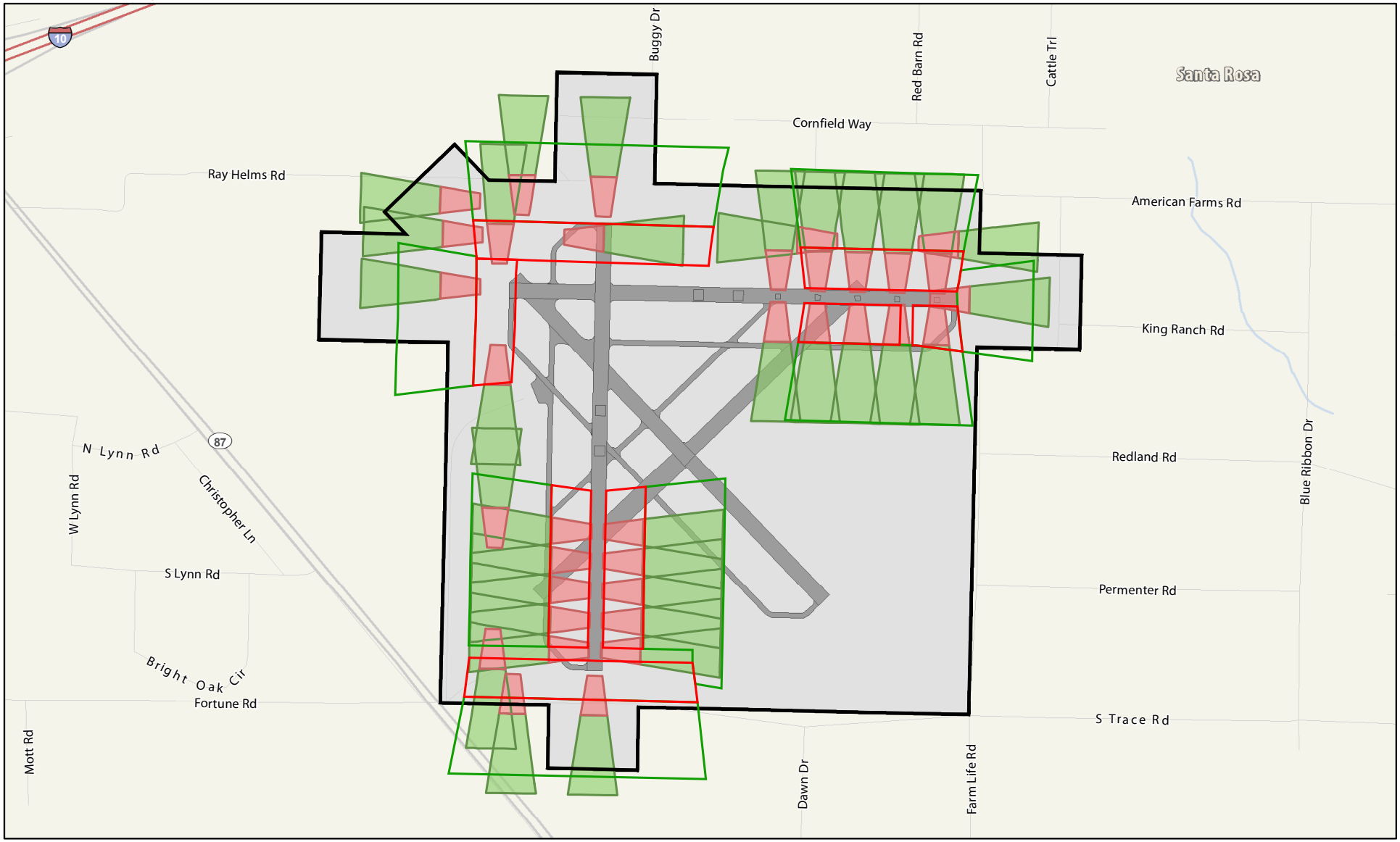
Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.13-6
2015 AICUZ APZs, NOLF Santa Rosa
Santa Rosa County, Florida

SOURCE: ESRI 2012; NAVFAC 2015;
Ecology and Environment, Inc. 2015, NAIP 2013.

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-7_AICUZ_APZs_Comparison_NOLF_SantaRosa.mxd



N

SCALE

0 0.1 0.2 Miles

SOURCE: ESRI 2012; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

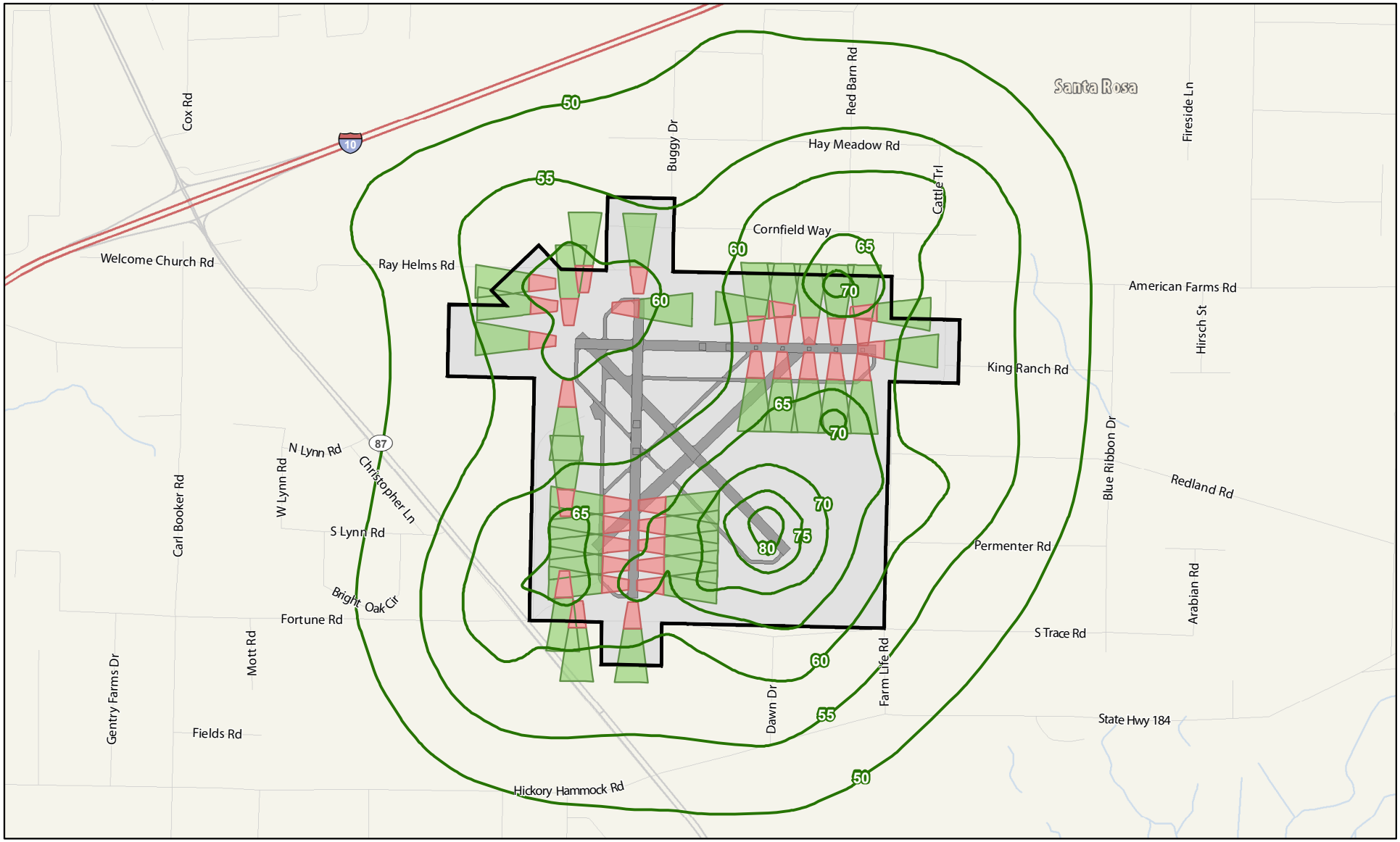
- Interstate
- Major Road
- Local Road
- NOLF Santa Rosa Boundary
- Airfield

Accident Potential Zone (2015)
- Clear Zone
- APZ I

Accident Potential Zone (1990)
- Clear Zone
- APZ I

Figure 7.13-7
Comparison of 1990 and 2015 AICUZ APZs, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-8_2015_AICUZ_Footprint_NOLF_SantaRosa.mxd



N

SCALE

0 0.2 0.4 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2015.

Legend

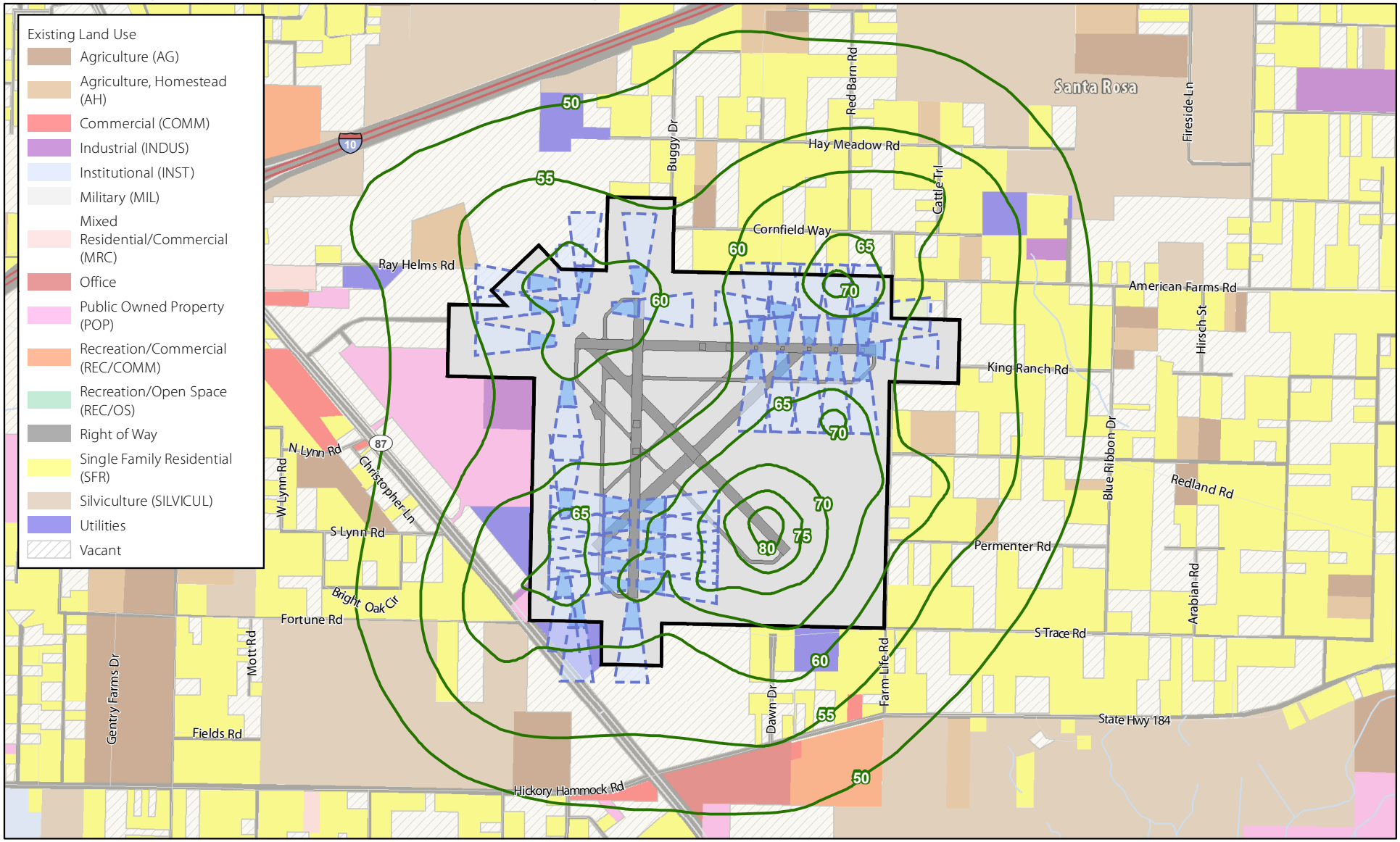
- Interstate
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Santa Rosa Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.13-8
2015 AICUZ Footprint, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-9_2015_AICUZ_Footprint_Existing_LU_NOLF_SantaRosa.mxd



N

SCALE

0 0.2 0.4 Miles

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Legend

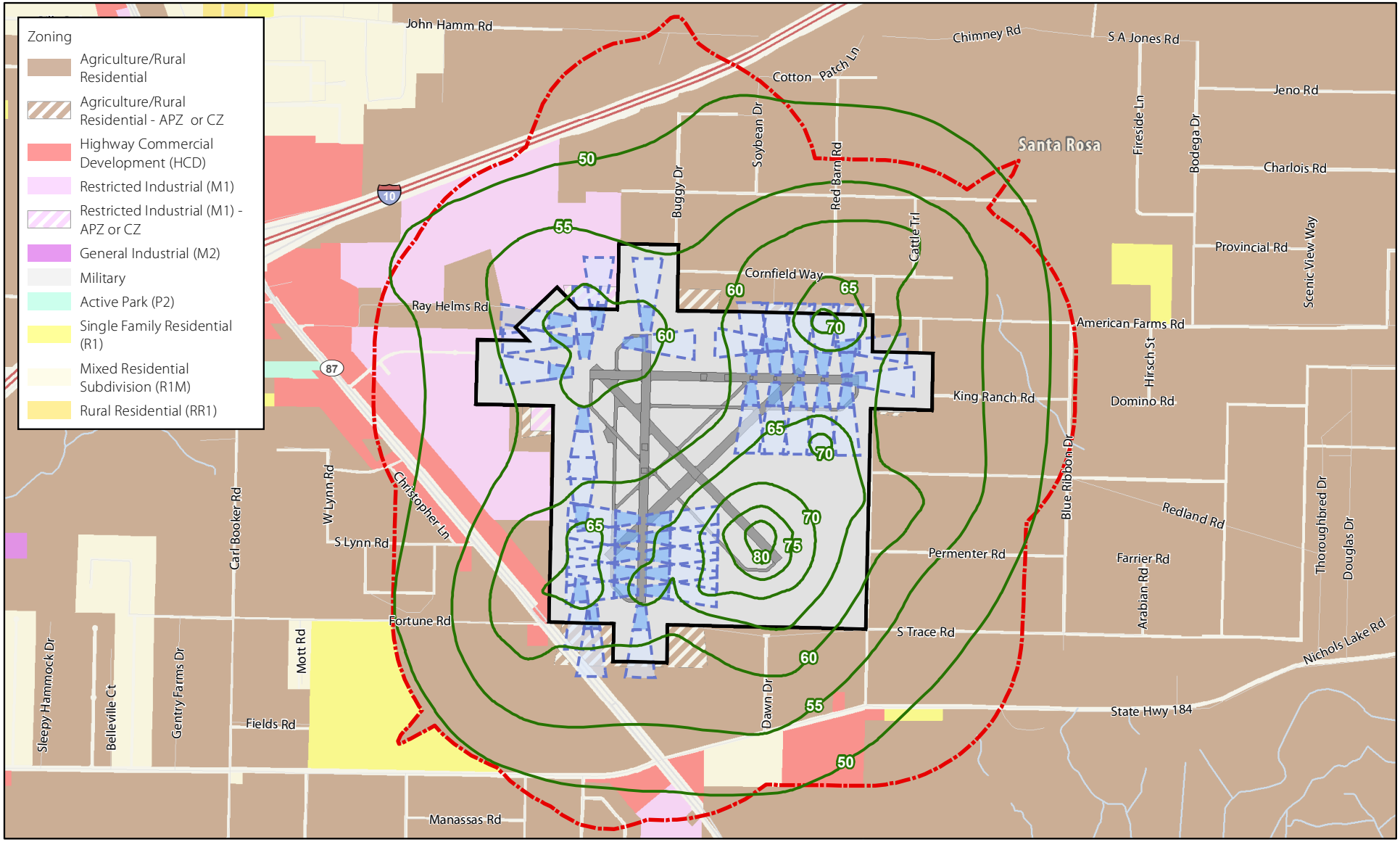
- Interstate
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Santa Rosa Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

