WITHAM FIELD

14 CFR Part 150 Study

Final Noise Exposure Map Report

Prepared for:
Martin County
2011 SE Airport Road
Stuart, FL 34996

July, 2021

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CHAPTER 1
Introduction

1.1 Introduction

The Martin County Board of County Commissioners (BOCC) has undertaken a Noise Exposure Map (NEM) update for the Martin County Airport (SUA or the Airport) based on Title 14 Code of Federal Regulations (CFR) Part 150 *Airport Noise Compatibility Planning* to evaluate the compatibility of the Airport with the surrounding communities. The preparation of an NEM Update, or Part 150 Study, is a voluntary action on the part of the BOCC.[1] However, once a Part 150 Study is undertaken, an airport sponsor is obligated to prepare an update whenever there is a significant change to the noise environment. The first Part 150 Study for SUA was prepared in 2004 and this most recent Study includes the development of updated NEMs.

The primary objective of this NEM Update is to identify the existing and future noise conditions around the Airport, as well as to determine the compatibility of existing and future land uses with aircraft noise, based on the noise conditions and land use compatibility guidelines in 14 CFR Part 150, Appendix A, Table 1 (see Chapter 3).

1.2 Need for the Preparation of a New Part 150 Study

Since the previous Part 150 Study was accepted by the Federal Aviation Administration (FAA) in 2014, a number of changes have taken place that have impacted the operational conditions at SUA. Activity at the Airport has rebounded and grown significantly since the Great Recession and significant investments have been made into new facilities at the Airport, such as several new/expanded hangars for multiple operators, the construction of a new Fixed Based Operator (FBO) building and a new US Customs & Border Protection Facility. These investments have made the Airport attractive for airport operators and are a positive sign of continued growth. SUA has experienced both an increase in aircraft operation levels and changes in aircraft fleet mix. Both local and itinerant operations have grown since the previous Part 150 Study with over 38,000 additional operations in 2019 when compared to 2014.[2]

The purpose of this Study is to update the 2014 Part 150 Study NEMs. Updating these noise contours will provide more up-to-date and relevant information, which will, in turn, allow SUA and the FAA to determine if continuation of the sound insulation program is appropriate for the Airport.

[1] The regulations contained in 14 CFR Part 150 are voluntary and airport operators are not required to participate. However, accepted NEMs and an approved NCP are necessary for federal financial participation in 14 CFR Part 150-related noise abatement measures at an airport.

[2] FAA Air Traffic Activity System (ATADS).

1.3 14 CFR Part 150 Study Process

The BOCC initiated the Part 150 Study for SUA in 2018. Key issues were identified, early on, through input from SUA and SUA stakeholders, which included affected jurisdictions, aviation officials, aircraft operators, local communities, and interested members of the public. Input was received at meetings with Airport staff, a public workshop, and Airport Noise Advisory Committee (ANAC) meetings with the community.

Initial Study efforts included an inventory of operational aircraft activity from 2018 to 2019, which was supplemented with information from SUA the FAA, and Airport tenants. This involved collecting data related to: the number of aircraft operating at the Airport on an annual basis; the fleet mix (types of aircraft); the time of day in which the aircraft operate (Day: 7:00 A.M. to 9:59 P.M. or Night: 10:00 P.M. to 6:59 A.M.); and existing aircraft operational procedures (i.e., runway use, flight tracks, departure and arrival corridors). In addition to operational data, land use data was collected and reviewed, which included zoning regulations, existing land use maps, and future land use plans.

After completing the inventory process, a noise prediction model, the Aviation Environmental Design Tool (AEDT) Version 3b was used to produce noise contours (areas of equal noise exposure around the Airport). The FAA requires these noise contours to be prepared for the current year (2020) and a projected condition for a future year that must be at least five years from the date of submittal of the document (2025).

1.4 Preparation of Noise Exposure Maps

NEMs graphically depict aircraft noise exposure levels on and in the vicinity of an airport by presenting lines of equal aircraft noise in Day-Night Average Sound Level (DNL) values. Aircraft noise DNL values represent the cumulative sound produced by a 24-hour period of aircraft activity. For 14 CFR Part 150 studies, this 24-hour period of aircraft activity is based on average aircraft activity over a 12-month period and the sound energy is represented as A-weighted decibels (dBA). NEMs provide local communities and airport operators an opportunity to see aircraft noise exposure levels in order to make better-informed decisions regarding proposed noise sensitive development in the vicinity of an airport.

1.4.1 NEM Study Years

The official NEMs include two maps. The first NEM depicts existing noise exposure levels and the land uses in the vicinity of the Airport. The SUA Existing Conditions (2020) NEM was developed using an aircraft operations forecast developed by ESA and approved by the FAA. It also uses actual calendar year data from 2017 and 2018 to generate day/night utilization, runway usage, flight tracks, and trip length data from SUA's Noise and Operations Management System (VNOMS).[3] The aircraft operations forecast used for the Part 150 Study for SUA is discussed in detail in Section 4.3.2 and was approved by the FAA on August 26, 2019 (see **Appendix B**).

[3] An aircraft operation is defined as one arrival flight or one departure flight.

The second NEM depicts noise exposure levels anticipated five years in the future, which represents forecast conditions. The future NEM was developed using projected levels of aircraft activity and operational conditions at SUA in 2025. In accordance with 14 CFR Part 150, the Future Conditions NEM represents conditions five years after the NEM date of submittal to the FAA. The NEMs provide the noise exposure baseline to determine whether the current Sound Insulation Program needs to be revised.

1.4.2 Technical Approach to Preparing Noise Exposure Maps

Subsequent chapters of this report describe in detail the information, methods, and tools used to develop the NEMs and estimate existing and future aircraft noise impacts in the vicinity of SUA. A brief overview of the technical approach is provided below.

1.4.2.1 Data Collection and Verification

A wide range of data and information related to the operation of aircraft at the Airport was collected by the Part 150 Study Team to provide a complete understanding of aircraft-related noise at SUA and its effects on local communities, including:

Aircraft Activity

The Part 150 Study Team collected information related to: all types of aircraft that operate at the Airport; the total number of annual aircraft operations; the times of day that these aircraft operate; and the flight paths and profiles used by these aircraft during departures and arrivals.

Approach and Departure Procedures

The Part 150 Study Team reviewed the airspace structure in the vicinity of the Airport and air traffic control procedures used to direct flights by the FAA in and out of SUA.

Land Use

The Part 150 Study Team collected existing land use information for the established study area to develop base maps. The Part 150 Study Team also identified proposed land use changes that are anticipated to occur in the vicinity of the Airport over the next five-year period.

1.4.2.2 Aircraft Noise Modeling

Using the FAA's AEDT, noise exposure contours were developed for 2020 (Existing Conditions NEM) and 2025 (Future Conditions NEM). This process involved compiling information and generating detailed input data for AEDT that represent current and forecast aircraft activity and operating conditions at SUA.

1.4.2.3 Preparation of NEMs

Geographic Information System (GIS) software was used to develop the 2020 and 2025 NEMs, in accordance with the criteria and guidelines found in 14 CFR Part 150.

1.4.2.4 Aircraft Noise Impact Analysis

GIS software was used to identify the type and amount (acreage) of incompatible land uses for the 2020 and 2025 NEMs. The analysis also determined the number of people, households, and noise-sensitive sites that are incompatible with aircraft noise exposure levels they receive.

1.5 Consultation and Public Involvement

14 CFR Part 150 Sections 150.21(b) and A150.105(a) (Appendix A to Part 150) require that the NEMs and documentation submitted "…*be developed and prepared…in consultation with states, public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL 65 contour depicted on the map, FAA regional officials, and other Federal officials having local responsibility for land uses depicted on the map. This consultation must include regular aeronautical users of the Airport. The Airport operator shall certify that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the draft noise exposure map and descriptions of forecast aircraft operations*."

The consultation and public involvement process for the Part 150 Study for SUA included the following elements to provide adequate opportunities for stakeholder engagement and participation during the development of the NEMs:

- Airport operators, tenants and users, the FAA, planning agencies, local communities, elected officials, and the general public were provided an opportunity to be involved in the development of the NEMs for SUA.
- A Public Workshop was held at the beginning of the Part 150 Study process to solicit input for the development of the draft NEMs. Another Public Workshop will be held after the publication of the Draft NEM Report.
- Information about the Part 150 Study was regularly shared with stakeholders, agencies, and the general public, which included updates on Study progress and schedule at ANAC meetings.

Additional information related to public outreach activities is included in **Chapter 6**.

1.6 NEM Report Organization

This report provides the NEMs for SUA and the technical documentation required by 14 CFR Part 150 and is organized as follows:

Chapter 1 Introduction

Chapter 2 Martin County Airport Overview
This chapter provides background information regarding the Airport and its history of noise abatement.

Chapter 3 Land Use
This chapter describes the Part 150 Study land use study area and the methods utilized for collecting data related to land uses in the study area and noise-sensitive sites.

Chapter 4 NEM Development
This chapter describes the development of the NEMs, the noise model, and noise modeling inputs.