Figure 7.13-9
2015 Composite AICUZ Map, Existing Land Use, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-10_2015_AICUZ_Footprint_Existing_Zoning_NOLF_SantaRosa.mxd



N

SCALE

0 0.2 0.4 Miles

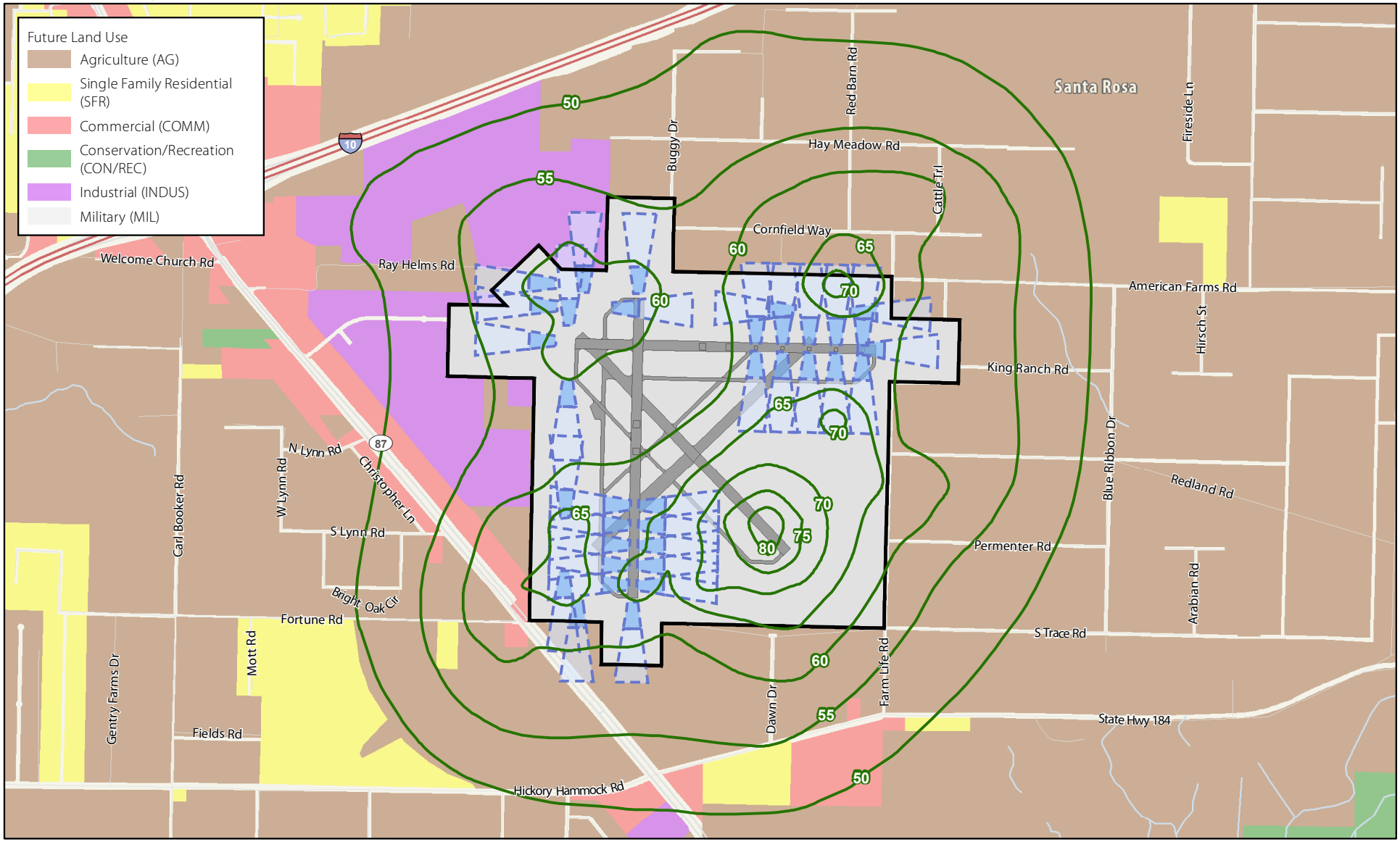
SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Legend

- Interstate
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Military Airport Zone
- Airfield
- NOLF Santa Rosa Boundary
- Accident Potential Zone (2015)
- Clear Zone
- APZ I

Figure 7.13-10
2015 Composite AICUZ Map, Existing Zoning, NOLF Santa Rosa
Santa Rosa County, Florida

Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-11_2015_AICUZ_Footprint_Future_LU_NOLF_SantaRosa.mxd



N

SCALE

0 0.2 0.4 Miles

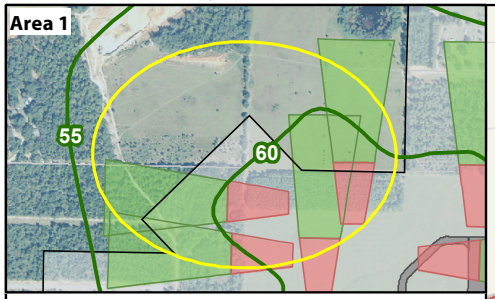
Legend

- Interstate
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Santa Rosa Boundary
- Accident Potential Zone (2015)
  - Clear Zone
  - APZ I

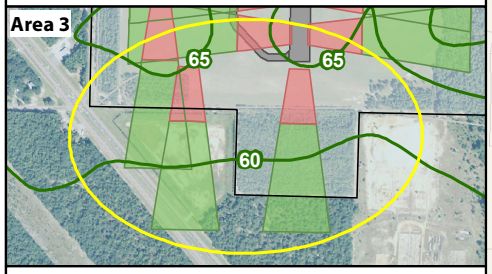
SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Santa Rosa County 2015; Ecology and Environment, Inc. 2015.

Figure 7.13-11
2015 Composite AICUZ Map, Future Land Use, NOLF Santa Rosa
Santa Rosa County, Florida

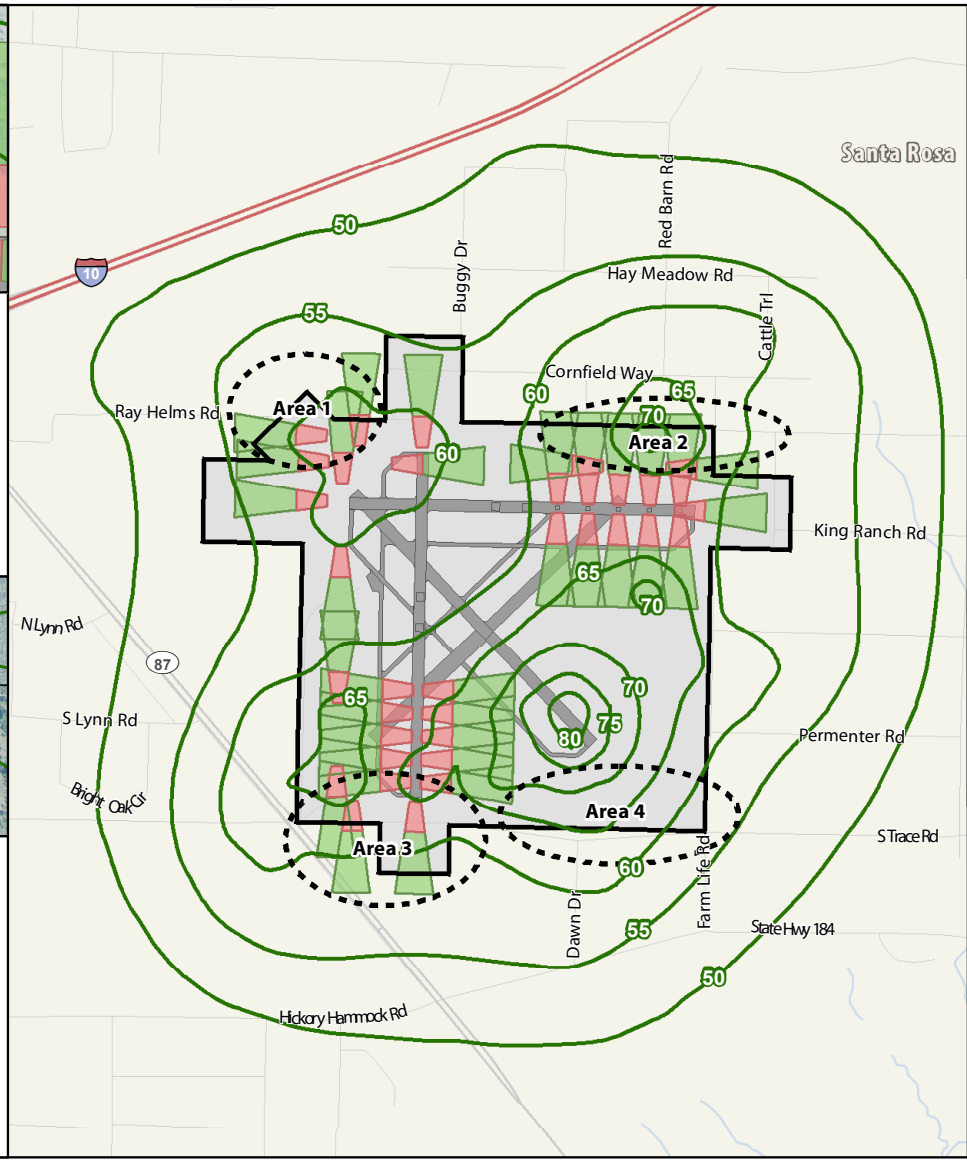
Path: M:\Pensacola\NAS_Whiting_Field\maps\MXD\AICUZ\2016\Santa_Rosa\2016_Dec\7_13-12_Compatibility_Concerns_2015_AICUZ_Footprint_NOLF_SantaRosa.mxd

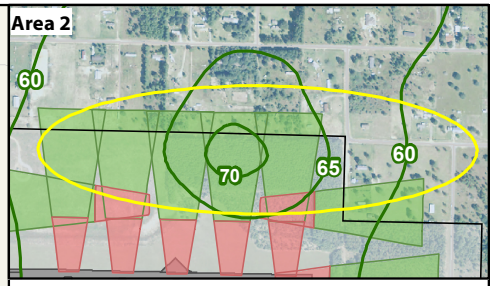


The current land uses in these areas are compatible with AICUZ guidelines at this time. However, the land areas located under APZ I and the Clear Zone are a concern pursuant to the future land use and current zoning designations of INDUS and M-1. According to Santa Rosa County data, the Navy has not purchased the land underneath this clear zone and it is currently owned by Vic's of Navarre, LLC. Residential districts as well as some manufacturing uses are incompatible within the APZ I and the Navy would like to see the area under the Clear Zone remain undeveloped.

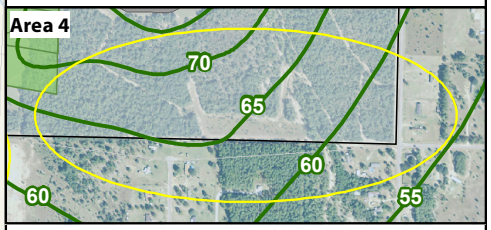


The current land uses in this area are compatible with AICUZ guidleines at this time. However, the land areas located under the APZ I, Clear Zone, and 65 to 70 dB DNL are a concern pursuant to the future land use and current zoning designations of HCD and AG-RR. Land classified as Utilities and Vacant fall within the four APZ I and the Clear Zone. The Navy has not purchased the land underneath this clear zone and it is owned by the State of Florida Department of Transportation. Residential districts and passenger terminals are incompatible within the APZ I and the Navy would like to see the area under the Clear Zone to remain undeveloped.





The current land use in these areas are incompatible with AICUZ guidelines at this time and the areas located under the APZ I and Noise Zone 2 are a concern pursuant to the future land use and current zoning designations of AG and AG-RR. Residential uses within APZ I and Noise Zone 2 are incompatible and should be prohibited. Based on this and the future land use designation, these areas are a compatibility concern due to the potential of future residential development. Any future residential development in these areas would be within APZ I and Noise Zone 2, and incompatible.



The current land use of the lot on the southeast corner of the site is incompatible with AICUZ guidelines at this time. A small portion of the 65 to 70 dB DNL noise contour extends over the boundary onto a mobile home lot classified single family residential (SFR). Land located within the 65 to 70 dB DNL are a concern due to the potential of future residential development pursuant to the future land use and current zoning designations of agriculture (AG) and agriculture/rural residential (AG-RR). The AICUZ instruction discourages residential land uses within 65+ dB DNL noise zones. The land under these areas should be monitored to prevent future incompatible development.

N

SCALE

0 0.2 0.4 Miles

Legend

- Interstate
- Major Road
- Local Road
- 2015 AICUZ Noise Contours
- Airfield
- NOLF Santa Rosa Boundary

Accident Potential Zone (2015)

- Clear Zone
- APZ I

SOURCE: ESRI 2012; BRRC 2015; NAVFAC 2015; Ecology and Environment, Inc. 2016.

Figure 7.13-12
Compatibility Concerns - 2015 AICUZ Footprint, NOLF Santa Rosa
Santa Rosa County, Florida

8

LAND USE RECOMMENDATIONS AND TOOLS

8.1 Federal Government/ Navy: Recommendations and Tools

8.2 State/Regional Governments: Recommendations and Tools

8.3 Local Government: Recommendations and Tools

8.4 Private Citizens/Real Estate Professionals/ Businesses: Recommendations and Tools

The following sections, along with the airfield and site-specific land use recommendations presented in Chapter 7, provide specific recommendations for federal, state, and local governments (including the Navy), businesses, real estate professionals, and private citizens to promote successful implementation of the AICUZ Program. Implementation of the recommendations is achieved over time through partnerships between the Navy and community stakeholders, and active participation by all parties is essential to the AICUZ Program's success.

When implemented, these AICUZ Study recommendations will continue to advance the goal, "to protect the health, safety, and welfare of those living near military airfields, while preserving the defense flying mission."

In order to accomplish this shared goal, various land use strategies are available for use within the established AICUZ footprints for all airfields within the NAS Whiting Field Complex.

Land Use Recommendations Specific to Each Airfield

Refer to Chapter 7 for the site-specific land use recommendations for the individual airfields.

8.1 FEDERAL GOVERNMENT/NAVY: RECOMMENDATIONS AND TOOLS

While ultimate control over land use and development in the vicinity of NAS Whiting Field and the associated NOLFs is the responsibility of the local governments, the Navy's Installation Commanders have the responsibility to engage in programs that support successful AICUZ implementation, and which support related local efforts. The following are recommendations and tools that should be considered by the federal government and Navy in order to encourage compatible development within and surrounding the AICUZ footprint.