Chapter 5 2020 and 2025 Noise Exposure
This chapter presents the 2020 and 2025 NEMs and information on land use compatibility and aircraft noise-related impacts.

Chapter 6 Consultation and Public Involvement
This chapter documents stakeholder and public outreach engagement efforts undertaken during the Part 150 Study process.

Technical information, documentation, and maps are contained in the appendices to this report, which are organized as follows:

Appendix A Glossary and Acronyms

Appendix B Aircraft Activity Forecast

Appendix C Airport Facilities and Airspace Classifications

Appendix D Aircraft Noise

Appendix E Radar Flight Tracks

Appendix F Consultation and Correspondence

Appendix G Public Comments and Responses

Appendix H Official Noise Exposure Maps

Appendix I Supplemental AEDT Modeling Information

CHAPTER 2
Martin County Airport Overview

2.1 Airport Location and Setting

The Airport is located on 726 acres in Martin County on Florida's "Treasure Coast". The City of Stuart borders the Airport to the northwest and west and the rest of the Airport is surrounding by unincorporated parts of Martin County. The Airport is easily accessible from the west by highways US-1 and A1A. The Florida Turnpike and I-95 are 6 and 12 miles from the Airport respectively. The location of the Airport is depicted on **Figure 2-1** and its environs are depicted on **Figure 2-2**.

2.1.1 Airport History

The Airport initially operated as a grass landing strip in the 1930s and was used as a military airfield during World War II. In the years that followed, it was primarily used for aircraft testing by Northrup Grumman, until the 1990s when Martin County began operating the Airport as a public general aviation (GA) airport. Since its opening, it has thrived as a GA airport, even being named Florida's General Aviation Airport of the Year by the Florida Department of Transportation in 2015.

2.2 Airport Overview

2.2.1 Aviation Role

Airport facilities support various aviation-related activities, ranging from large corporate jets to small GA aircraft and it supports a full range of business, training, community service and recreational aviation activities. The Airport also hosts the Stuart Air Show for the local community each year. The FAA's National Plan of Integrated Airport Systems (NPIAS) identifies SUA as a National General Aviation Airport.

2.2.2 Airport Facilities Overview

This section provides an overview of SUA's facilities, airspace, and approach and departure procedures. The configuration of the airfield and landside facilities at SUA is described in the following sections and shown on **Figure 2-3**.

2.2.2.1 General Aviation Facilities

General Aviation refers to all types of aviation that are not considered military, cargo, scheduled commercial passenger air service, or non-scheduled air transportation for hire. GA activity at the Airport is comprised of business, or corporate, as well as personal, private, and flight training. There are two fixed base operators (FBOs) that provide service to GA operators at the Airport.

Stuart Jet Center offers more than 15 acres of lighted and secured ramp space, as well as approximately 250,000 square feet of available hangar space and is currently expanding to include a new 20,000 square foot storage hangar. Atlantic Aviation, which took over from another FBO in 2014, is expanding its existing space at the Airport with the construction of a new 25,000 square foot hangar, as well as renovating its main customer service center. Both FBOs provide aircraft ground handling and fueling services, pilot's lounges, passenger lounges, rental cars, and crew/service centers, and are located immediately southwest of Runway 12/30.

2.2.2.2 Runways

The Airport has three runways, arranged in a World War II era-style triangular configuration, each of which are utilized for GA traffic. Information regarding the characteristics of each runway is provided in **Table 2-1.**

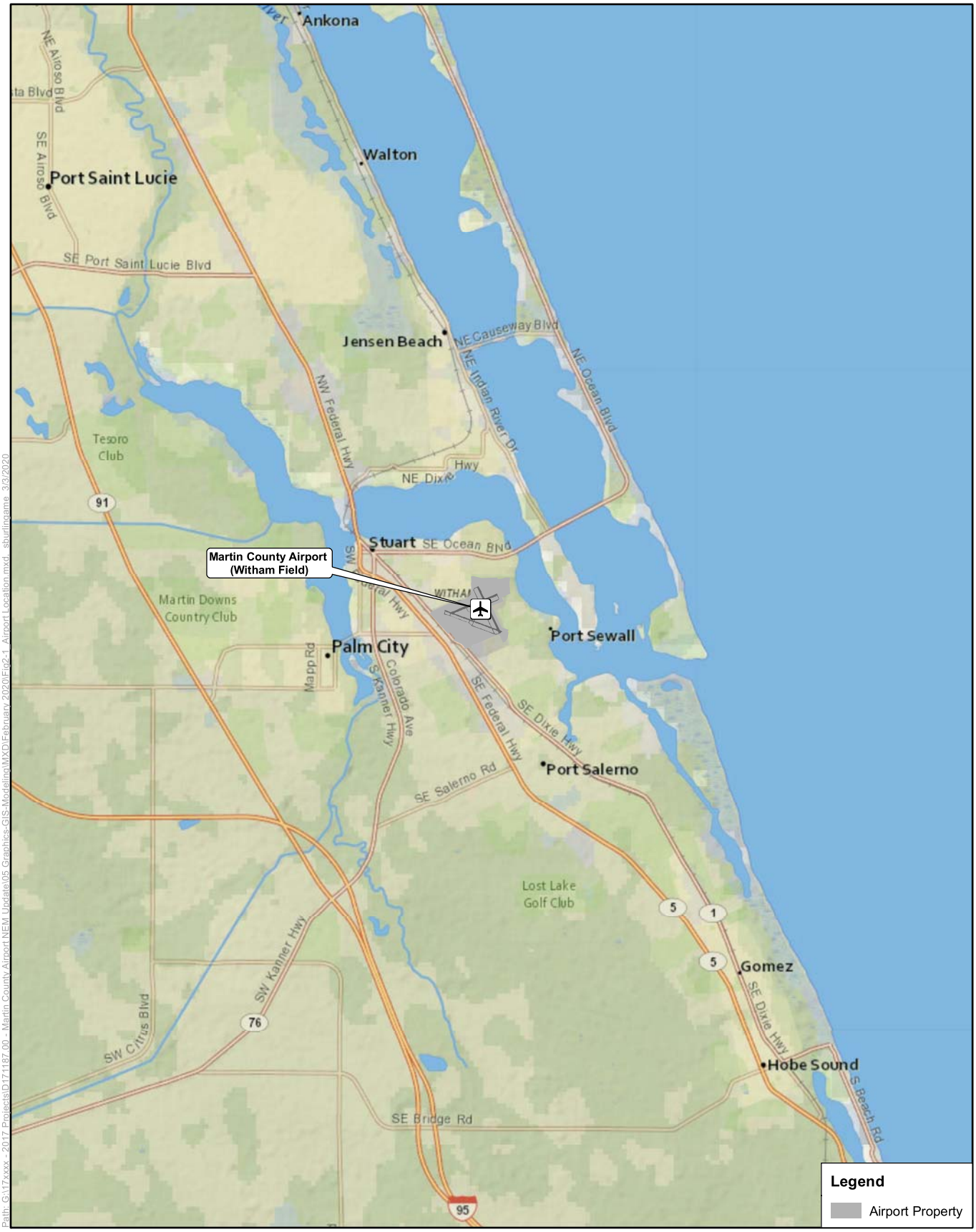
Runway 12/30 is 5,828 feet long, 100 feet wide, and is located immediately north of the Airport's support facilities. It is constructed of asphalt and is grooved. Runway 12 has a displaced threshold of 460 feet, which reduces the available landing distance to 5,368 feet; however, Runway 30 does not have a displaced threshold. Both ends of Runway 12/30 feature an Engineered Materials Arresting System (EMAS), which is a bed of engineered materials constructed at the end of a runway designed to decrease the risk of a runway excursion. Engineered materials are defined in FAA Advisory Circular No 150/5220-22B as "high energy absorbing materials of selected strength, which will reliably and predictably crush under the weight of an aircraft".

Runway 16/34 is 4,998 feet long, 100 feet wide, and located on the east side of the Airport. It is constructed of asphalt and is in excellent condition. Runway 16 has a displaced threshold of 336 feet, which reduces the available landing distance to 4,662 feet. Runway 34 has a displaced threshold of 880 feet, which reduces the available landing distance to 4,118 feet.

Runway 07/25 is 4,652 feet long, 100 feet wide, and located on the northwest side of the Airport. It is constructed of asphalt and is grooved. Runway 07/25 has no displaced thresholds, leaving the entire 4,652 feet available for both takeoffs and landings.

2.2.2.3 Taxiways

As shown on **Figure 2-3**, a series of taxiways connects the three runways to the FBO facilities and GA areas, including primary taxiways which are located parallel to the runways. Taxiways facilitate aircraft movement parallel to the active runways when departing aircraft are positioned for takeoff and when arriving aircraft taxi to their ramp areas. Each primary taxiway also has individual connectors that link the main runway with the parallel taxiway. Both Runway 12/30 and 16/34 have full length parallel taxiways while Runway 07/25 has a partial parallel.



Path: G:\17xxxx - 2017 Projects\D171187.00 - Martin County Airport NEM Update\05 Graphics-GIS-Modeling\MXD\February 2020\Fig2-1_Airport Location.mxd sburlingame 3/3/2020

SOURCE: ESA, 2020

Martin County Airport NEM Update

Figure 2-1
Airport Location
Martin County Airport (Witham Field)

ESA

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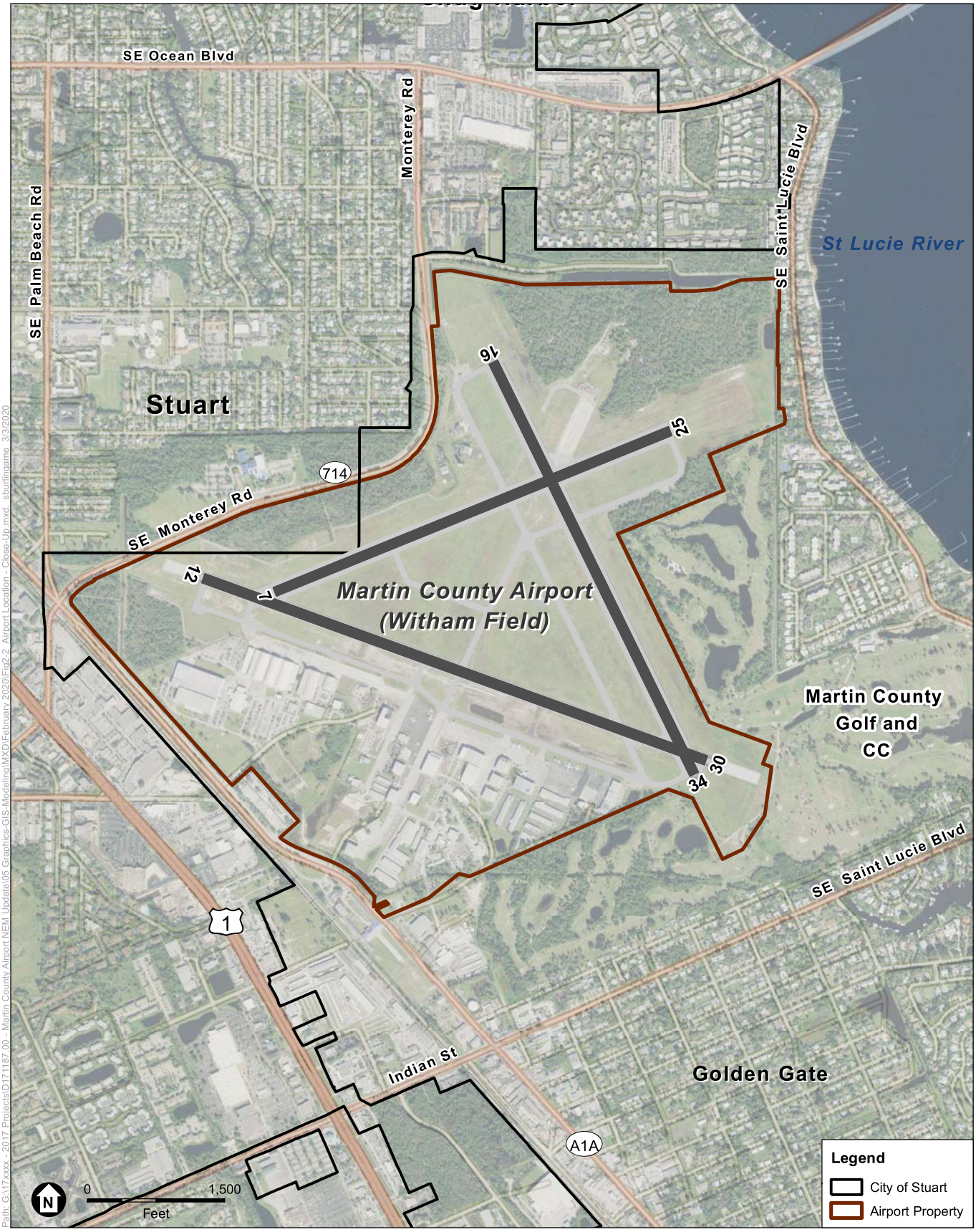

SOURCE: Esri; ESA, 2020

Martin County Airport NEM Update

Figure 2-2
Figure Title
Martin County Airport (Witham Field)

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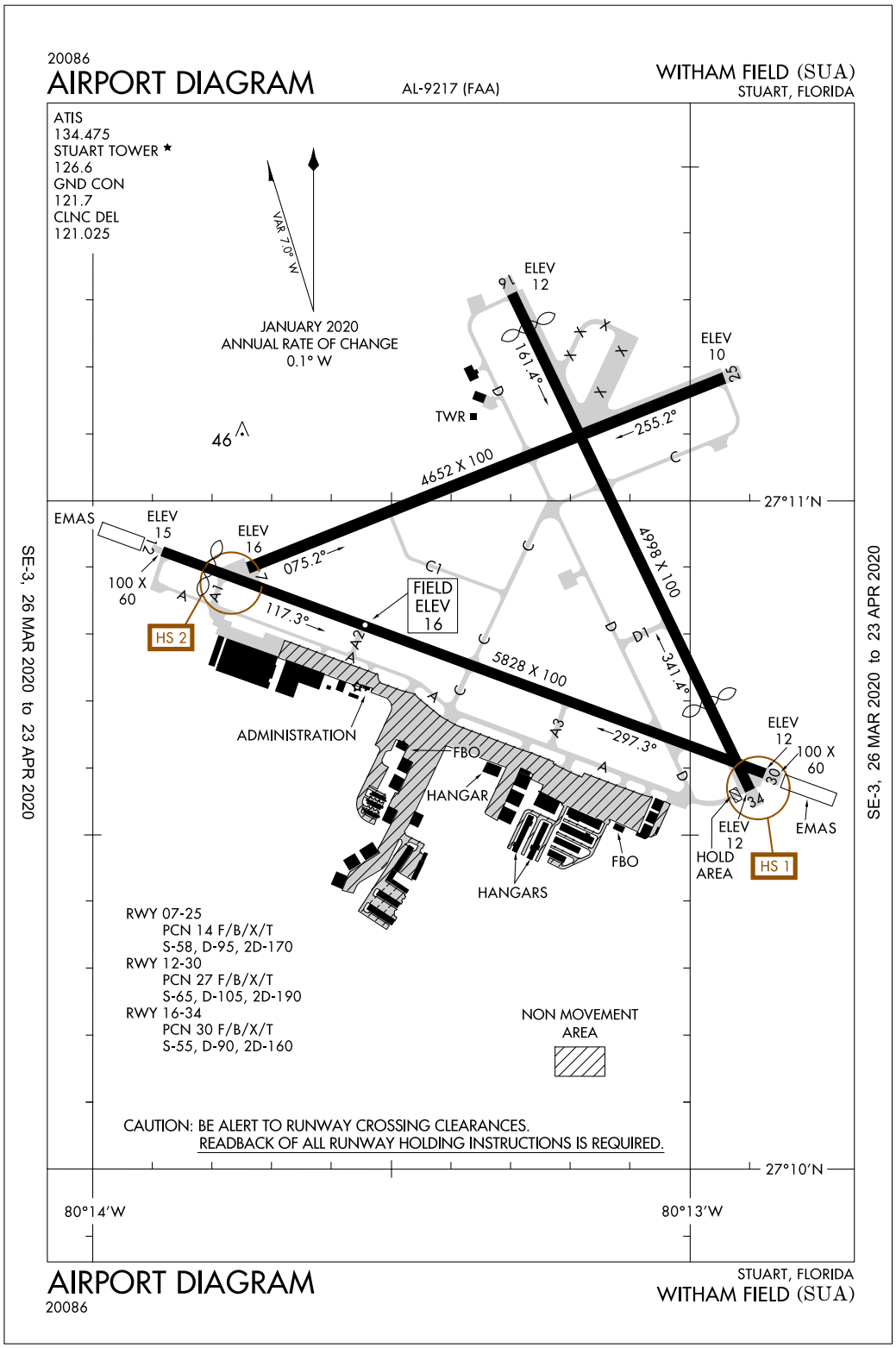

SOURCE: Federal Aviation Administration, 2020; ESA, 2020

Martin County Airport NEM Update

Figure 2-3
Airport Diagram
Martin County Airport (Witham Field)

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TABLE 2-1
MARTIN COUNTY AIRPORT RUNWAY CHARACTERISTICS

Runway Characteristics	Runway 12 – 30		Runway 16 – 34		Runway 07 -- 25	
	12	30	16	34	07	25
Runway Length (feet)	5,828		4,998		4,652	
Runway Width (feet)	100		100		100	
Displaced Arrival Threshold (feet)	460	0	336	880	0	0
Runway Landing Distance Available (feet)	5,368	5,828	4,662	4,118	4,692	4,692
EMAS Length (feet)	502	413				
Approach Surface Slope	34:1	34:1	20:1	20:1	20:1	20:1
Runway End Elevation (feet above MSL)	14.7	11.5	12.0	11.9	15.5	9.9
Runway Markings	Non-precision	Non-precision	Non-precision	Non-precision	Non-precision	Non-precision
Runway Lighting	MIRL	MIRL	NONE	NONE	MIRL	MIRL
Instrument Approach Capability	Non-precision [RNAV]	Non-precision [RNAV]	Visual	Visual	Visual	Visual
Runway Visual Aids	PAPI	PAPI	NONE	NONE	PAPI	PAPI

NOTES:
MSL = Mean Sea Level
MIRL = Medium Intensity Runway Lighting
PAPI = Precision Approach Path Indicator
SOURCES: FAA Airport Master Record, Form 5010; AirNav.com accessed January, 2020.