8.1.1 FEDERAL GOVERNMENT/NAVY: RECOMMENDATIONS

BROAD-BASED RECOMMENDATIONS

Pursuant to OPNAVINST 11010.36C (AICUZ Program), the Installation Commander at the NAS Whiting Field Complex shall:

- ☐ Work with local decision makers in the surrounding communities to update their MAZ overlay to align with this AICUZ Study. The MAZ should fully encompass all 65+ dB noise contours and APZs over land and should be the basis for land use compatibility planning.
- ☐ Work with state and local planning officials to implement the objectives of the AICUZ Program and elements outlined in this AICUZ Study.
- ☐ Continue use of the CPLO to assist in the execution of the AICUZ Program and to act as spokesperson for the Command in AICUZ matters.
- ☐ Require staff to attend training seminars to enable effective local AICUZ implementation. This staff may include commanding officers, executive officers, AOD staff, and ATC facility officers, among others.

- ☐ Provide assistance in maintaining the necessary AICUZ information, including operational data, needed to update this AICUZ Study.
- ☐ Work with local decision makers in the surrounding communities to evaluate and justify the retention of land or interest of land required for operational performance.
- ☐ Notify the chain-of-command in the AICUZ Program office whenever local conditions merit update or review of this AICUZ Study.
- ☐ Provide the AICUZ brochure to real estate professionals on a recurring basis and/or provide sufficient copies for public distribution in those areas, including via online methods.
- ☐ Provide AICUZ workshops to lenders throughout the region and provide the latest noise zones and APZs to the regional HUD office for their consideration before issuing Federal Housing Administration (FHA) and U.S. Department of Veterans Affairs (VA) insurance on mortgage loans on homes within an AICUZ footprint.

SPECIFIC RECOMMENDATIONS

- ☐ The Navy should continue AICUZ program community outreach efforts.
- ☐ NAS Whiting Field Complex representatives should continue to participate in compatible land use meetings with the local municipalities to identify areas where potential incompatible land uses exist and discuss other related topics regarding interaction between the NAS Whiting Field Complex and its neighbors.
- ☐ Make presentations on the AICUZ program to individuals or community decision makers, including regional and local planning councils/commissions, city councils, county legislatures, government councils, real estate professionals, land developers, and other interested agencies.

- ☐ Develop a website to include AICUZ-specific topics related to the NAS Whiting Field Complex and utilize materials for presentation and distribution, including poster boards, an electronic or slide presentation, and fact sheets.
- ☐ Continue the noise monitoring program for continuous assessment of noise generated from aircraft operations and to facilitate prompt responses for complaints.
- ☐ Continue the installation's land buffering program to protect the installation's military mission through the purchase of appropriate real estate interests (including restrictive use easements).

The Navy representative for the NAS Whiting Field Complex should continue to attend public hearings and provide comments on actions that affect AICUZ planning for NAS Whiting Field and the associated NOLFs.

8.1.2 FEDERAL GOVERNMENT/NAVY: TOOLS

Tools used by the federal government and the Navy that help control incompatible development within and surrounding the AICUZ footprint include:

- ☐ Acquisition of real estate interests
- ☐ REPI Program
- ☐ Environmental Review

Several regulatory and management tools are available to NAS Whiting Field to guide development and land use within the vicinity of the installation's airfields. These tools are described below. Please note that this section supplements the Planning Authorities described in Section 6.2. of this AICUZ Study.

ACQUISITION OF REAL ESTATE INTERESTS

In accordance with OPNAVINST 11010.C36C, the Navy is permitted to acquire interest in properties (fee simple or restrictive easements) to protect the operational integrity of its air installations. The Department of Defense typically considers the acquisition of real estate interests only when incompatible development threatens the operational integrity of an airfield, and when local communities are unwilling or unable to address the threat using municipal authorities (such as the zoning ordinance or building code). The first priority for acquisition, whether in fee or by restrictive easement, is the Clear Zone. The second priority is other APZs. Noise zones, outside the Clear Zone and APZs, may be considered for acquisition only when all avenues of achieving compatible-use zoning or similar protections have been explored and the operational integrity of the installation is clearly threatened.

READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION (REPI) PROGRAM

Title 10 U.S.C. Section 2684a authorizes the Secretary of Defense or the Secretary of a military department to enter into agreements with an eligible entity or entities to address the use or development of real property in the vicinity of, or ecologically related to, a military installation or military airspace. This can be done to limit use of the property that would be incompatible with the installation's mission or place other constraints on military training, testing, and operations. Eligible partnering entities include states, political subdivisions of a state, and private entities that have, as their principal organizational purpose or goal, the conservation, restoration, or preservation of land and natural resources.

REPI Agreements provide for an eligible entity to acquire fee title, or a lesser interest, in land for the purpose of limiting encroachment on the mission of a military installation and/or to preserve habitat off the installation to relieve current or anticipated environmental restrictions that might interfere with military operations or training on the installation. The Department of Defense can share the real estate acquisition costs for projects that support the purchase of fee simple interests or easements (conservation or other restrictive use easements) for such property. The eligible entity negotiates and acquires the real estate interest for REPI projects with a voluntary seller, and restrictive easements are typically transferred to the United States of America.

ENVIRONMENTAL REVIEW

Federal agencies, including the Navy, are required to consider the environmental impacts of any federal project that could significantly impact the environment by conducting a comprehensive environmental review. NEPA requires federal agencies to provide the public an opportunity to comment on actions that may significantly impact the environment. Impacts of the action are generally documented in an EIS or an EA. The environmental review process represents an excellent means for incorporating the fundamentals of an AICUZ study in the planning review process of a project.

8.2 STATE/REGIONAL GOVERNMENTS: RECOMMENDATIONS AND TOOLS

Florida and Alabama have state-level regulations and programs that impact growth via land use controls around the NAS Whiting Field Complex. These tools can be used to control development within the AICUZ footprint. In addition, regional planning agencies and development organizations can control development by aiding and influencing the local governments in the development of policies, plans, and regulations necessary for the physical and economic growth of the region. The following sections provide recommendations and tools that can be used by state and regional governments to control development within the AICUZ footprint.

8.2.1 STATE/REGIONAL GOVERNMENTS: RECOMMENDATIONS

- ☐ The State of Florida should continue implementing Senate Bill 1604 (Chapter 2004-230, Florida Laws SB 2004-1604, created s.163.3175, Florida Statutes) relating to military affairs and promoting compatibility of lands adjacent to or in close proximity to military installations.

- ☐ The State of Alabama should continue implementing the Military Land Use Planning Act (Act 2014-13, SB80).

- ☐ Regional planning agencies should coordinate with their local government members to update comprehensive/master plans, zoning ordinances, subdivision regulations, land development codes, building codes, and any other applicable land use regulations to reflect the 2015 AICUZ footprint, APZs, and Clear Zones.

- ☐ Regional planning agencies should encourage local governments to strengthen and modify their guidelines on land uses and activities within noise zones and APZs and ensure compatibility with the recommendations of Navy land use compatibility guidelines shown in Table 6-1.

- ☐ Regional planning agencies should provide web-based information on the AICUZ Program for the NAS Whiting Field Complex and provide a link to the NAS Whiting Field website for information on aircraft operations.

8.2.2 STATE/REGIONAL GOVERNMENTS: TOOLS

Tools used by state and regional governments that help control incompatible development within and surrounding the AICUZ footprint include:

- ☐ Growth management regulations and regional planning agencies

GROWTH MANAGEMENT REGULATIONS AND REGIONAL PLANNING AGENCIES

The Florida Department of Economic Opportunity is the land management agency responsible for oversight of the growth management laws of Florida. Florida's Growth Management Act (Chapter 163, Part II, Local Government Planning and Land Development Regulation Act) was re-designated as the Community Planning Act in 2011. Under the Community Planning Act (Chapter 163, Part II), Sections 163.3175, 163.3177, 163.3187, and 163.3191, require each Florida county and associated municipality where a military base is located to send information that is necessary for determining potential land use compatibility issues directly to the installation commanding officer, including those issues involving local or other non-military jurisdictions that impact the base.

The State of Alabama has a Military Land Use Planning Act (Act 2014-13, SB80), which encourages compatible land use near military installations and aims to prevent encroachment, as described in Section 6.2 of this AICUZ Study. In addition, all planning actions related to comprehensive planning, land use regulations, and zoning are under the discretion and jurisdiction of the individual counties, cities, and municipalities within the state of Alabama. This planning process is guided by the AARC; the state of Alabama does not have a state-wide growth management regulation like Florida.

The regional planning agencies that support local governments in the vicinity of NAS Whiting Field Main Station and the associated NOLFs are the WFRPC, the SARPC, and the ATRC. These agencies provide technical and planning assistance to their member governments in the preparation of comprehensive plans, master plans, zoning ordinances, subdivision regulations, capital improvement plans, economic development plans, and grant applications. The regional planning agencies coordinate with their member governments to provide local leaders with a view of the region, as a whole, and how city and county needs and issues interrelate. Through regional plans, the councils/commissions can assist with the community

outreach efforts to inform local decision makers about the AICUZ Program and to identify areas where potential incompatible land uses may occur.

8.3 LOCAL GOVERNMENT: RECOMMENDATIONS AND TOOLS

NAS Whiting Field is responsible for informing and educating community decision makers about the AICUZ Program. However, local governments have the authority to implement land use regulations that can ensure AICUZ compatibility; the military relies on this local authority to assist with mission sustainment. Local governments should recognize their responsibility in providing land use controls in those areas within the AICUZ footprint in order to protect the health, safety, and general welfare of the population. The following sections summarize recommendations and tools that can be used by the local government to achieve the compatibility goals of the AICUZ program.

8.3.1 LOCAL GOVERNMENT: RECOMMENDATIONS

- ☐ Community decision makers should continue to actively inform and request input from NAS Whiting Field regarding land use decisions that have the potential to affect the operational integrity of the installation.
- ☐ Local governments should continue to update their websites with information on the AICUZ Program for the NAS Whiting Field Complex and provide a link to the NAS Whiting Field website for information on aircraft operations.
- ☐ Local governments should update comprehensive/master plans, zoning ordinances, subdivision regulations, land development codes, and any other applicable land use regulations to reflect the 2015 AICUZ footprint, APZs and Clear Zones and OPNAVINST 11010.36C.
- ☐ Local county and city governments should implement or update their military overlay zones defined in this 2015 AICUZ Study to fully encompass all 65+ dB noise contours and APZs over land as the basis for compatible land use planning.

- ☐ The Santa Rosa County Planning and Zoning Commission should update the MAZ to include the updated AICUZ footprint presented in this 2015 AICUZ Study.
- ☐ The Escambia County Planning and Zoning Commission and NAS Whiting Field should continue to work together to fully implement the AIPD to include the updated AICUZ footprint presented in this 2015 AICUZ Study.
- ☐ Local county and city governments (Conecuh, Baldwin, and Escambia County, Alabama) should work with NAS Whiting Field to develop a JLUS. The JLUS document could present a policy framework to support adoption and implementation of compatible development measures designed to protect the public's health, safety, and welfare and the military's mission.
- ☐ Santa Rosa County and Escambia County, Florida, should evaluate their previous JLUSs based on the new information presented in this 2015 AICUZ and consider updates, as needed.
- ☐ Local governments should work with NAS Whiting Field to establish Special Planning Districts for areas outside the established APZs where compatibility concerns would be possible if operations at NAS Whiting Field and/or associated NOLFs change in the future.
- ☐ Local governments should evaluate and review all capital improvement projects in proximity to the installation for potential direct and indirect impacts they may have on the ability to implement a successful AICUZ Program.
- ☐ Local governments should review the impacts that relevant annexation plans may have on the ability to implement a successful AICUZ Program and amend comprehensive/master plans to include the annexed areas to ensure compatible development of those lands.
- ☐ When applicable, local governments should amend building codes to require that sound attenuation techniques are incorporated in the construction of new structures and homes within the AICUZ footprint or work with Navy officials to include these techniques on a voluntary basis where such codes are not required.

- ☐ Within noise zones and APZs, the counties and cities should require disclosure statements with an acknowledgement by both buyer and seller that the property is affected by noise and/or APZs.
- ☐ Local governments should explore the transfer of development rights (TDR) concept within comprehensive/master planning as an appropriate alternative to across-the-board restriction of private property rights.

8.3.2 LOCAL GOVERNMENT: TOOLS

Tools used by the local government that help control incompatible development within and surrounding the AICUZ footprint include:

- ☐ Comprehensive/ master plans and planning
- ☐ JLUS planning initiatives
- ☐ Zoning
- ☐ Building codes
- ☐ Capital improvement programs
- ☐ Restrictive easements
- ☐ TDRs
- ☐ Acquisition of real estate interests
- ☐ Special Planning Districts
- ☐ Annexation
- ☐ Real estate disclosures

LOCAL GOVERNMENT COMPREHENSIVE/MASTER PLANS AND PLANNING

As stated in Section 6.2., the local planning authority surrounding NAS Whiting Field airfields includes various counties and municipalities across two states. Development of the surrounding lands is dictated by local comprehensive/master land use planning and regulations developed and adopted by these authorities. The local plans dictate public policy in terms of future land use, housing, transportation, infrastructure, conservation, recreation and open space, intergovernmental coordination, and capital improvements. The existing and future land use maps that show these areas are key plan elements that direct development. In addition, the local planning authorities can include specific AICUZ language and AICUZ footprint maps in the comprehensive planning process, along with information on how to coordinate with NAS Whiting Field on land use decisions.

JOINT LAND USE STUDY PLANNING INITIATIVES

A JLUS is a tool that local governments can use to help better understand and incorporate the AICUZ technical data into their local planning programs and outreach efforts. JLUS initiatives are funded through the Department of Defense's Office of Economic Adjustment in the form of planning assistance grants for state and local governments. The goal of the JLUS program is to promote compatible community growth that supports military training and operational missions. Currently, Santa Rosa County and Escambia County, Florida, have developed and initiated a JLUS with NAS Whiting Field. The inter-jurisdictional partnership resulted in the identification of actions that have been, and continue to be, taken jointly by the

community and installation to promote compatible development and address current and future encroachment. Baldwin, Escambia, and Conecuh counties in Alabama have not conducted a JLUS, to date.

ZONING

Zoning regulates the use of land and the placement and design of structures on the land. Zoning can restrict the height of structures and prohibit the creation of other hazards to air traffic, including smoke, radio interference, and glare. Zoning regulations are available for use by the local governments in the vicinity of the NAS Whiting Field Complex. Zoning does not address the problem of incompatible land use that already exists within the AICUZ footprint.

BUILDING CODES

Local building codes can be used to implement sound attenuation measures recommended in the AICUZ Program. The local building codes may be modified to ensure consistency with the sound attenuation recommendations of the AICUZ Program, either as part of a new construction permit or for remodeling, expansion, or rebuilding. By using proper sound insulation construction techniques and materials the impact of aircraft noise can be minimized and interference with regular indoor activities can be reduced. Although building codes will not prevent incompatible development, they can aid in minimizing impacts to the utmost extent possible.

CAPITAL IMPROVEMENTS PROGRAMS

Capital improvements projects, such as potable water lines, sewage transmission lines, road paving and/or improvements, new right-of-way acquisition, and schools typically encourage new development in areas where it might not otherwise be economically or environmentally feasible. These types of capital improvements can be used to direct growth and types of growth away from the AICUZ footprint and toward AICUZ-compatible areas. Local governments can develop capital improvement programs that avoid extending capital improvements into or near high-noise zones or APZs.

RESTRICTIVE EASEMENTS

Local governments may consider the purchase of development rights within the AICUZ footprint. As a result of purchasing the rights for property development, incompatible land use may be prevented from occurring near an installation. This program is most effective where development rights of agricultural land are purchased. The land is kept productive and no incompatible land use activities can be developed.

TRANSFER OF DEVELOPMENT RIGHTS

Transfer of Development Rights (TDR) is a land use planning tool that involves purchasing development rights from one property (e.g., an area proposed for incompatible residential development near an air station) and transferring those rights to another piece of property (e.g., an area well outside of noise contours and APZs that is more conducive to residential development). As a result, incompatible development of the original property can be prevented near the installation. In addition, developers who utilize TDRs often receive approvals for increased densities in the receiving areas as an incentive. TDRs require local governments to adopt a TDR ordinance identifying sending and receiving areas in the jurisdiction.

ACQUISITION OF REAL ESTATE INTERESTS

Real estate interests may be acquired to support the AICUZ Program, including acquisition of fee simple interest in the land or restrictive use easements. Land acquisitions are designed to eliminate land use incompatibilities through voluntary transactions in the real estate market and local development process. Acquisition strategies can be particularly effective tools when they also advance the complementary goals of environmental protection or when the long-term preservation of agriculture and other open spaces is achieved. These goals can be combined with the REPI program discussed above.

SPECIAL PLANNING DISTRICTS

Special Planning Districts are established to implement tailor-made policies, development standards, design guidelines, and land uses that overlay the existing zoning for designated areas within jurisdictional boundaries. The districts regulations supersede the underlying zoning and may be either more or less restrictive. Local governments have the power to create

Special Planning Districts, such as "military influence areas" or "airport overlay zones/districts," where local governments can either enact restrictions on land development or require notification and coordination with the military for proposed development within these districts. The use of Special Planning Districts can mitigate the negative effects of certain projects or land use activities. Some examples of Special Planning Districts that have been implemented for specific airfields include AIPDs and MAZs, as stated in discussions on specific airfields in Section 7 of this AICUZ Study.

ANNEXATION

Annexation refers to adding land and land appropriate for urbanization, into an existing political unit, such as a city. This action provides the city and landowners with the option to include adjacent properties in the city's jurisdiction. With the proper authority, annexation can ensure the compatible and well-ordered development of the city.

REAL ESTATE DISCLOSURE

Real estate disclosures allow prospective buyers, lessees, or renters of property in the vicinity of military operation areas to make informed decisions regarding the purchase or lease of property. Disclosure of noise and safety zones is a crucial tool in protecting and notifying the community about expected impacts of aviation noise and location of APZs. This can reduce frustration and criticism of those who may not be adequately informed prior to purchase of properties within impact areas.

8.4 PRIVATE CITIZENS/REAL ESTATE PROFESSIONALS/ BUSINESSES: RECOMMENDATIONS AND TOOLS

Private citizens, real estate professionals, and businesses should also recognize their responsibilities regarding compatible land use planning and growth within the AICUZ footprint. The following are actions, procedures, and recommendations that these groups can use or consider to help control development within the AICUZ footprint.

8.4.1 PRIVATE CITIZENS/REAL ESTATE PROFESSIONALS/BUSINESSES: RECOMMENDATIONS

- ☐ Lending institutions should consider limiting financing for real estate purchases and construction that is incompatible with the AICUZ Program.
- ☐ Local banking and financial institutions should be encouraged to incorporate a "Due Diligence Review" of all loan applications to determine possible noise or APZ impacts on mortgaged properties.
- ☐ Real estate professionals should provide written disclosure to prospective purchasers, renters, or lessees when a property is located within an APZ or a noise zone.
- ☐ Real estate professionals should provide acknowledgement of the NAS Whiting Fields AICUZ Program and a link to the installation's website for information on aircraft operations and the AICUZ Program.
- ☐ Real estate professionals should use the NAS Whiting Field AICUZ brochure as a tool to assist prospective homebuyers in understanding the location of homes in the region relative to the AICUZ footprint.
- ☐ Properties listed on the real estate Multiple Listing Service (MLS) system that are within the AICUZ footprint and MAZ overlay for the air station should be identified as such.
- ☐ Private citizens should become informed about the AICUZ Program's goals and objectives, its value in protecting the health, safety, and welfare of the population, and the positive community aspects of a successful AICUZ Program. When appropriate, citizen groups (e.g., community organizations, homeowners associations) may request AICUZ presentations from NAS personnel and/or local governments implementing AICUZ recommendations into land development regulations.

- ☐ Potential purchasers, renters, or lessees should inquire if desired housing locations are within an APZ and/or noise zone. Questions can be directed to local real estate professionals, lending institutions, and/or a NAS Whiting Field Complex representative.

- ☐ Private citizens should provide sufficient and accurate information when registering a noise compliant with the installation to ensure that the complaint can be accurately researched and addressed to avoid future conflicts, where appropriate.

8.4.2 PRIVATE CITIZENS/REAL ESTATE PROFESSIONALS/BUSINESSES: TOOLS

Tools for private citizens, real estate professionals, and businesses that help control incompatible development within and surrounding the AICUZ footprint include:

- ☐ Business development and construction loans
- ☐ Real estate professionals' cooperation
- ☐ Private citizens' property investment choices

BUSINESS DEVELOPMENT AND CONSTRUCTION LOANS TO PRIVATE CONTRACTORS

As part of a lender's investigation of potential loans to private interests for real estate acquisition and development, a review of noise and accident potential is encouraged. Diligent lending practices will promote the compatible development of the land in the vicinity of the NAS Whiting Field Complex and will protect both lenders and developers. Local banking and finance institutions should be encouraged to incorporate a "Due Diligence Review" for all loan applications, including a determination of possible noise or APZ impacts on the mortgaged property. The Navy can play a role in this strategy by providing AICUZ workshops to lenders throughout the region. In addition, the Navy can provide the latest noise zones and APZs to the regional HUD office for review before issuing FHA and VA insurance on mortgage loans for homes scheduled for construction within the AICUZ footprint.

REAL ESTATE PROFESSIONALS' COOPERATION

Real estate professionals should ensure that prospective buyers or lessees are fully aware of what it means to be within a high-noise zone and/or APZ. Private citizens should be provided with all of the information available to make informed decisions when purchasing or altering any property in proximity to an air station or other military airfield. Disclosure should be further supported by local officials through adoption of a "truth in sales and rental" ordinance that requires local real estate and rental agents to provide prospective purchasers and renters with current information concerning the noise environment and APZs surrounding an airfield. Under the terms of such an ordinance, notice in writing would be given to

prospective purchasers, stating that the seller (or landlord) is required, by law, to show the buyer (or renter/lessee) copies of the recorded subdivision plat, the approved site plan, and the current aircraft noise map.

PRIVATE CITIZENS' PROPERTY INVESTMENT CHOICES

Private citizens of the local communities surrounding an installation should become informed about the AICUZ Program and its goals and objectives, its value in protecting the health, safety, and welfare of the population, the limits of the AICUZ Program, and the positive community aspects of a successful AICUZ Program. Private citizens that are potential purchasers, renters, or lessees of properties near NAS Whiting Field and the NOLFs should be proactive and inquire if the location is within an APZ and/or noise zone when working with local real estate professionals, lending institutions, and/or a NAS Whiting Field representative. Private citizens should also provide sufficient and accurate information when registering a noise compliant with the installation. The installation needs sufficient and accurate information to assess the potential causes resulting in the complaint and to assess any practical remedies for reducing future complaints.

9

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APPENDIX A

NOISE AND ITS EFFECT ON PEOPLE AND THE ENVIRONMENT

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APPENDIX A — Discussion of Noise and Its Effect on the Environment

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WR 13-11
January 2014

APPENDIX A, NOISE EFECTS, SOUND LEVELS, SUPPLEMENTAL METRICS, ENVIRONMENT, HUMANS, ANNOYANCE, SPEECH INTEFERENCE, SLEEP DISTURBANCE, HEARING IMPAIRMENT, HEALTH EFFECTS,

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Acronyms & Abbreviations

ID	Definition
AAD	Annual Average Daily
AGL	Above Ground Level
ANSI	American National Standards Institute
ASHLA	American Speech-Language-Hearing Association
CHABA	Committee on Hearing, Bioacousitcis, and Biomechanics
CNEL	Community Noise Equivalent Level
$CNEL_{mr}$	Onset-Rate Adjusted Monthly Community Noise Equivalent Level
dB	Decibel
dBA	A-Weighted Decibels
dB(A)	A-Weighted Decibels
DLR	German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt e.V.)
DNL	Day-Night Average Sound Level
DOD	Department of Defense
FAA	Federal Aviation Administration (US)
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
HA	Highly Annoyed
HYENA	Hypertension and Exposure to Noise near Airports
Hz	Hertz
ISO	International Organization for Standardization
L	Sound Level
L_{dn}	Day-Night Average Sound Level
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
$L_{eq(16)}$	Equivalent Sound Level over 16 hours
$L_{eq(24)}$	Equivalent Sound Level over 24 hours
$L_{eq(30min)}$	Equivalent Sound Level over 30 minutes
$L_{eq(8)}$	Equivalent Sound Level over 8 hours
$L_{eq(h)}$	Hourly Equivalent Sound Level
L_{max}	Maximum Sound Level
L_{pk}	Peak Sound Level

(Continued on next page)

ID	Definition
m	meter (distance unit)
mmHg	millimeters of mercury
MOA	Military Operations Area
MTR	Military Training Route
NA	Number of Events At or Above a Selected Threshold
NATO	North Atlantic Treaty Organization
NDI	Noise Depreciation Index
NIPTS	Noise-induced Permanent Threshold Shift
NSDI	Noise Sensitivity Depreciation Index
OR	Odd Ratio
POI	Point of Interest
PTS	Permanent Threshold Shift
RANCH	Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health
SEL	Sound Exposure Level
SIL	Speech Interference Level
SUA	Special Use Airspace
TA	Time Above
TTS	Temporary Threshold Shift
U.S.	United States
UKDfES	United Kingdom Department for Education and Skills
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WHO	World Health Organization

Appendix A

This appendix discusses sound and noise and their potential effects on the human and natural environment. Section A.1 provides an overview of the basics of sound and noise. Section A.2 defines and describes the different metrics used to describe noise. The largest section, Section A.3, reviews the potential effects of noise, focusing on effects on humans but also addressing effects on property values, terrain, structures, and animals. Section A.4 contains the list of references cited.

A.1 Basics of Sound

Section A.1.1 describes sound waves and decibels. Section A.1.2 review sounds levels and types of sounds.

A.1.1 Sound Waves and Decibels

Sound consists of minute vibrations in the air that travel through the air and are sensed by the human ear. Figure A-1 is a sketch of sound waves from a tuning fork. The waves move outward as a series of crests where the air is compressed and troughs where the air is expanded. The height of the crests and the depth of the troughs are the amplitude or sound pressure of the wave. The pressure determines its energy or intensity. The number of crests or troughs that pass a given point each second is called the frequency of the sound wave.

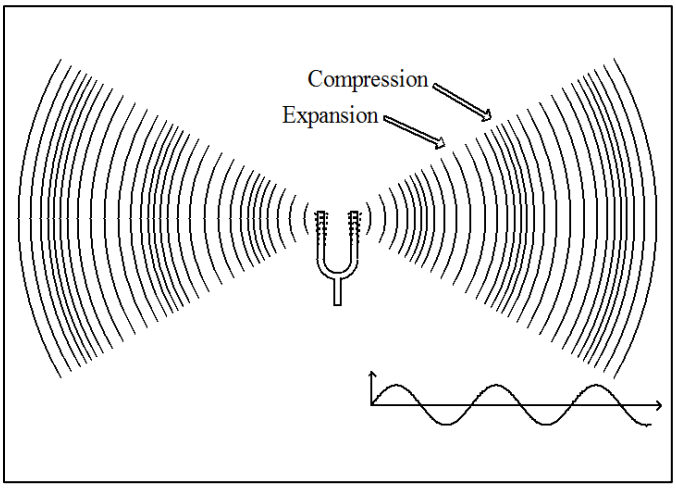


Figure A-1. Sound Waves from a Vibrating Tuning Fork

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.

As shown in Figure A-1, the sound from a tuning fork spreads out uniformly as it travels from the source. The spreading causes the sound's intensity to decrease with increasing distance from the source. For a source such as an aircraft in flight, the sound level will decrease by about 6 dB for every doubling of the distance. For a busy highway, the sound level will decrease by 3-4.5 dB for every doubling of distance.

As sound travels from the source it also gets absorbed by the air. The amount of absorption depends on the frequency composition of the sound, the temperature, and the humidity conditions. Sound with high frequency content gets absorbed by the air more than sound with low frequency content. More sound is absorbed in colder and drier conditions than in hot and wet conditions. Sound is also affected by wind and temperature gradients, terrain (elevation and ground cover) and structures.

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain (Berglund and Lindvall 1995).

Because of the logarithmic nature of the decibel unit, sound levels cannot simply be added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

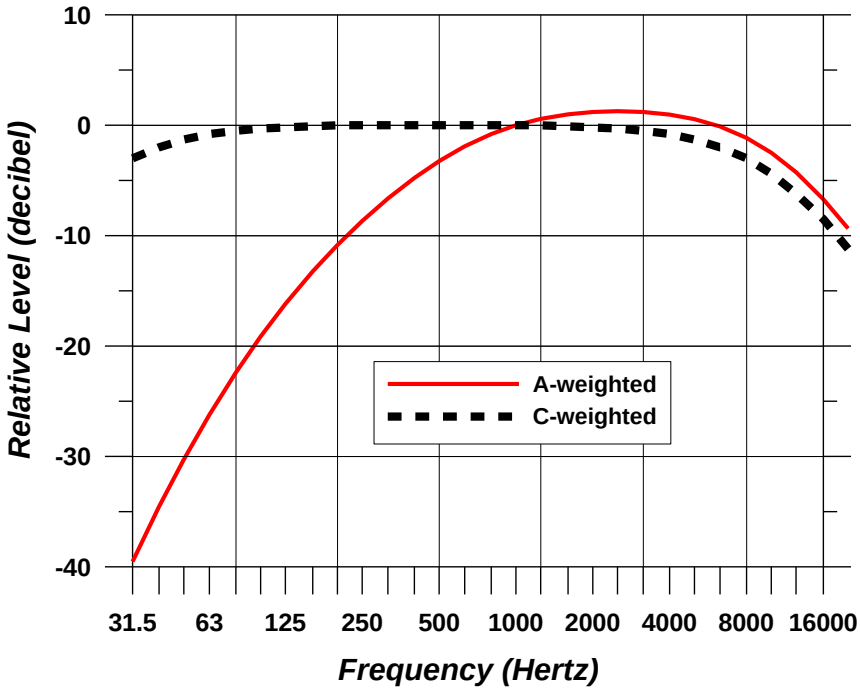
Because the addition of sound levels is different than that of ordinary numbers, this process is often referred to as "decibel addition."

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness. This relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90% decrease in sound intensity but only a 50% decrease in perceived loudness because the human ear does not respond linearly.