2.2.2.4 Airport Traffic Control Tower

The Airport is served by an airport traffic control tower (ATCT) located to the northwest of the Airport, which operates daily from 7:00 am until 10:00 pm. The Rules and Regulations of the Airport dictate the rules for pilots to operate outside of the ATCT's hour of operations.[5] Radar approach and departure control is operated by the Miami Terminal Radar Approach Control (TRACON) facility.

2.2.2.5 Aircraft Maintenance

While the Airport is not home to any large scale maintenance, repair and overhaul (MRO) facilities, many of the FBOs and other GA facilities provide maintenance services for both GA jet and propeller aircraft. East Coast Aviation Service, Inc., which is a 14 CFR Part 145-certified repair station, is the main facility to support aircraft maintenance. Additionally, the Dassault Aircraft Service Center was relocated in 2019 from Palm Beach International (PBI) into a new 25,000-

[5] *Martin County Airport/Witham Field Rules and Regulations,* https://www.martin.fl.us/resources/martin-county-airport-rules-regulations-pdf

square-foot facility at the Airport, which provides them with double the hangar capacity as compared to their former PBI facility.

2.2.2.6 Other Aviation-Related Facilities

In addition to the FBOs and maintenance facilities, a number of aviation-related support facilities are located on Airport property, including:

- Martin County Fire Rescue Training Facility;
- US Customs and Border Protection facility;
- Flight Training facilities;
- Civil Air Patrol; and
- Aircraft storage hangars.

2.2.3 Regional Economic Impact/Development

The Airport is a significant driver of the regional economy—its operating activity produce direct economic contributions and an equally significant multiplier effect to the regional economy. The Florida Department of Transportation's (FDOT) 2019 Florida Statewide Economic Impact Study summarizes the direct contribution and regional benefit generated by SUA and notes that the Airport employed 3,222 people and contributed over $786 million in economic impact to the regional economy.[6]

In addition to the strong impact on the local economy, increased demand by users in northern Palm Beach County and Martin County has also resulted in sustained growth at the Airport. Martin County and the FBOs, Atlantic Aviation and Stuart Jet Center, continue to make significant investments in new facilities and services that make the Airport increasingly capable of supporting aircraft operators. Recent improvements include:

- 2015 - Stuart Jet Center constructed a new LEED-certified "green" building;
- 2016 – Stuart Jet Center constructed of a 24,000-square-foot hangar that supports 6 to 8 aircraft;
- 2018 - Treasure Coast Flight Training expanded its fleet from 15 to 30 permanently-based aircraft;
- February 2019 – A new US Customs and Border Protection Facility was opened;
- March 2019 –The Dassault Aircraft Service Center relocated from PBI into a new 25,000-square-foot facility, effectively doubling their previous hangar capacity;
- April 2019 – Stuart Jet Center was ranked among the top 4,500 FBOs in the world by Aviation International News, including #1 for line service, #3 for customer service representatives, and #9 for most-improved FBO;

[6] *Florida Statewide Economic Impact Study, March 2019,* Florida Department of Transportation. https://www.fdot.gov/aviation/economicimpact.shtm. Accessed January 15, 2020

- 2019 - Atlantic Aviation began constructing a 25,000-square-foot hangar that will support 6 to 8 aircraft and renovating its main customer service center; and
- 2019 - Stuart Jet Center is currently constructing a new 20,000-square-foot storage hangar that will support 5 to 6 aircraft.

Other projects underway or planned during the next five years, which will continue to support growth, include the construction of two additional 20,000-square-foot hangars that will each accommodate 5 to 6 aircraft.

2.2.4 Airspace Classification

Airspace is classified by the FAA as either Class A, B, C, D, or E, which are controlled, or Class G, which is uncontrolled. Generally speaking, Class A airspace begins at 18,000 feet MSL, continues upward, and is used to manage aircraft travelling between airports at high-altitudes. Class B airspace surrounds the nation's busiest airports, such as Miami International Airport. Class C airspace surrounds airports with high traffic levels, but not as high as Class B airports. Class D airspace surrounds those airports with an ATCT but whose traffic levels are less than the threshold for Class C airspace. SUA is located in Class D airspace. Class E airspace is any other controlled airspace where pilots are in radio contact with some portion of the FAA air traffic control (ATC) network, which consists of air route traffic control centers, terminal approach control facilities, ATCTs, and flight service stations. Additional information about airspace classifications can be found in **Appendix C** of this report.

2.2.5 Traffic Patterns

The Airport and the FAA designate general rules for flights operating at SUA off of each runway. Aircraft arriving from other locations will be directed by the tower onto specific approach procedures that are discussed in subsequent sections. For local operations or at times when the tower is not open, the Airport follows the general rule of having a left turn traffic pattern for each runway. In practice, the standard pattern of flight for each runway will involve taking off, making a 90 degree turn to the left, flying away from the airport, making another 90 degree turn to the left, flying parallel to the runway, making a third 90 degree turn, flying back towards the airport and then making another 90 degree turn to the left to approach the other end of the runway. Runway 12/30 is the most commonly used runway at SUA including 82% of arrivals and 78% of departures. The activity on this runway is primarily in an east flow with aircraft arriving from the west and departing to the east 64% of the time with the left turn traffic pattern to the north of Runway 12/30.

2.3 Navigational Aids

Navigational aids ("NAVAIDS"), airport lighting, and airport markings help pilots to safely navigate around the Airport and through local airspace. The NAVAIDS available to pilots operating at SUA are summarized in **Table 2-2**.

TABLE 2-2
MARTIN COUNTY AIRPORT NAVIGATIONAL AIDS

Navigational Aids	Description
Area Navigation (RNAV)	RNAV is a method of Instrument Flight Rules (IFR) navigation that permits aircraft operation on any desired flight path using the combination of both GPS and ground-based navigational aids. RNAV routes and terminal procedures, including departure procedures and standard terminal arrivals, are designed with RNAV systems in mind to save time and fuel, reduce aircraft dependence on ATC vectoring, and provide for more efficient use of the airspace.
Global Positioning System (GPS)	The GPS, operated by the US Space Force, uses a network of satellites that create reference points to enable aircraft equipped with GPS receivers to determine their latitude, longitude, and altitude. GPS systems can be used during all phases of flight.
Very High Frequency Omni-Directional Range (VOR) and **Distance Measuring Equipment (DME)**	A VOR is a ground-based electronic system that provides azimuth information for high and low altitude routes and airport approaches. DME determines a slant range distance from an aircraft to the DME. VORs can be stand-alone or equipped with DME. These navigational aids provide navigational fixes on an aeronautical chart.

SOURCE: FAA, 2017. Adapted by Environmental Science Associates

2.4 Instrument Approach Procedures

Instrument approach procedures (IAPs) are flight procedures developed and published by the FAA that pilots use to navigate their aircraft to the runway for landing. The most currently-published IAPs for the Airport are RNAV (GPS) instrument approach procedures. These procedures are listed below and the instrument approach procedure charts can be found on Appendix C.

- RNAV (GPS) RWY 12
- RNAV (GPS) RWY 30

The RNAV (GPS) RWY 12 procedure was last updated on February 28, 2019 while the RNAV (GPS) RWY 30 was last updated on June 26, 2014.

2.5 Standard Terminal Arrivals and Departure Procedures

The airspace surrounding SUA is structured so that arriving aircraft can be safely and efficiently transitioned from the en route environment (high altitudes between airports) to the approach control environment (lower altitudes near airports) and eventually to the runway (ground level). Likewise, the airspace is structured so that departing aircraft can transition from the runway to the terminal environment and ultimately to the en route environment. Standard Terminal Arrival Routes (STARs) and Departure Procedures (DPs) simplify and expedite IFR arrival and departure procedures. As discussed previously, aircraft flying in and out of SUA follow these routes, depending on the operational flow of the Airport.

2.5.1 Standard Terminal Arrival Routes

The Miami TRACON and SUA ATC use one STAR procedure to route distant aircraft into the vicinity of the Airport--WLACE FOUR, which is an RNAV procedure. The WLACE FOUR was

last updated on September 13, 2018. **Appendix C** includes the charts and descriptions of this published procedure.