Sound frequency is measured in terms of cycles per second or hertz (Hz). The normal ear of a young person can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. As we get older, we lose the ability to hear high frequency sounds. Not all sounds in this wide range of frequencies are heard equally. Human hearing is most sensitive to frequencies in the 1,000 to 4,000 Hz range. The notes on a piano range from just over 27 Hz to 4,186 Hz, with middle C equal to 261.6 Hz. Most sounds (including a single note on a piano) are not simple pure tones like the tuning fork in Figure A-1, but contain a mix, or spectrum, of many frequencies.

Sounds with different spectra are perceived differently even if the sound levels are the same. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. These two curves, shown in Figure A-2, are adequate to quantify most environmental noises. A-weighting puts emphasis on the 1,000 to 4,000 Hz range.

Very loud or impulsive sounds, such as explosions or sonic booms, can sometimes be felt, and can cause secondary effects, such as shaking of a structure or rattling of windows. These types of sounds can add to annoyance, and are best measured by C-weighted sound levels, denoted dBC. C-weighting is nearly flat throughout the audible frequency range, and includes low frequencies that may not be heard but cause shaking or rattling. C-weighting approximates the human ear's sensitivity to higher intensity sounds.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure A-2. Frequency Characteristics of A- and C-Weighting

A.1.2 Sound Levels and Types of Sounds

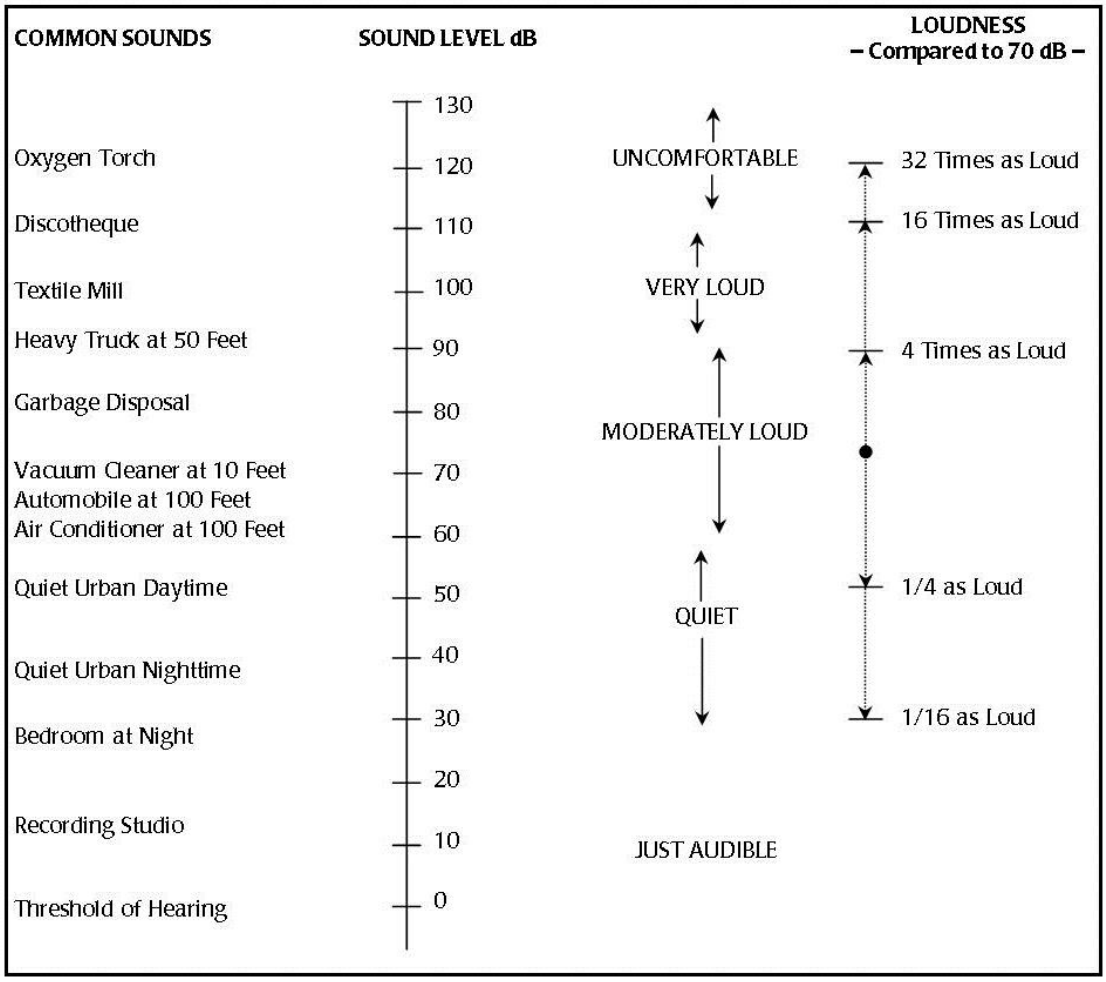
Most environmental sounds are measured using A-weighting. They're called A-weighted sound levels, and sometimes use the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the term "A-weighted" is often omitted and the unit dB is used. Unless otherwise stated, dB units refer to A-weighted sound levels.

Sound becomes noise when it is unwelcome and interferes with normal activities, such as sleep or conversation. Noise is unwanted sound. 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 A-3 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 A.2.

Aircraft noise consists of two major types of sound events: flight (including takeoffs, landings and flyovers), and stationary, such as engine maintenance run-ups. The former are intermittent and the latter primarily continuous. Noise from aircraft overflights typically occurs beneath main approach and departure paths, in local air traffic patterns around the airfield, and in areas near aircraft parking ramps and staging areas. As aircraft climb, the noise received on the ground drops to lower levels, eventually fading into the background or ambient levels.

Impulsive noises are generally short, loud events. Their single-event duration is usually less than 1 second. Examples of impulsive noises are small-arms gunfire, hammering, pile driving, metal impacts during rail-yard shunting operations, and riveting. Examples of high-energy impulsive sounds are quarry/mining explosions, sonic booms, demolition, and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams (American National Standards Institute [ANSI] 1996).

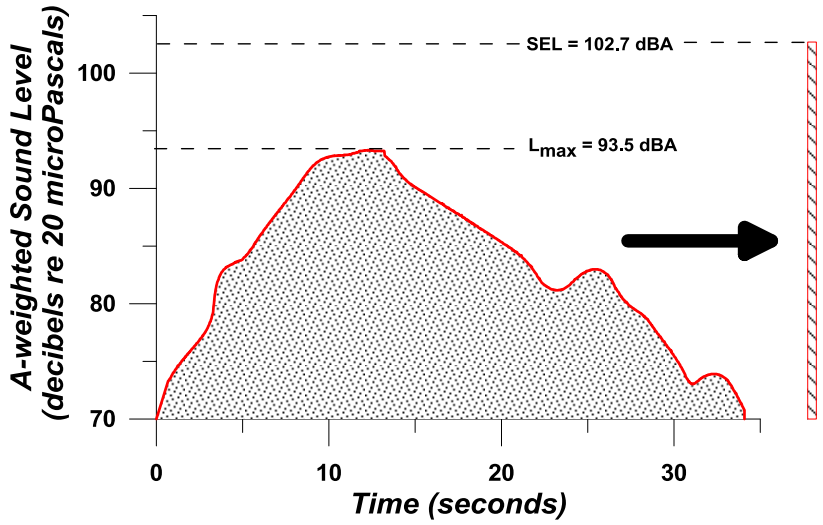


Sources: Harris 1979; Federal Interagency Committee on Aviation Noise (FICAN) 1997.

Figure A-3. Typical A-weighted Sound Levels of Common Sounds

A.2 Noise Metrics

Noise metrics quantify sounds so they can be compared with each other, and with their effects, in a standard way. The simplest metric is the A-weighted level, which is appropriate by itself for constant noise such as an air conditioner. 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 A-4, which also indicates two metrics (L_{max} and SEL) that are described in Sections A.2.1 and A.2.3 below. Over time there can be a number of events, not all the same.



Source: Wyle Laboratories

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

There are a number of metrics that can be used to describe a range of situations, from a particular individual event to the cumulative effect of all noise events over a long time. This section describes the metrics relevant to environmental noise analysis.

A.2.1 Single-events

Maximum Sound Level (L_{max})

The highest A-weighted sound level measured during a single event in which the sound changes with time is called the maximum A-weighted sound level or Maximum Sound Level and is abbreviated L_{max}. The L_{max} is depicted for a sample event in Figure A-4.

L_{max} is the 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). Slowly varying or steady sounds are generally measured over 1 second, denoted "slow" response. 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.

Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level is the highest instantaneous level measured by a sound level measurement meter. L_{pk} is typically measured every 20 microseconds, and usually based on unweighted or linear response of the meter. It is used to describe individual impulsive events such as blast noise. Because blast noise varies from shot to shot and varies with meteorological (weather) conditions, the U.S. Department of Defense (DOD) usually characterizes L_{pk} by the metric PK 15(met), which is the L_{pk} exceeded 15% of the time. The "met" notation refers to the metric accounting for varied meteorological or weather conditions.

Sound Exposure Level (SEL)

Sound Exposure Level 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. It represents the total sound energy in the event. Figure A-4 indicates the SEL for an example event, representing it as if all 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.

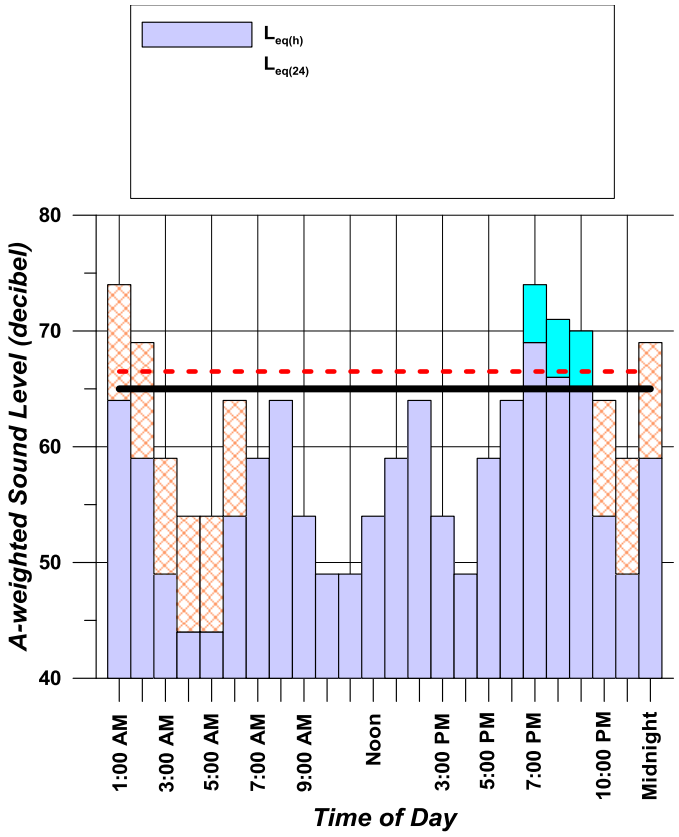
A.2.2 Cumulative Events

Equivalent Sound Level (L_{eq})

Equivalent Sound Level is a "cumulative" metric that combines a series of noise events over a period of time. L_{eq} is the sound level that represents the decibel average SEL of all sounds in the time period. Just as SEL has proven to be a good measure of a single event, L_{eq} has proven to be a good measure of series of events during a given time period.

The time period of an L_{eq} measurement is usually related to some activity, and is given along with the value. The time period is often shown in parenthesis (e.g., $L_{eq(24)}$ for 24 hours). The L_{eq} from 7 a.m. to 3 p.m. may give exposure of noise for a school day.

Figure A-5 gives an example of $L_{eq(24)}$ using notional hourly average noise levels ($L_{eq(h)}$) for each hour of the day as an example. The $L_{eq(24)}$ for this example is 61 dB.



Source: Wyle Laboratories

Figure A-5. Example of $L_{eq(24)}$, DNL and CNEL Computed from Hourly Equivalent Sound Levels

Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level is a cumulative metric that accounts for all noise events in a 24-hour period. However, unlike $L_{eq(24)}$, DNL contains a nighttime noise penalty. To account for our increased sensitivity to noise at night, DNL applies a 10 dB penalty to events during the nighttime period, defined as 10:00 p.m. to 7:00 a.m. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

CNEL is a variation of DNL specified by law in California (California Code of Regulations Title 21, *Public Works*) (Wyle Laboratories 1970). CNEL has the 10 dB nighttime penalty for events between 10:00 p.m. and 7:00 a.m. but also includes a 4.8 dB penalty for events during the evening period of 7:00 p.m. to 10:00 p.m. The evening penalty in CNEL accounts for the added intrusiveness of sounds during that period.

For airports and military airfields, DNL and CNEL represent the average sound level for annual average daily aircraft events.

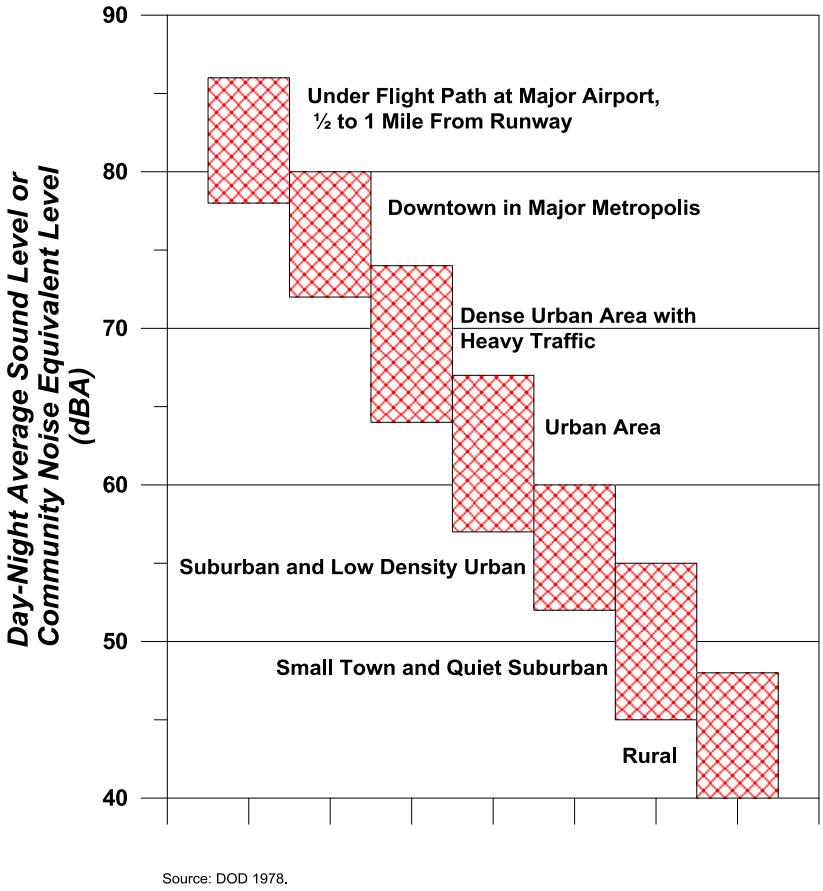
Figure A-5 gives an example of DNL and CNEL using notional hourly average noise levels ($L_{eq(h)}$) for each hour of the day as an example. Note the $L_{eq(h)}$ for the hours between 10 p.m. and 7 a.m. have a 10 dB penalty assigned. For CNEL the hours between 7p.m. and 10 p.m. have a 4.8 dB penalty assigned. The DNL for this example is 65 dB. The CNEL for this example is 66 dB.

Figure A-6 shows the ranges of DNL or CNEL that occur in various types of communities. Under a flight path at a major airport the DNL may exceed 80 dB, while rural areas may experience DNL less than 45 dB.

The decibel summation nature of these metrics causes the noise levels of the loudest events to control the 24-hour average. As a simple example, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

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.

DNL or CNEL do not represent a level heard at any given time, but represent long term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (Schultz 1978; USEPA 1978).



Source: DOD 1978.

Figure A-6. Typical DNL or CNEL Ranges in Various Types of Communities

Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operations Areas (MOAs), and Restricted Areas/Ranges generate a noise environment that is somewhat different from that around airfields. Rather than regularly occurring operations like at airfields, activity in SUAs is highly sporadic. It is often seasonal, ranging from 10 per hour to less than 1 per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, with rates of up to 150 dB per second.

The cumulative daily noise metric devised to account for the "surprise" effect of the sudden onset of aircraft noise events on humans and the sporadic nature of SUA activity is the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). Onset rates between 15 and 150 dB per second require an adjustment of 0 to 11 dB to the event's SEL, while onset rates below 15 dB per second require no adjustment to the event's SEL (Stusnick et al. 1992). The term 'monthly' in L_{dnmr} refers to the noise assessment being conducted for the month with the most operations or sorties -- the so-called busiest month.

In California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m.) and is denoted $CNEL_{mr}$.

A.2.3 Supplemental Metrics

Number-of-Events Above (NA) a Threshold Level (L)

The Number-of-Events Above (NA) metric gives the total number of events that exceed a noise level threshold (L) during a specified period of time. Combined with the selected threshold, the metric is denoted NAL. The threshold can be either SEL or L_{max}, and it is important that this selection is shown in the nomenclature. When labeling a contour line or point of interest (POI), NAL is followed by the number of events in parentheses. For example, where 10 events exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL(10). Similarly, for L_{max} it would be NA90L_{max}(10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

NA is a supplemental metric. It is not supported by the amount of science behind DNL/CNEL, but it is valuable in helping to describe noise to the community. A threshold level and metric are selected that best meet the need for each situation. An L_{max} threshold is normally selected to analyze speech interference, while an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

Time Above (TA) a Specified Level (L)

The Time Above (TA) metric is the total time, in minutes, that the A-weighted noise level is at or above a threshold. Combined with the threshold level (L), it is denoted TAL. TA can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data for that time.

TA is a supplemental metric, used to help understand noise exposure. It is useful for describing the noise environment in schools, particularly when assessing classroom or other noise sensitive areas for various scenarios. TA can be shown as contours on a map similar to the way DNL contours are drawn.

TA helps describe the noise exposure of an individual event or many events occurring over a given time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. TA analysis is usually conducted along with NA analysis so the results show not only how many events occur, but also the total duration of those events above the threshold.

A.3 Noise Effects

Noise is of concern because of potential adverse effects. The following subsections describe how noise can affect communities and the environment, and how those effects are quantified. The specific topics discussed are:

- Annoyance;
- Speech interference;
- Sleep disturbance;
- Noise-induced hearing impairment;
- Non-auditory health effects;
- Performance effects;
- Noise effects on children;
- Property values;
- Noise-induced vibration effects on structures and humans;
- Noise effects on terrain;
- Noise effects on historical and archaeological sites; and
- Effects on domestic animals and wildlife.

A.3.1 Annoyance

With the introduction of jet aircraft in the 1950s, it became clear that aircraft noise annoyed people and was a significant problem around airports. Early studies, such as those of Rosenblith et al. (1953) and Stevens et al. (1953) showed that effects depended on the quality of the sound, its level, and the number of flights. Over the next 20 years considerable research was performed refining this understanding and setting guidelines for noise exposure. In the early 1970s, the USEPA published its "Levels Document" (USEPA 1974) that reviewed the factors that affected communities. DNL (still known as L_{dn} at the time) was identified as an appropriate noise metric, and threshold criteria were recommended.

Threshold criteria for annoyance were identified from social surveys, where people exposed to noise were asked how noise affects them. Surveys provide direct real-world data on how noise affects actual residents.

Surveys in the early years had a range of designs and formats, and needed some interpretation to find common ground. In 1978, Schultz showed that the common ground was the number of people "highly annoyed," defined as the upper 28% range of whatever response scale a survey used (Schultz 1978). With that definition, he was able to show a remarkable consistency among the majority of the surveys for which data were available. Figure A-7 shows the result of his study relating DNL to individual annoyance measured by percent highly annoyed (%HA).

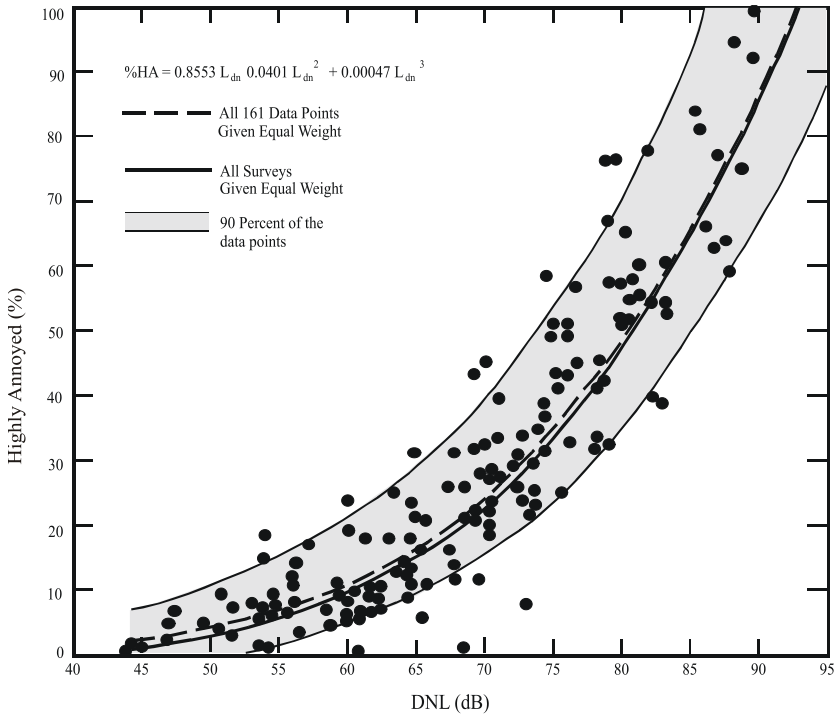


Figure A-7. Schultz Curve Relating Noise Annoyance to DNL (Schultz 1978)

Schultz's original synthesis included 161 data points. Figure A-8 compares revised fits of the Schultz data set with an expanded set of 400 data points collected through 1989 (Finegold et al. 1994). The new form is the preferred form in the US, endorsed by the Federal Interagency Committee on Aviation Noise (FICAN 1997). Other forms have been proposed, such as that of Fidell and Silvati (2004), but have not gained widespread acceptance.

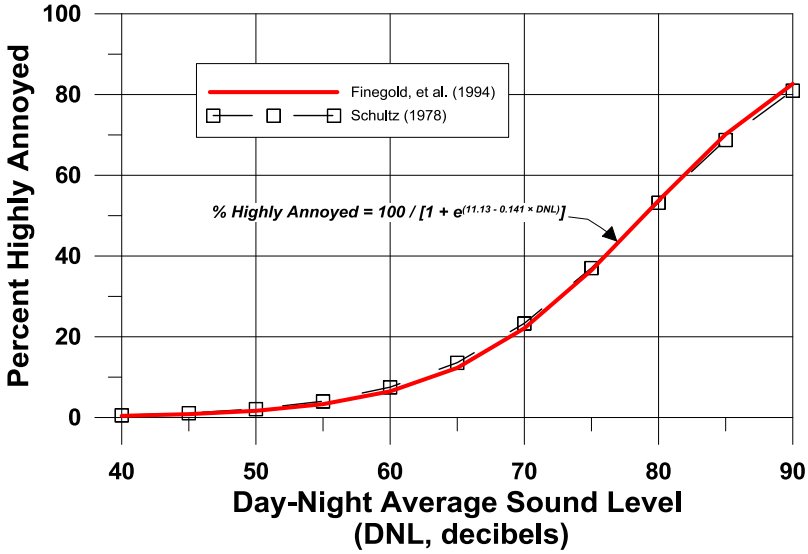


Figure A-8. Response of Communities to Noise; Comparison of Original Schultz (1978) with Finegold et al (1994)

When the goodness of fit of the Schultz curve is examined, the correlation between groups of people is high, in the range of 85-90%. The correlation between individuals is lower, 50% or less. This is not surprising, given the personal differences between individuals. The surveys underlying the Schultz curve include results that show that annoyance to noise is also affected by non-acoustical factors. Newman and Beattie (1985) divided the non-acoustic factors into the emotional and physical variables shown in Table A-1.

Table A-1. Non-Acoustic Variables Influencing Aircraft Noise Annoyance

Emotional Variables	Physical Variables
Feeling about the necessity or preventability of the noise;	Type of neighborhood;
Judgement of the importance and value of the activity that is producing the noise;	Time of day;
Activity at the time an individual hears the noise;	Season;
Attitude about the environment;	Predicitabiltiy of the noise;
General sensitivity to noise;	Control over the noise source; and
Belief about the effect of noise on health; and	Length of time individual is exposed to a noise.
Feeling of fear associated with the noise.	

Schreckenberg and Schuemer (2010) recently examined the importance of some of these factors on short term annoyance. Attitudinal factors were identified as having an effect on annoyance. In formal regression analysis, however, sound level (L_{eq}) was found to be more important than attitude.

A recent study by Plotkin et al. (2011) examined updating DNL to account for these factors. It was concluded that the data requirements for a general analysis were much greater than most existing studies. It was noted that the most significant issue with DNL is that it is not readily understood by the public, and that supplemental metrics such as TA and NA were valuable in addressing attitude when communicating noise analysis to communities (DOD 2009a).

A factor that is partially non-acoustical is the source of the noise. Miedema and Vos (1998) presented synthesis curves for the relationship between DNL and percentage "Annoyed" and percentage "Highly Annoyed" for three transportation noise sources. Different curves were found for aircraft, road traffic, and railway noise. Table A-2 summarizes their results. Comparing the updated Schultz curve suggests that the percentage of people highly annoyed by aircraft noise may be higher than previously thought.

Table A-2. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Hightly Annoyed (%HA)			
	Miedema and Vos			Schultz
	Air	Road	Rail	Combined
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema and Vos 1998.

As noted by the World Health Organization (WHO), however, even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 1999).

Consistent with WHO's recommendations, the Federal Interagency Committee on Noise (FICON 1992) considered the Schultz curve to be the best source of dose information to predict community response to noise, but recommended further research to investigate the differences in perception of noise from different sources.

A.3.2 Speech Interference

Speech interference from noise is a primary cause of annoyance for communities. Disruption of routine activities such as radio or television listening, telephone use, or conversation leads to frustration and annoyance. The quality of speech communication is important in classrooms and offices. In the workplace, speech interference from noise can cause fatigue and vocal strain in those who attempt to talk over the noise. In schools it can impair learning.

There are two measures of speech comprehension:

1. *Word Intelligibility* - the percent of words spoken and understood. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.
2. *Sentence Intelligibility* – the percent of sentences spoken and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

U.S. Federal Criteria for Interior Noise

In 1974, the USEPA identified a goal of an indoor $L_{eq(24)}$ of 45 dB to minimize speech interference based on sentence intelligibility and the presence of steady noise (USEPA 1974). Figure A-9 shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background indoor sound levels of less than 45 dB L_{eq} are expected to allow 100% sentence intelligibility.

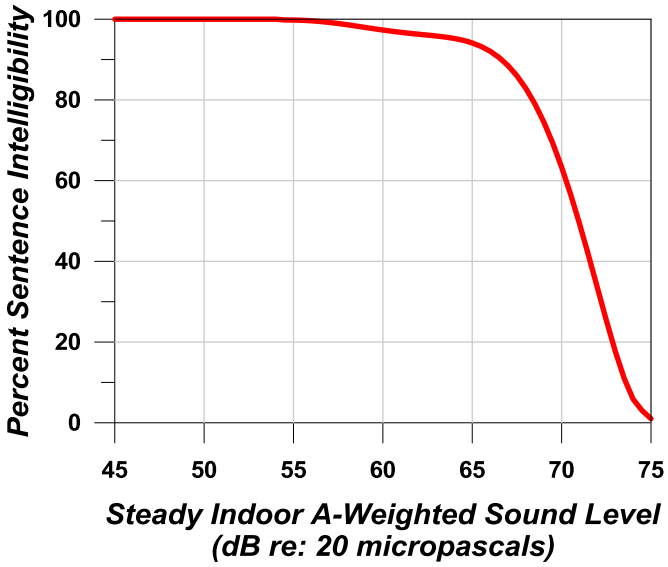


Figure A-9. Speech Intelligibility Curve (digitized from USEPA 1974)

The curve in Figure A-9 shows 99% intelligibility at L_{eq} below 54 dB, and less than 10% above 73 dB. Recalling that L_{eq} is dominated by louder noise events, the USEPA $L_{eq(24)}$ goal of 45 dB generally ensures that sentence intelligibility will be high most of the time.

Classroom Criteria

For teachers to be understood, their regular voice must be clear and uninterrupted. Background noise has to be below the teacher's voice level. Intermittent noise events that momentarily drown out the teacher's voice need to be kept to a minimum. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Lazarus (1990) found that for listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., a comparison of the level of the sound to the level of background noise) is in the range of 15 to 18 dB. The initial ANSI classroom noise standard (ANSI 2002) and American Speech-Language-Hearing Association (ASLHA 1995) guidelines concur, recommending at least a 15 dB signal-to-noise ratio in classrooms. If the teacher's voice level is at least 50 dB, the background noise level must not exceed an average of 35 dB. The National Research Council of Canada (Bradley 1993) and WHO (1999) agree with this criterion for background noise.

For eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} during normal school hours (FAA 1985).

Most aircraft noise is not continuous. It consists of individual events like the one sketched in Figure A-4. Since speech interference in the presence of aircraft noise is caused by individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate. In addition to the background level criteria described above, single-event criteria that account for those noisy events are also needed.

A 1984 study by Wyle for the Port Authority of New York and New Jersey recommended using Speech Interference Level (SIL) for classroom noise criteria (Sharp and Plotkin 1984). SIL is based on the maximum sound levels in the frequency range that most affects speech communication (500-2,000 Hz). The study identified an SIL of 45 dB as the goal. This would provide 90% word intelligibility for the short time periods during aircraft overflights. While SIL is technically the best metric for speech interference, it can be approximated by an L_{max} value. An SIL of 45 dB is equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

Lind et al. (1998) also concluded that an L_{max} criterion of 50 dB would result in 90% word intelligibility. Bradley (1985) recommends SEL as a better indicator. His work indicates that 95% word intelligibility would be achieved when indoor SEL did not exceed 60 dB. For typical flyover noise this corresponds to an L_{max} of 50 dB. While WHO (1999) only specifies a background L_{max} criterion, they also note the SIL frequencies and that interference can begin at around 50 dB.

The United Kingdom Department for Education and Skills (UKDfES) established in its classroom acoustics guide a 30-minute time-averaged metric of $L_{eq(30min)}$ for background levels and the metric of $L_{A1,30min}$ for intermittent noises, at thresholds of 30-35 dB and 55 dB, respectively. $L_{A1,30min}$ represents the A-weighted sound level that is exceeded 1% of the time (in this case, during a 30-minute teaching session) and is generally equivalent to the L_{max} metric (UKDfES 2003).