2.5.2 Departure Procedures

Aircraft departing from the Airport are often assigned a specific Departure Procedure (DP). A DP is a published procedure that provides a standard route from the runway to the appropriate en route airspace structure. In some cases, a DP may have an associated en route transition, which is a published procedure segment that connects the end of the DP to an en route flight path. DPs are designed to maintain safe distances between adjacent departures, separate departing aircraft from arriving aircraft, provide for efficient interception of an outbound course, simplify the issuance of departure clearances, and reduce radio communication.

Published DPs (flight procedures approved by the FAA) for the Airport include BRNGER TWO and SNDLR TWO, both are which are RNAV Standard Instrument Departures (SIDs). The BRNGER TWO and SNDLR TWO were last updated on July 21, 2016. **Appendix C** includes the charts and descriptions of both published procedures.

2.6 Noise Monitoring, Noise Abatement, and Community Outreach Programs

SUA has been historically proactive in addressing aircraft noise concerns. It has implemented a number of programs to monitor aircraft noise levels and assist local communities in understanding the effects of aircraft noise, including the implementation of a sound insulation program that allows for homes near SUA to have sound insulation installed if certain background noise levels are reached.

2.6.1 Sound Insulation Program

As part of the Noise Compatibility Program Update, Martin County published the *Martin County Airport / Witham Field Noise Compatibility Program Update (2013)* on August 16, 2013 and the Record of Approval was issued by the FAA on June 16, 2014. In this document, the 2010 and 2015 contours developed during the 2010 NEM update were certified to represent 2012 and 2017 conditions. This document detailed a number of measures that were recommended in order to mitigate aircraft noise at the Airport including providing residential sound insulation treatment to qualifying homes and property acquisition within the DNL 65-70 and 60-65 dB noise contour intervals documented in the 2015 (2017) NEM. The 2013 NCP Update describes the hybrid program (sound insulation and property acquisition), which started as an outcome of the 2004 Part 150 Study and continues through to the current day. Phases One and Two of the hybrid program have been completed, with the eligible homes either being acquired by Martin County or receiving noise insulation, if the residents elected to remain. Phase Three will be dependent upon this NEM Update.

2.6.2 Aircraft Monitoring System (VANTAGE and VNOMS)

The Airport uses technology from Vector Airport Systems, called VANTAGE, to track and map the operations occurring at the Airport. VANTAGE gathers data from three different sources: flight tracking radar, ground-based camera detection/identification, and flight plan tracking. Data from these sources can be combined with photos from the on-Airport camera network to develop a better understanding of Airport operations. VANTAGE compiles a wide variety of aircraft-related data, including date/time of operation, operation type, tail number, runway used, and aircraft operator information. Vector's Noise and Operations Management System, VNOMS, combines VANTAGE data with radar data associated with each aircraft operation to form a complete picture of all aircraft operations at the Airport

2.6.3 Airport Noise Abatement Committee

SUA established the ANAC in 2003 to provide a platform to share Airport noise-related information with interested parties in the surrounding community. The ANAC has been continuously active since December 2003 and meets quarterly at the Airport Maintenance Building. SUA acts upon recommendations made by the ANAC, which oversaw the first comprehensive Part 150 Study. These recommendations included implementation of noise abatement and land use compatibility planning and mitigation measures, which were eventually adopted in the 2004 Part 150 Noise Study. The ANAC originally had 11 members when it was formed in 2003, but SUA added two new members to it on May 6, 2008—one representing residents in noise-impacted areas near the Airport and one representing the Witham Aero Club; thus, bringing current membership up to 13.

2.6.4 Aircraft Noise Complaints

As part of its noise program, SUA collects and manages noise complaint information related to airport activity. A noise comment hotline was created in response to the increased complaints resulting from more activity at the Airport. Each noise complaint received is compiled in a database, verified for accuracy, and analyzed for reporting purposes. The annual noise complaints peaked at Martin County Airport in 2015 with 223 complaints and in recent years have gotten as low as 91 annual complaints. The plurality of complaints occur from January through March of each year. **Figure 2-4** shows the concentrations of noise complaints around the Airport over twelve months from 2017-2018.

2.6.5 Community Outreach

SUA staff and representatives continue to participate in local community and town meetings to discuss and answer citizen questions related to aircraft noise. The ANAC serves as one method of outreach to communities and other stakeholders. The airport continues to release and publish monthly Voluntary Curfew Reports, which identify aircraft that fly during the voluntary nighttime curfew. The voluntary nighttime curfew of Stage 2 aircraft between 10 p.m. and 7 a.m. was approved as a measure at the Airport in 2004 following the 2002 Noise Exposure Map Study. The voluntary nighttime curfew was later modified and expanded to all aircraft and strongly discourages aircraft operations during the hours of 11 p.m. to 7 a.m. daily. Using data from the VNOMS system,

flights during the voluntary nighttime curfew are tracked and a notification of each flight occurring during the voluntary nighttime curfew period is mailed to the airplane owner as well as summarized in the monthly voluntary curfew reports. The Airport also maintains a website that provides information regarding the noise abatement procedures and the status of the ongoing Part 150 Process. A public outreach program is also part of the Part 150 Study process at the Airport (see **Chapter 6** for additional information).

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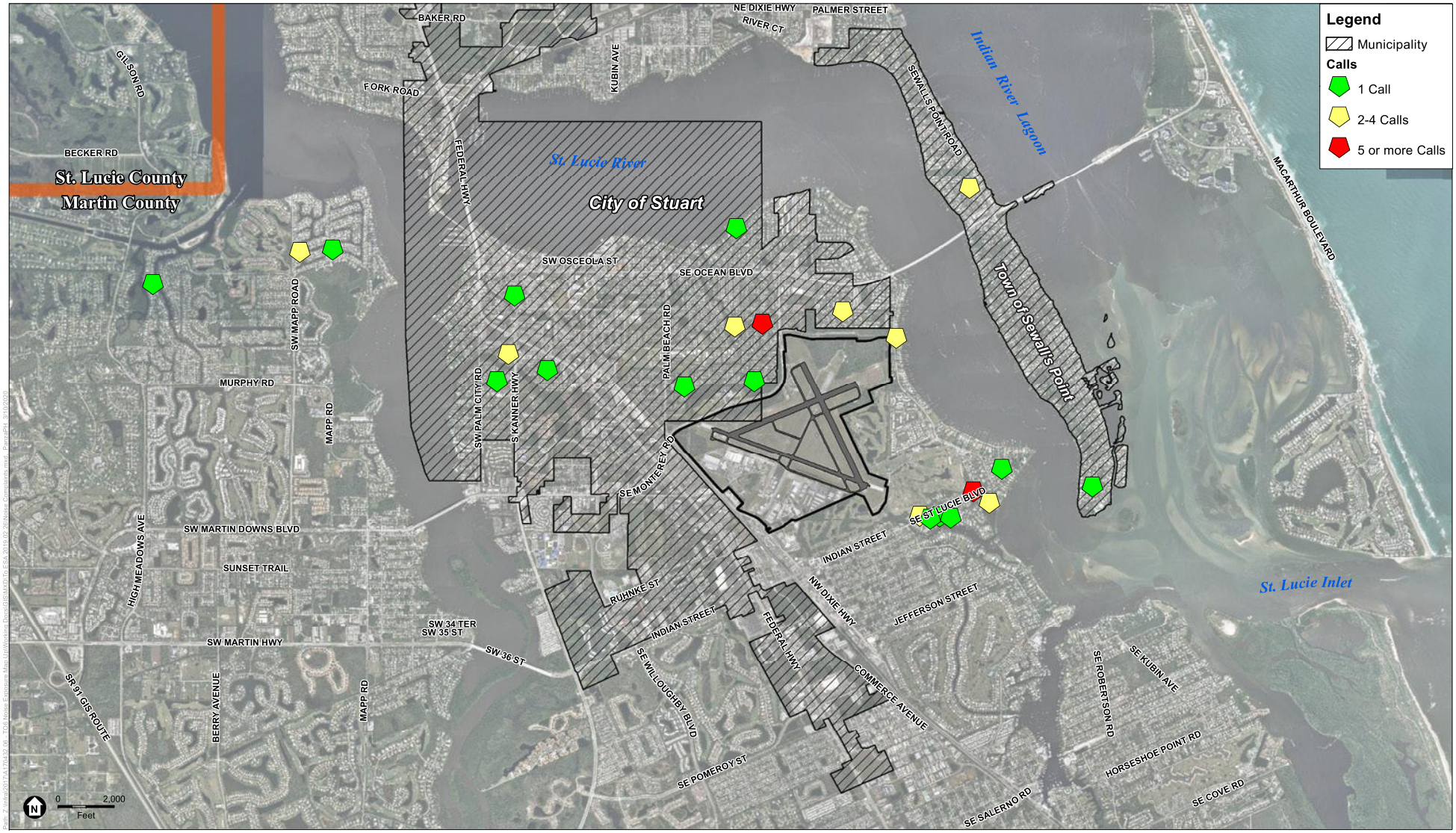