Table A-3 summarizes the criteria discussed. Other than the FAA (1985) 45 dB L_{max} criterion, they are consistent with a limit on indoor background noise of 35-40 dB L_{eq} and a single event limit of 50 dB L_{max}. It should be noted that these limits were set based on students with normal hearing and no special needs. At-risk students may be adversely affected at lower sound levels.

Table A-3. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	$L_{eq(during\ school\ hours)}$ = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used.
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom.
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB.
U.S. ANSI (2010)	L_{eq} = 35 dB, based on Room Volume (e.g., cubic feet)	Acceptable background level for continuous and intermittent noise.
U.K. DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs.

A.3.3 Sleep Disturbance

Sleep disturbance is a major concern for communities exposed to aircraft noise at night. A number of studies have attempted to quantify the effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies. Emphasis is on studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on sleep observations performed under laboratory conditions.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations.

Initial Studies

The relation between noise and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep and the noise level, but also on the non-acoustic factors cited for annoyance. The easiest effect to measure is the number of arousals or awakenings from noise events. Much of the literature has therefore focused on predicting the percentage of the population that will be awakened at various noise levels.

FICON's 1992 review of airport noise issues (FICON 1992) included an overview of relevant research conducted through the 1970s. Literature reviews and analyses were conducted from 1978 through 1989 using existing data (Griefahn 1978; Lukas 1978; Pearsons et. al. 1989). Because of large variability in the data, FICON did not endorse the reliability of those results.

FICON did, however, recommend an interim dose-response curve, awaiting future research. That curve predicted the percent of the population expected to be awakened as a function of the exposure to SEL. This curve was based on research conducted for the U.S. Air Force (Finegold 1994). The data included most of the research performed up to that point, and predicted a 10% probability of awakening when exposed to an interior SEL of 58 dB. The data used to derive this curve were primarily from controlled laboratory studies.

Recent Sleep Disturbance Research – Field and Laboratory Studies

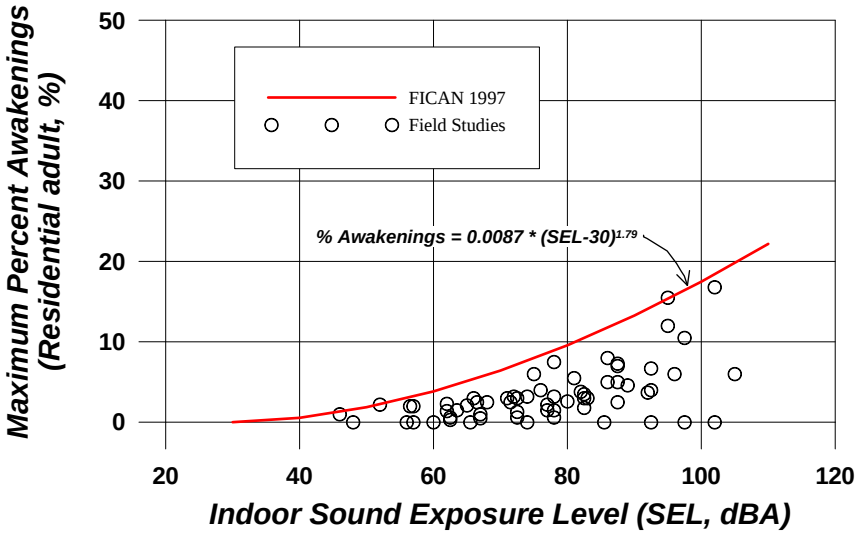
It was noted that early sleep laboratory studies did not account for some important factors. These included habituation to the laboratory, previous exposure to noise, and awakenings from noise other than aircraft. In the early 1990s, field studies in people's homes were conducted to validate the earlier laboratory work conducted in the 1960s and 1970s. The field studies of the 1990s found that 80-90% of

sleep disturbances were not related to outdoor noise events, but rather to indoor noises and non-noise factors. The results showed that, in real life conditions, there was less of an effect of noise on sleep than had been previously reported from laboratory studies. Laboratory sleep studies tend to show more sleep disturbance than field studies because people who sleep in their own homes are used to their environment and, therefore, do not wake up as easily (FICAN 1997).

FICAN

Based on this new information, in 1997 FICAN recommended a dose-response curve to use instead of the earlier 1992 FICON curve (FICAN 1997). Figure A-10 shows FICAN's curve, the red line, which is based on the results of three field studies shown in the figure (Ollerhead et al. 1992; Fidell et al. 1994; Fidell et al. 1995a, 1995b), along with the data from six previous field studies.

The 1997 FICAN curve represents the upper envelope of the latest field data. It predicts the maximum percent awakened for a given residential population. According to this curve, a maximum of 3% of people would be awakened at an indoor SEL of 58 dB. An indoor SEL of 58 dB is equivalent to an outdoor SEL of 83 dB, with the windows closed (73 dB with windows open).



Source: FICAN 1997

Figure A-10. FICAN 1997 Recommended Sleep Disturbance Dose-Response Relationship

Number of Events and Awakenings

It is reasonable to expect that sleep disturbance is affected by the number of events. The German Aerospace Center (DLR Laboratory) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and related factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance. It involved both laboratory and in-home field research phases. The DLR investigators developed a dose-response curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

A different approach was taken by an ANSI standards committee (ANSI 2008). The committee used the average of the data shown in Figure A-10 (i.e., the blue dashed line) rather than the upper envelope, to predict average awakening from one event. Probability theory is then used to project the awakening from multiple noise events.

Currently, there are no established criteria for evaluating sleep disturbance from aircraft noise, although recent studies have suggested a benchmark of an outdoor SEL of 90 dB as an appropriate tentative

criterion when comparing the effects of different operational alternatives. The corresponding indoor SEL would be approximately 25 dB lower (at 65 dB) with doors and windows closed, and approximately 15 dB lower (at 75 dB) with doors or windows open. According to the ANSI (2008) standard, the probability of awakening from a single aircraft event at this level is between 1 and 2% for people habituated to the noise sleeping in bedrooms with windows closed, and 2-3% with windows open. The probability of the exposed population awakening at least once from multiple aircraft events at noise levels of 90 dB SEL is shown in Table A-4.

Table A-4. Probability of Awakening from NA90SEL

Number of Aircraft Events at 90 dB SEL for Average 9-Hour Night	Minimum Probability of Awakening at Least Once	
	Windows Closed	Windows Open
1	1%	2%
3	4%	6%
5	7%	10%
9 (1 per hour)	12%	18%
18 (2 per hour)	22%	33%
27 (3 per hour)	32%	45%

Source: DOD 2009b.

In December 2008, FICAN recommended the use of this new standard. FICAN also recognized that more research is underway by various organizations, and that work may result in changes to FICAN's position. Until that time, FICAN recommends the use of the ANSI (2008) standard (FICAN 2008).

Summary

Sleep disturbance research still lacks the details to accurately estimate the population awakened for a given noise exposure. The procedure described in the ANSI (2008) Standard and endorsed by FICAN is based on probability calculations that have not yet been scientifically validated. While this procedure certainly provides a much better method for evaluating sleep awakenings from multiple aircraft noise events, the estimated probability of awakenings can only be considered approximate.

A.3.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound (i.e., a shift in the hearing threshold to a higher level). This change can either be a Temporary Threshold Shift (TTS) or a Permanent Threshold Shift (PTS) (Berger et al. 1995).

TTS can result from exposure to loud noise over a given amount of time. An example of TTS might be a person attending a loud music concert. After the concert is over, there can be a threshold shift that may last several hours. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover. A common example of PTS is the result of regularly working in a loud factory. A TTS can eventually become a PTS over time with repeated exposure to high noise levels. Even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a TTS results in a PTS is difficult to identify and varies with a person's sensitivity.

Criteria for Permanent Hearing Loss

It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). A large amount of data on hearing loss have been collected, largely for workers in manufacturing industries, and analyzed by the scientific/medical community. The Occupational Safety and Health Administration (OSHA) regulation of 1971 places the limit on workplace noise exposure at an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (U.S. Department of Labor 1971). Some hearing loss is still expected at those levels. The most protective criterion, with no measurable hearing loss after 40 years of exposure, is an average sound level of 70 dB over a 24-hour period.

The USEPA established 75 dB $L_{eq(8)}$ and 70 dB $L_{eq(24)}$ as the average noise level standard needed to protect 96% of the population from greater than a 5 dB PTS (USEPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 dB as the lowest level at which hearing loss may occur (CHABA 1977). WHO concluded that environmental and leisure-time noise below an $L_{eq(24)}$ value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 1999).

Hearing Loss and Aircraft Noise

The 1982 USEPA Guidelines report (USEPA 1982) addresses noise-induced hearing loss in terms of the "Noise-Induced Permanent Threshold Shift" (NIPTS). This defines the permanent change in hearing caused by exposure to noise. Numerically, the NIPTS is the change in threshold that can be expected from daily exposure to noise over a normal working lifetime of 40 years. A grand average of the NIPTS over time and hearing sensitivity is termed the Average NIPTS, or Ave. NIPTS for short. The Ave. NIPTS that can be expected for noise measured by the $L_{eq(24)}$ metric is given in Table A-5. Table A-5 assumes exposure to the full outdoor noise throughout the 24 hours. When inside a building, the exposure will be less (Eldred and von Gierke 1993).

The Ave. NIPTS is estimated as an average over all people exposed to the noise. The actual value of NIPTS for any given person will depend on their physical sensitivity to noise – some will experience more hearing loss than others. The USEPA Guidelines provide information on this variation in sensitivity in the form of the NIPTS exceeded by 10% of the population, which is included in the Table A-5 in the "10th Percentile NIPTS" column (USEPA 1982). For individuals exposed to $L_{eq(24)}$ of 80 dB, the most sensitive of the population would be expected to show degradation to their hearing of 7 dB over time.

To put these numbers in perspective, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. Furthermore, there is no known evidence that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ±5 dB (USEPA 1974).

Table A-5. Ave. NIPTS and 10th Percentile NIPTS as a Function of $L_{eq(24)}$

$L_{eq(24)}$	Ave. NIPTS (dB)*	10th Percentile NIPTS (dB)*
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

** rounded to the nearest 0.5 dB*

Source: DOD 2012.

The scientific community has concluded that noise exposure from civil airports has little chance of causing permanent hearing loss (Newman and Beattie 1985). For military airbases, DOD policy requires that hearing risk loss be estimated for population exposed to $L_{eq(24)}$ of 80 dB or higher (DOD 2012), including residents of on-base housing. Exposure of workers inside the base boundary is assessed using DOD regulations for occupational noise exposure.

Noise in low-altitude military airspace, especially along MTRs where L_{max} can exceed 115 dB, is of concern. That is the upper limit used for occupational noise exposure (e.g., U.S. Department of Labor 1971). One laboratory study (Ising et al. 1999) concluded that events with L_{max} above 114 dB have the potential to cause hearing loss. Another laboratory study of participants exposed to levels between 115 and 130 dB (Nixon et al. 1993), however, showed conflicting results. For an exposure to four events across that range, half the subjects showed no change in hearing, a quarter showed a temporary 5 dB decrease in sensitivity, and a quarter showed a temporary 5 dB increase in sensitivity. For exposure to eight events of 130 dB, subjects showed an increase in sensitivity of up to 10 dB (Nixon et al. 1993).

Summary

Aviation noise levels are not comparable to the occupational noise levels associated with hearing loss of workers in manufacturing industries. There is little chance of hearing loss at levels less than 75 dB DNL. Noise levels equal to or greater than 75 dB DNL can occur near military airbases, and DOD policy specifies that NIPTS be evaluated when exposure exceeds 80 dB $L_{eq(24)}$ (DOD 2009c). There is some concern about L_{max} exceeding 115 dB in low altitude military airspace, but no research results to date have definitely related permanent hearing impairment to aviation noise.

A.3.5 Non-auditory Health Effects

Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, "It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body."

The connection from annoyance to stress to health issues requires careful experimental design. Some highly publicized reports on health effects have, in fact, been rooted in poorly done science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980) no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Atlanta's Hartsfield International Airport, no relationships were found for levels above 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires administered for health, socioeconomic and lifestyle factors, including diet and physical exercise. Hypertension was defined by WHO blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

HYENA results were presented as an odds ratio (OR). An OR of 1 means there is no added risk, while an OR of 2 would mean risk doubles. An OR of 1.14 was found for nighttime aircraft noise, measured by L_{night}, the L_{eq} for nighttime hours. For daytime aircraft noise, measured by $L_{eq(16)}$, the OR was 0.93. For road traffic noise, measured by the full day $L_{eq(24)}$, the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

It is interesting that aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries so that result is pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two recent studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. The authors of these studies noted that further research is needed to refine the associations and the causal interpretation with noise or possible alternative explanations.

Summary

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large scale HYENA study, and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

A.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have found links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies where noise levels are above 85 dB. Little change has been found in low-noise cases. Moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on workers.

A.3.7 Noise Effects on Children

Recent studies on school children indicate a potential link between aircraft noise and both reading comprehension and learning motivation. The effects may be small but may be of particular concern for children who are already scholastically challenged.

A.3.7.1 Effects on Learning and Cognitive Abilities

Early studies in several countries (Cohen et al. 1973, 1980, 1981; Bronzaft and McCarthy 1975; Green et al. 1982; Evans et al. 1998; Haines et al. 2002; Lercher et al. 2003) showed lower reading scores for children living or attending school in noisy areas than for children away from those areas. In some studies noise exposed children were less likely to solve difficult puzzles or more likely to give up.

More recently, the Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health (RANCH) study (Stansfeld et al. 2005; Clark et al. 2005) compared the effect of aircraft and road traffic noise on over 2.000 children in three countries. This was the first study to derive exposure-effect associations for a range of cognitive and health effects, and was the first to compare effects across countries.

The study found a linear relation between chronic aircraft noise exposure and impaired reading comprehension and recognition memory. No associations were found between chronic road traffic noise exposure and cognition. Conceptual recall and information recall surprisingly showed better performance in high road traffic noise areas. Neither aircraft noise nor road traffic noise affected attention or working memory (Stansfeld et al. 2005; Clark et al. 2006).

Figure A-11 shows RANCH's result relating noise to reading comprehension. It shows that reading falls below average (a z-score of 0) at L_{eq} greater than 55 dB. Because the relationship is linear, reducing exposure at any level should lead to improvements in reading comprehension.

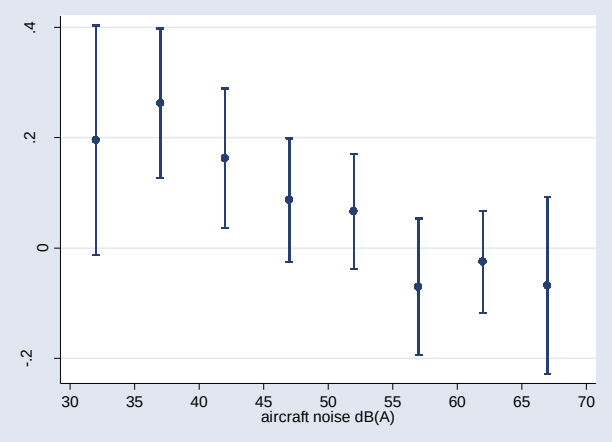


Figure A-11. RANCH Study Reading Scores Varying with L_{eq}
Sources: Stansfeld et al. 2005; Clark et al. 2006

An observation of the RANCH study was that children may be exposed to aircraft noise for many of their childhood years and the consequences of long-term noise exposure were unknown. A follow-up study of the children in the RANCH project is being analyzed to examine the long-term effects on children's reading comprehension (Clark et al. 2009). Preliminary analysis indicated a trend for reading comprehension to be poorer at 15-16 years of age for children who attended noise-exposed primary schools. There was also a trend for reading comprehension to be poorer in aircraft noise exposed secondary schools. Further analysis adjusting for confounding factors is ongoing, and is needed to confirm these initial conclusions.