SOURCE: Martin County, Rolling 12 Months 2nd Quarter 2018

Martin County Airport/Witham Field Part 150 Study

Figure 2-4
Noise Complaints

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2.6.6 Noise Abatement Measures

In addition to the voluntary nighttime curfew discussed in the previous section, the Airport requests that turbojet aircraft operate in accordance with Noise Abatement Program measures developed by the National Business Aviation Association (NBAA) that provide "safe, standardized and uncomplicated operating procedures that are effective in reducing noise exposure."[7] As part of a recommendation stemming from the 2002 Noise Exposure Map and 2004 Noise Compatibility Program, the airport has encourages the use of the NBAA close-in noise abatement departure profile when departing from the Airport. The 2012 Noise Compatibility Program Update found that the use of the NBAA close-in departure profile reduces single event takeoff noise levels between 5 and 7 decibels for residents close to the airport.[8]

[7] *NBAA Noise Abatement Program,* NBAA, https://nbaa.org/wp-content/uploads/aircraft-operations/environment/noise-abatement-program/nbaa-noise-abatement-program.pdf

[8] Martin County Airport Witham Field Noise Compatibility Program Update, 2012, p. 27. https://www.martin.fl.us/resources/noise-compatability-program-update-pdf

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CHAPTER 3
Land Use

3.1 Introduction

Title 14 CFR Part 150 requires the review of land uses located in the airport environs to understand the relationship between those land uses and the noise exposure associated with arriving and departing flights at an airport. This includes delineation of land uses within the DNL 60 dB (the locally adopted threshold of significance for some areas) and higher contours on the NEMs and identification of noise-sensitive uses that may be incompatible with that level of noise exposure. Identification of a noise-sensitive use within the DNL 60 dB contour does not necessarily mean that the use is either considered incompatible or that it is eligible for mitigation. Rather, identification merely indicates that the use is generally considered incompatible, and requires further investigation. Factors that influence compatibility and/or eligibility may include, but are not limited to, previous sound reduction treatments, current interior noise levels, structure condition, ambient and self-generated noise levels, whether a given use is considered temporary or permanent, and the timeframe within which a given structure was constructed.[15,16]

3.2 Land Use Data Collection

Various types of land use information were collected to provide the basis for the evaluation of land use compatibility and noise exposure in this study. The study area contains land within the incorporated City of Stuart and unincorporated Martin and St. Lucie Counties. Existing land use data was compiled at the parcel level using existing land use codes sourced from the Martin and St. Lucie County property appraisers. Future land uses were reviewed relative to the Martin and St. Lucie County comprehensive land use plans.

3.2.1 Land Use Data Collection Area

The SUA Part 150 Study required the development of a database of existing land uses located in the Airport environs affected by noise and flight activity. This process defined a broad data collection area that conforms to 14 CFR Part 150 criteria. The Land Use Data Collection Area for this study considered a number of factors, including:

[15] On March 27, 1998, FAA issued a policy on 14 CFR Part 150 airport noise compatibility programs that limits approval of remedial mitigation measures, e.g., soundproofing, property acquisitions, and relocation, etc., to land uses that were in place as of October 1, 1998 unless an airport can demonstrate that DNL contours were not published prior to that date. New non-compatible uses resulting from airport expansion may be eligible for consideration.

[16] Determination of eligibility would be made when the SUA Noise Compatibility Program has been approved, program protocols have been established, and the implementation phase has been initiated.

- Land use within a radial distance of 30,000 feet from each runway end at the Airport for capture of flight tracks in accordance with 14 CFR Part 150 requirements; and
- Flight track data associated with arrivals and departure operations at the Airport from July 2017 to June 2018.

3.3 Land Use Compatibility

3.3.1 Aircraft Noise and Land Use Compatibility

Guidelines regarding the compatibility of land uses within various DNL contour intervals are specified in *Appendix A of 14 CFR Part 150*. These guidelines are consistent with land use guidelines developed by other federal agencies, such as the U.S. Environmental Protection Agency and the U.S. Department of Housing and Urban Development. The noise metric used for land use compatibility is the DNL, which represents average noise levels over a 24-hour period. DNL values are expressed in dBA, which is a sound pressure level metric that emphasizes sound at the frequency range where the human ear is most sensitive. In the calculation of DNL, sound events occurring during the nighttime (10:00 P.M. to 7:00 A.M.) are increased by a 10 decibel-weighting to represent the increased sensitivity of people to noise that occurs at night. Aircraft DNL values represent the cumulative effects of all aircraft operations occurring during an average 24-hour period referred to as an "annual average day," which is derived from aircraft operations data for an entire calendar year. Further details on aircraft noise are presented in **Appendix D** of this report.

The FAA has determined that the major land uses listed in 14 CFR Part 150, Appendix A, Table 1 (presented here as **Table 3-1**) are normally compatible with aircraft noise below the DNL 65 dB contour. Therefore, when evaluating land use compatibility, attention is focused on uses within the DNL 65 dB contour. The City of Stuart uses the DNL 65 dB contour while, Martin County has adopted the DNL 60 dB as the threshold for compatibility. Martin County adopted DNL 60 dB as the threshold for noise compatibility planning in July, 2002. Per the ordinance, when the area designated as "Zone B" is determined from the DNL 60 dB contour, uses shall be limited solely to single-family detached dwellings, accessory structures associated with single-family residential dwellings and modular homes that meet the sound insulation requirements.[17]

As shown in Table 3-1, noise-sensitive land uses such as single and multi-family residential, mobile home parks, transient lodging (e.g., hotels), daycares, public and private schools, and outdoor music venues are considered incompatible with noise levels of DNL 65 dB or higher. Other noise sensitive land uses such as hospitals, nursing homes, churches, auditoriums, and concert halls are considered compatible with noise levels of DNL 65 to 75 dB, provided that appropriate noise attenuation is designed into the building's structure. Commercial, manufacturing, and recreational land (parks, amusement parks, zoos, etc.) are generally less sensitive to noise and are considered compatible with noise levels up to DNL 70 dB without noise attenuation and up to DNL 80 dB with appropriate levels of noise attenuation. For this SUA Part 150 Study, the identification of compatible and incompatible land uses within the DNL 60 dB and higher contours was documented using the guidance provided in Table 3-1, as well as local land use regulations, to the extent that it was readily

[17] Martin County Code of Ordinances, Section 3.33- Noise Compatibility Overlay, Ord. No. 919, pt. 1, 9-11-2012

applied to the area land use categories. Within the boundaries of the City of Stuart, the compatibility guidelines presented in Table 3-1 were followed as written. Within the areas of Martin County outside of the City of Stuart, the residential land uses that are normally considered incompatible at DNL 65 dB or higher were instead considered incompatible at DNL 60 dB or higher in line with Martin County's local land use regulations.

TABLE 3-1
14 CFR PART 150 LAND USE COMPATIBILITY GUIDELINES
IN AIRCRAFT NOISE EXPOSURE AREAS

Land Use	Yearly Day-Night Noise Level (DNL) in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, Other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient Lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail - building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade – general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing & Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y

Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

TABLE 3-1
14 CFR PART 150 LAND USE COMPATIBILITY GUIDELINES
IN AIRCRAFT NOISE EXPOSURE AREAS

Numbers in parenthesis refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Notes:

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a 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 and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB 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 normal noise level is low.

(3) Measures to achieve NLR of 30 dB 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 normal noise level is low.

(4) Measures to achieve NLR of 35 dB 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 normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25 dB.

(7) Residential buildings require an NLR of 30 dB.

(8) Residential buildings not permitted.

Key to Table

SLUCM Standard Land Use Coding Manual
Y(Yes) Land use and related structures compatible without restrictions.
N (No) Land use and related structures are not compatible and should be prohibited.
NLR Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35 Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

3.3.2 Local Ambient Noise Environment

One important consideration in evaluating land use compatibility, relative to aircraft noise, is the overall noise environment in proximity to the airport. 14 CFR Part 150, Appendix A, Section 101 indicates that "if the self-generated noise from a given use and/or the ambient noise from other non-aircraft and non-airport uses is equal to or greater than the noise from aircraft and airport sources," the land use is considered compatible. There are no permanent noise monitors at the airport to easily collect data from ambient noise sources. However, given the generally suburban character of the area and the limited noise sources such as commercial or industrial development or major highways, no areas were considered compatible because of ambient noise levels equal to or greater than the noise from aircraft/airport sources.

3.3.3 Land Uses Within the Land Use Data Collection Area

Land within the Land Use Data Collection Area is heavily developed and includes multiple residential communities. The predominant land use in the vicinity of the Airport is primarily Single Family & Duplex; Public Facilities and Institutions. Retail and Office, as well as areas of Industrial & Manufacturing, land use are found along both NW Dixie Highway and Federal Highway running northwest/southeast on the west side of the Airport. Land uses within the Land Use Data Collection Area are summarized in **Table 3-2** and depicted on **Figure 3-1**. Land use categories were consolidated into categories of similar land use typologies (e.g. density and intensity) using generally accepted industry best practices. Data used to identify land uses in the Land Use Data Collection Area was compiled at the parcel level using existing land use codes sourced from the Martin and St. Lucie County property appraisers. A more detailed discussion of land uses is provided in **Appendix E**.