FICAN funded a pilot study to assess the relationship between aircraft noise reduction and standardized test scores (Eagan et al. 2004; FICAN 2007). The study evaluated whether abrupt aircraft noise reduction within classrooms, from either airport closure or sound insulation, was associated with improvements in test scores. Data were collected in 35 public schools near three airports in Illinois and Texas. The study used several noise metrics. These were, however, all computed indoor levels, which makes it hard to compare with the outdoor levels used in most other studies.

The FICAN study found a significant association between noise reduction and a decrease in failure rates for high school students, but not middle or elementary school students. There were some weaker associations between noise reduction and an increase in failure rates for middle and elementary schools. Overall the study found that the associations observed were similar for children with or without learning difficulties, and between verbal and math/science tests. As a pilot study, it was not expected to obtain final answers, but provided useful indications (FICAN 2007).

While there are many factors that can contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (NATO 2000; WHO 1999). The awareness has also led to the classroom noise standard discussed earlier (ANSI 2002).

A.3.7.2 Health Effects

A number of studies, including some of the cognitive studies discussed above, have examined the potential for effects on children's health. Health effects include annoyance, psychological health, coronary risk, stress hormones, sleep disturbance and hearing loss.

Annoyance. Chronic noise exposure causes annoyance in children (Bronzaft and McCarthy 1975; Evans et al. 1995). Annoyance among children tends to be higher than for adults, and there is little habituation

(Haines et al. 2001a). The RANCH study found annoyance may play a role in how noise affects reading comprehension (Clark et al. 2005).

Psychological Health. Lercher et al. (2002) found an association between noise and teacher ratings of psychological health, but only for children with biological risk defined by low birth weight and/or premature birth. Haines et al. (2001b) found that children exposed to aircraft noise had higher levels of psychological distress and hyperactivity. Stansfeld et al. (2009) replicated the hyperactivity result, but not distress.

As with studies of adults, the evidence suggests that chronic noise exposure is probably not associated with serious psychological illness, but there may be effects on well-being and quality of life. Further research is needed, particularly on whether hyperactive children are more susceptible to stressors such as aircraft noise.

Coronary Risk. The HYENA study discussed earlier indicated a possible relation between noise and hypertension in older adults. Cohen et al. (1980, 1981) found some increase in blood pressure among school children, but within the normal range and not indicating hypertension. Hygge et al. (2002) found mixed effects. The RANCH study found some effect for children at home and at night, but not at school. Overall the evidence for noise effects on children's blood pressure is mixed, and less certain than for older adults.

Stress Hormones. Some studies investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines et al. 2001a, 2001b). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Sleep Disturbance. A sub-study of RANCH in a Swedish sample used sleep logs and the monitoring of rest/activity cycles to compare the effect of road traffic noise on child and parent sleep (Ohrstrom et al. 2006). An exposure-response relationship was found for sleep quality and daytime sleepiness for children. While this suggests effects of noise on children's sleep disturbance, it is difficult to generalize from one study.

Hearing loss. A few studies have examined hearing loss from exposure to aircraft noise. Noise-induced hearing loss for children who attended a school located under a flight path near a Taiwan airport was greater than for children at another school far away (Chen et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was greater than 75 dB DNL and L_{max} were about 87 dB during overflights. Conversely, several other studies reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Andrus et al. 1975; Fisch 1977; Wu et al. 1995). It is not clear from those results whether children are at higher risk than adults, but the levels involved are higher than those desirable for learning and quality of life.

Ludlow and Sixsmith (1999) conducted a cross-sectional pilot study to examine the hypothesis that military jet noise exposure early in life is associated with raised hearing thresholds. The authors concluded that there were no significant differences in audiometric test results between military personnel who as children had lived in or near stations where fast jet operations were based, and a similar group who had no such exposure as children.

A.3.8 Property Values

Noise can affect the value of homes. Economic studies of property values based on selling prices and noise have been conducted to find a direct relation.

The value-noise relation is usually presented as the Noise Depreciation Index (NDI) or Noise Sensitivity Depreciation Index (NSDI), the percent loss of value per dB (measured by the DNL metric). An early study by Nelson (1978) at three airports found an NDI of 1.8-2.3% per dB. Nelson also noted a decline in NDI over time which he theorized could be due to either a change in population or the increase in commercial value of the property near airports. Crowley (1978) reached a similar conclusion. A larger study by Nelson (1980) looking at 18 airports found an NDI from 0.5 to 0.6% per dB.

In a review of property value studies, Newman and Beattie (1985) found a range of NDI from 0.2 to 2% per dB. They noted that many factors other than noise affected values.

Fidell et al. (1996) studied the influence of aircraft noise on actual sale prices of residential properties in the vicinity of a military base in Virginia and one in Arizona. They found no meaningful effect on home values. Their results may have been due to non-noise factors, especially the wide differences in homes between the two study areas.

Recent studies of noise effects on property values have recognized the need to account for non-noise factors. Nelson (2004) analyzed data from 33 airports, and discussed the need to account for those factors and the need for careful statistics. His analysis showed NDI from 0.3 to 1.5% per dB, with an average of about 0.65% per dB. Nelson (2007) and Andersson et al. (2013) discuss statistical modeling in more detail.

Enough data is available to conclude that aircraft noise has a real effect on property values. This effect falls in the range of 0.2 to 2.0% per dB, with the average on the order of 0.5% per dB. The actual value varies from location to location, and is very often small compared to non-noise factors.

A.3.9 Noise-Induced Vibration Effects on Structures and Humans

High noise levels can cause buildings to vibrate. If high enough, building components can be damaged. The most sensitive components of a building are the windows, followed by plaster walls and ceilings. Possibility of damage depends on the peak sound pressures and the resonances of the building. In general, damage is possible only for sounds lasting more than one second above an unweighted sound level of 130 dB (CHABA 1977). That is higher than expected from normal aircraft operations. Even low altitude flyovers of heavy aircraft do not reach the potential for damage (Sutherland 1990).

Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle", of objects within the dwelling – hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, rattling occurs at peak unweighted sound levels that last for several seconds at levels above 110 dB, which is well above that considered normally compatible with residential land use Thus, assessments of noise exposure levels for compatible land use will also be protective of noise-induced rattle.

The sound from an aircraft overflight travels from the exterior to the interior of the house in one of two ways: through the solid structural elements and directly through the air. Figure A-12 illustrates the sound transmission through a wall constructed with a brick exterior, stud framing, interior finish wall, and absorbent material in the cavity. The sound transmission starts with noise impinging on the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This surface then radiates sound into the dwelling interior. As the figure shows, vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

Normally, the most sensitive components of a structure to airborne noise are the windows, followed by plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at unweighted sound levels above 130 dB, there is the possibility of structural damage. While certain frequencies (such as 30 Hertz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a unweighted sound level of 130 dB are potentially damaging to structural components (von Gierke and Ward 1991).

In the assessment of vibration on humans, the following factors determine if a person will perceive and possibly react to building vibrations:

1. Type of excitation: steady state, intermittent, or impulsive vibration.
2. Frequency of the excitation. International Organization for Standardization (ISO) standard 2631-2 (ISO 1989) recommends a frequency range of 1 to 80 Hz for the assessment of vibration on humans.
3. Orientation of the body with respect to the vibration.
4. The use of the occupied space (i.e., residential, workshop, hospital).
5. Time of day.

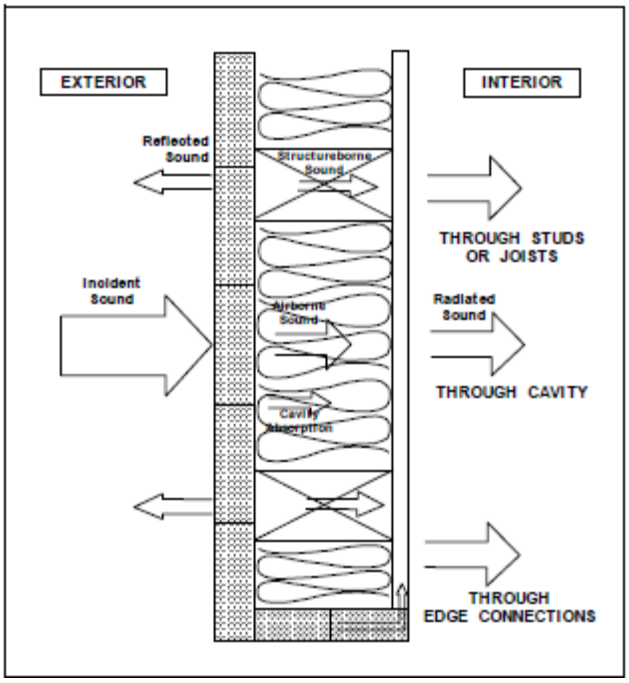


Figure A-12. Depiction of Sound Transmission through Built Construction

Table A-6 lists the whole-body vibration criteria from ISO 2631-2 for one-third octave frequency bands from 1 to 80 Hz.

Table A-6. Vibration Criteria for the Evaluation of Human Exposure to Whole-Body Vibration

	RMS Acceleration (m/s/s)		
Frequency (Hz)	Combined Criteria Base Curve	Residential Night	Residential Day
1.00	0.0036	0.0050	0.0072
1.25	0.0036	0.0050	0.0072
1.60	0.0036	0.0050	0.0072
2.00	0.0036	0.0050	0.0072
2.50	0.0037	0.0052	0.0074
3.15	0.0039	0.0054	0.0077
4.00	0.0041	0.0057	0.0081
5.00	0.0043	0.0060	0.0086
6.30	0.0046	0.0064	0.0092
8.00	0.0050	0.0070	0.0100
10.00	0.0063	0.0088	0.0126
12.50	0.0078	0.0109	0.0156
16.00	0.0100	0.0140	0.0200
20.00	0.0125	0.0175	0.0250
25.00	0.0156	0.0218	0.0312
31.50	0.0197	0.0276	0.0394
40.00	0.0250	0.0350	0.0500
50.00	0.0313	0.0438	0.0626
63.00	0.0394	0.0552	0.0788
80.00	0.0500	0.0700	0.1000

Source: ISO 1989.

A.3.10 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such events. It is improbable that such effects would result from routine subsonic aircraft operations.

A.3.11 Noise Effects on Historical and Archaeological Sites

Historical buildings and sites can have elements that are more fragile than conventional structures. Aircraft noise may affect such sites more severely than newer, modern structures. In older structures, seemingly insignificant surface cracks caused by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved measurements of noise and vibration in a restored plantation house, originally built in 1795. It is located 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. The aircraft measured was the Concorde. There was special concern for the building's windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning (Wesler 1977).

As for conventional structures, noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites. Unique sites should, of course, be analyzed for specific exposure.

A.3.12 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns are vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960s and 1970s on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights.

Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the Manci et al. (1988) literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

A.3.12.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarized the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally. A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft. Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994a).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a 1-year time period and none were associated with aircraft disturbances (U.S. Air Force 1993). In 1987, researchers contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Of the 43 cattle previously exposed to low-altitude flights, 3 showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level (AGL) and 400 knots by running less than 10 meters (m). They resumed normal activity within 1 minute (U.S. Air Force 1994a). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30-60 feet overhead did not affect milk production and pregnancies of 44 cows in a 1964 study (U.S. Air Force 1994a).

Additionally, Beyer (1983) reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights. A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994a).

In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50-100 m), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50-100 m, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994a). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase

were recorded; noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100-135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Gladwin et al. 1988; Manci et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 feet) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994b). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994b). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994b). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120-130 dB.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s. Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994b).

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles et al. 1990). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994b).

A.3.12.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock. This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci et al. 1988).

Mammals

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dB can damage mammals' ears, and levels at 95 dB can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet AGL over important grizzly and polar bear habitat. Wolves have been frightened by low-altitude flights that were 25-1,000 feet AGL. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, rising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kilogram animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed (Weisenberger et al. 1996).

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, are not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America 1980). Since 1980 it appears that research on responses

of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dB caused a greater intensity of startle reactions than lower-intensity booms at 72-79 dB. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Park Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles et al. 1993).

Birds

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals,

bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Ellis et al. 1991; Grubb and King 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant to 85 dB for crested tern (Brown 1990; Ward and Stehn 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by "raucous discordant cries." There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A cooperative study between the DOD and the U.S. Fish and Wildlife Service (USFWS), assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 m away and SELs were 70 dB.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for 10-20 seconds. No apparent nest failure occurred as a result of the sonic booms. Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4-8 m). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15-20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

Raptors

In a literature review of raptor responses to aircraft noise, Manci et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or re-occupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation (Ellis et al. 1991).

Manci et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dB) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle. A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 m away caused reactions similar to other disturbance types. Ellis et al. (1991) showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 m, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (USFWS 1998). However, Fraser et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey. A study by Trimper et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing,

agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences. The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk. Anderson et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (9 of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

Migratory Waterfowl

Fleming et al. (1996) conducted a study of caged American black ducks found that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects (Fleming et al. 1996).

Another study by Conomy et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dB. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38% to 6% in 17 days and remained stable at 5.8% thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were less than 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci et al. 1988, reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards et al. 1979).

Wading and Shorebirds

Black et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dB on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology.

Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75% of the 220 observations. Approximately 90% displayed no reaction or merely looked toward the direction of the noise source. Another 6% stood up, 3% walked from the nest, and 2% flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85-100 dB on approach and 94-105 dB on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the Concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of sooty terns on the Dry Tortugas (Austin et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, sooty terns were observed to react to sonic booms by rising in a "panic flight," circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of noddies on the same island hatched successfully in 1969, the year of the sooty tern hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Cottereau 1972; Cogger and Zegarra 1980; Bowles et al. 1991, 1994) failed to show adverse effects on hatching of eggs. A structural analysis by Ting et al. (2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoot toads, may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Manci et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American alligator and the spectacled caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including a DNL of 85 dB.

A.3.12.3 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the "startle" or "fright" response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing

aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

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APPENDIX B

APPROVAL LETTER FOR THE ROTARY-WING AIRFIELD ACCIDENT POTENTIAL ZONES

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, DC 20350-2000

11000
Ser N46/15U133339
8 Dec 15

From: Director, Shore Readiness Division (N46)
To: Commanding Officer, Naval Air Station Whiting Field

Subj: APPROVAL OF MODIFIED ACCIDENT POTENTIAL ZONES (APZs) FOR WHITING FIELD'S ROTARY-WING OUTLYING FIELDS

Ref: (a) NAS Whiting Field ltr 11010 Ser N00/4418 of 15 Dec 14 w/ends

1. Approval is granted for your request in reference (a), as recommended by Commander, Navy Installations Command, for the use of the modified accident potential zones (APZs) for Whiting Field's Rotary-Wing Outlying Fields.

2. My point of contact regarding this matter is Karthik Bharat at DSN 225-5519, COMM (703) 695-5519, or e-mail karthik.bharat@navy.mil.

E. M. KERN

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