3.3.4 Noise-Sensitive Sites

In addition to identifying and mapping land uses, 14 CFR Part 150 also requires the identification of noise-sensitive public buildings and properties eligible for inclusion in the National Register of Historic Places. The SUA Part 150 Study identified the following noise-sensitive uses within the Land Use Data Collection Area:

- Places of worship;
- Libraries;
- Hospitals;
- Schools;
- Museums and Cultural Sites;
- Senior Care Facilities;
- Daycares; and
- Historic Resources/Structures. (note: none located within data collection area)

Multiple data sources including databases from the Florida Department of Children and Families, the Martin County School Board, and the St. Lucie County School Board were reviewed and compiled to identify all of the noise-sensitive sites. The FDOT District 2 Historical Structures database was used to identify historic resources/structures within the Land Use Data Collection Area (note: none located within data collection area); this database was compiled by the North Central Florida Regional Planning Council (NCFRPC) and the Northeast Florida Regional Planning Council (NEFRPC).

The locations of noise-sensitive uses in the Land Use Data Collection Area are depicted in **Figure 3-2**. As indicated previously, inclusion of these properties within the DNL 60 dB contour does not necessarily mean that a use is either considered incompatible or that it is eligible for mitigation. Inclusion merely indicates that the use is generally considered incompatible, but requires further investigation.

TABLE 3-2
CONSOLIDATED LAND USE CATEGORIES WITHIN THE LAND USE DATA COLLECTION AREA

Consolidated Land Use Categories	Typical Uses	Compatibility with the DNL 60 dB Contour
Single Family and Duplex	Single family homes, two-family homes, and duplex buildings.	Generally considered incompatible.
Multi-Family Residential	Apartment buildings, cooperative apartment buildings, condominiums, public housing complexes, and assisted living facilities.	Generally considered incompatible.
Mobile Home	Transportable prefabricated structures used for residential living	Generally considered incompatible
Retail and Office	Retail, including shopping malls, shopping centers, stores, shops, entertainment, restaurants, bars, galleries, and service establishments. Business, professional, and healthcare services.	Generally considered compatible.
Industrial and Manufacturing	Piers, docks and marinas, bulk fuel storage, heavy manufacturing and assembly plants, light manufacturing and processing facilities, warehouse and storage, truck terminals, junkyards, sand and gravel pits, and wholesale nurseries and greenhouses.	Generally considered compatible.
Transportation and Parking	Roadways and highways (including rights-of-way), parking lots, and garages.	Generally considered compatible.
Utilities	Electric power generation and transmission lines, water supply and treatment facilities.	Generally considered compatible.
Public Facilities and Institutions	Schools and universities, libraries, museums, cultural facilities, places of worship, government buildings, auditoriums, hospitals and hospice facilities, nursing homes, police and fire protection, post offices, correctional institutions, and animal shelters.	Generally considered compatible with the exception of specific noise-sensitive uses (schools, hospitals, churches, nursing homes).
Conversation, Recreation, and Agriculture	Parks, recreation areas (parks, amusement parks, zoos, etc.), playgrounds, athletic fields, conservation land, preserves, farms, and public land.	Generally considered compatible with the exception of outdoor music venues, and any farms (agriculture) with homes.
Vacant	No present use	Potentially incompatible if it were to be developed with an incompatible use.

SOURCES: Martin County Property Appraiser, 2018, St. Lucie County Property Appraiser, GAI Consultants, ESA.
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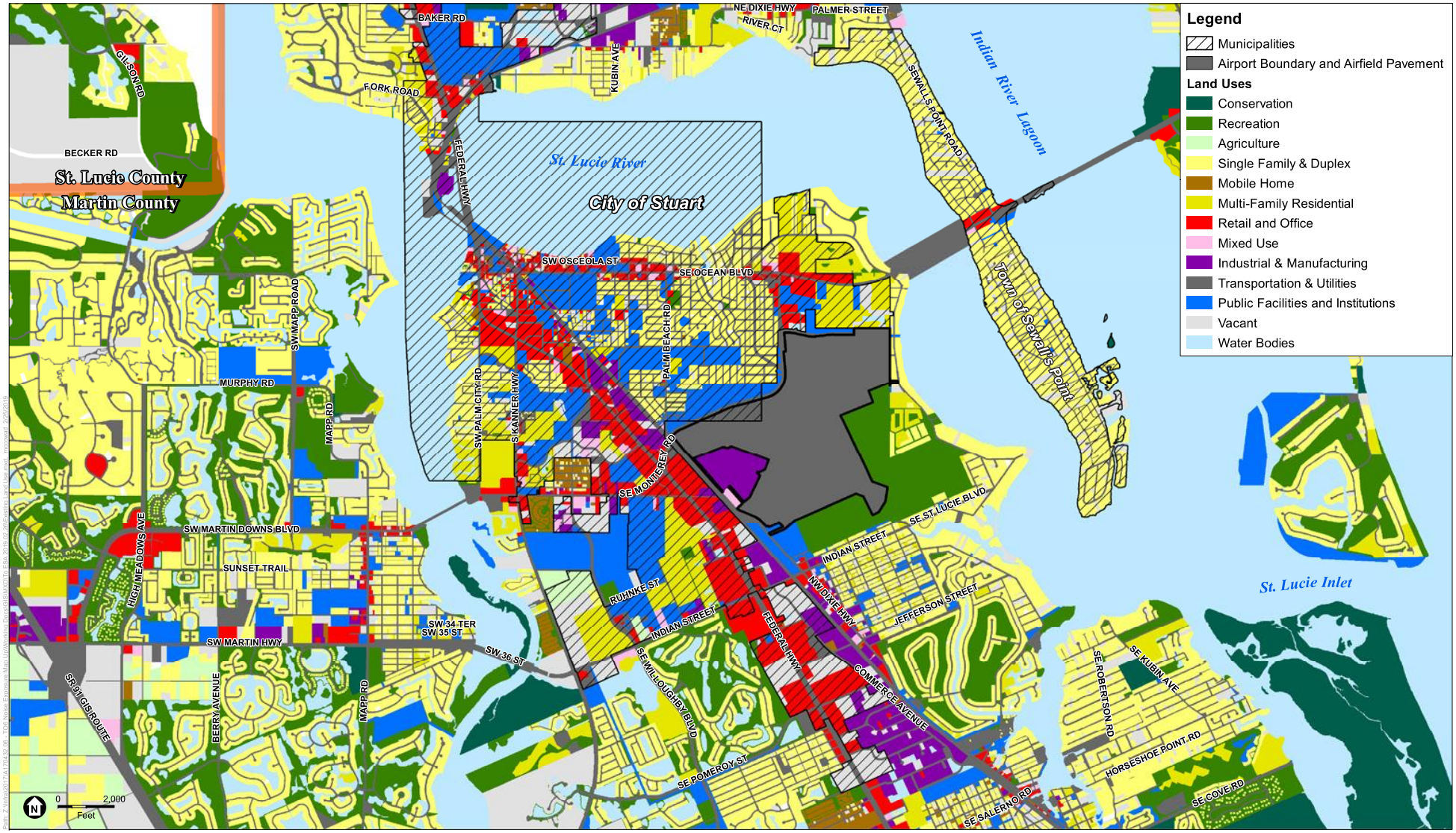

SOURCE: Martin County Property Appriaser 8/2018; St. Lucie County Property Appraiser 9/2018; GAI; ESA

Martin County Airport/Witham Field Part 150 Study

Figure 3-1
Existing Land Uses

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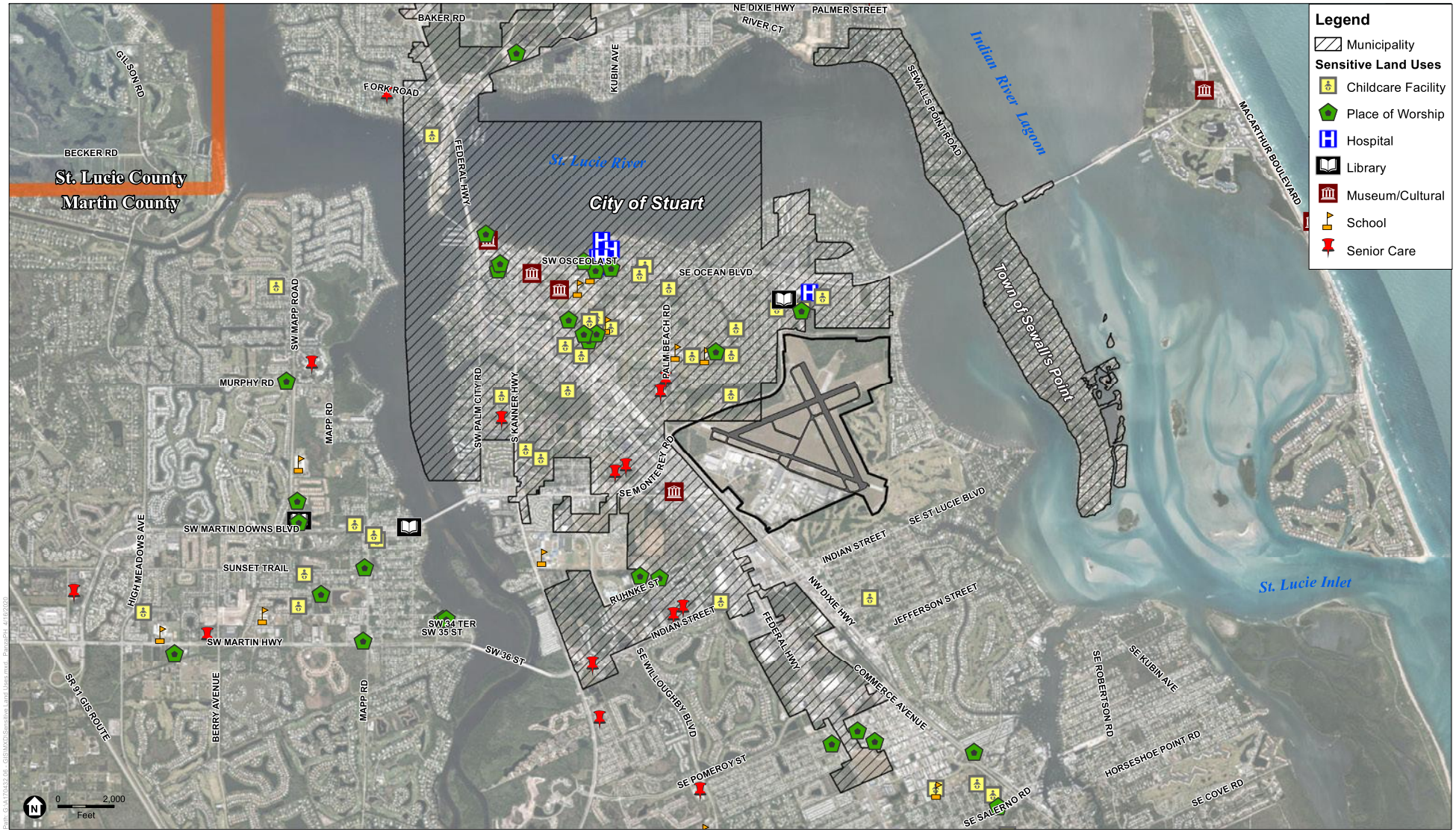

SOURCE: Martin County; St. Lucie County; Florida Department of Children and Families; Martin County School Board; St. Lucie County School Board; GAI

Martin County Airport/Witham Field Part 150 Study

Figure 3-2
Noise Sensitive Land Uses

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CHAPTER 4
NEM Development

4.1 Introduction

This chapter summarizes the methods and data used to conduct the aircraft noise analysis and produce the noise exposure contours that are depicted on the NEMs. It also provides information on the noise model used to calculate noise exposure, the noise metric used in this study, and discusses the information used as inputs into the noise model.

4.2 FAA Noise Model and Metrics

4.2.1 Aviation Environmental Design Tool

The FAA's AEDT is the required model to calculate noise exposure for 14 CFR Part 150 studies as of May 29, 2015. The NEMs were begun using AEDT 2d and were updated to AEDT 3b when the updated model was released on September 24, 2019.[18] This model was used to calculate noise exposure for the 2020 (Existing Conditions) and 2025 (Future Conditions) scenarios in this study.

The AEDT uses airport-specific information (e.g., runway data); flight track information; aircraft operation levels distributed by time of day, aircraft fleet mix, and aircraft profiles to develop noise exposure contours. During an annual average 24-hour period, referred to as "annual average day" (AAD), the AEDT accounts for each aircraft flight along flight tracks departing from, or arriving to, an airport. The flight tracks are coupled with information in the model's database relating to noise levels at varying distances and flight performance data for each type of aircraft. In general, the model computes and sums noise levels at grid locations at ground level around the airport. The cumulative values of noise exposure at each grid location are used to develop contours of equal noise exposure. The AEDT can also compute noise levels at user-defined points.

4.2.2 Day-Night Average Sound Level

Day-Night Average Sound Level, expressed in dBA, accounts for the noise levels of all individual aircraft events, the number of times those events occur, and the period of day/night in which they occur. The calculation of DNL involves logarithmically averaging aircraft sound levels at grid locations over a 24-hour period, with a 10-decibel adjustment added to those noise events occurring between 10:00 P.M. and 7:00 A.M. Because of the increased sensitivity to noise during normal sleeping hours and because ambient (without aircraft) sound levels during nighttime are typically

[18] Since the update to 3b, there have been updates to AEDT with AEDT 3c and 3d. However, consistent with policy from the FAA's Office of Environment and Energy, the most current version at the time of the modeling effort (AEDT 3b) was used for this effort.

lower than during daytime hours, the 10-decibel adjustment, or "weighting," represents the added intrusiveness of sounds occurring during nighttime hours.

The DNL metric is the noise descriptor required by the FAA for aircraft noise exposure analyses under 14 CFR Part 150.[19] A more detailed discussion of the AEDT and noise metrics is provided in **Appendix D**.

4.3 Data for Developing Noise Exposure Maps

The following sections summarize the information used to develop the NEMs.

4.3.1 Aircraft Activity Levels

In accordance with 14 CFR Part 150, the Airport's NEMs were prepared for two scenarios: 2020 (Existing Conditions) and 2025 (Future Conditions). To obtain aircraft activity levels for the development of the NEMs, aviation activity forecasts for aircraft operations were developed in 2019 by ESA, submitted to the FAA for approval, and approved on August 26, 2019. (see **Appendix B**).

The FAA's TAF and the FDOT's aviation planning forecast were consulted, but both projected a relatively low annual growth rate compared to what the BOCC expected, based on operational trends and planned Airport development. In consultation with the FAA, ESA developed a forecast scenario (the SUA Forecast) based on the current and future development plans at the Airport, which was then accepted by the FAA for use as part of the Part 150 Study. The SUA Forecast used in developing the NEMs projects 117,527 annual aircraft operations at the Airport in 2020 and 134,591 annual aircraft operations in 2025. By comparison, the FAA's 2019 TAF only projected 105,944 operations in 2020 and 107,823 operations in 2025.[20] The SUA Forecast was reviewed in light of the COVID-19 pandemic. While the pandemic did have an effect on airport activity in the spring of 2020, activity almost completely rebounded by year end. It was determined that the forecast activity level used in developing the 2020 NEM was within .8 percent of the actual FY 2020 activity level and 2.8 percent of the project 2020 CY activity level. See SUA Activity Review Technical Memorandum included in **Appendix B**. Activity growth moving forward is expected to continue to be driven by both recent and ongoing investments in new facilities and services as well as near term public use of private air transport as an alternative to travel on commercial airlines. As a result, it was concluded that the SUA Forecast remains reasonable for use in developing the NEMs.

4.3.2 Aircraft Fleet Mix

The SUA Forecast and information from the Airport's VNOMS was used to determine (1) the types of aircraft (fleet mix) projected to operate at the Airport in 2020 and 2025 and (2) the number of operations generated by each aircraft type in those years, based on a full year of data from July 2017 to June 2018. In addition, the FAA's Civilian Aircraft Registry and VNOMS data were utilized to identify different aircraft type and engine combinations. This information was then used

[19] U.S. Department of Transportation. Federal Aviation Administration. Order 1050.1F, *Environmental Impacts: Policies and Procedures*. July 16, 2015.

[20] U.S. Department of Transportation. Federal Aviation Administration. *Terminal Area Forecast*. July, 2019.

to identify the corresponding aircraft within the AEDT. The projected fleet totals, by aircraft category, are shown in **Table 4-1** and a detailed listing of AEDT-specific aircraft operations, by aircraft type, are included in **Appendix D**.

Table 4-1
Annual Aircraft Operations by Aircraft Category

Aircraft Category	2020 Operations	2025 Operations
Helicopter	389	446
Jet	24,142	27,648
Piston	88,604	101,469
Turboprop	4,391	5,029
Grand Total	**117,527**	**134,591**

NOTE: An aircraft operation is equivalent to one arrival/landing or one departure/takeoff.
NOTE: Operations may not sum exactly due to rounding

SOURCE: Environmental Science Associates, 2020.

4.3.3 Touch-And-Go Operations

A touch-and-go circuit is an aviation maneuver that involves landing on a runway and taking off without coming to a full stop. Touch-and-go traffic for each aircraft was tabulated from the VNOMS data used to generate the aircraft fleet mix and assessed relative to the operation count for each aircraft for both daytime and nighttime operations. The touch-and-go traffic across all aircraft was calculated to be 5.23% of total operations, with approximately 98% of touch-and-go traffic occurring in the daytime. For the purposes of this analysis, the relative ratio of touch and goes and nighttime activity to total activity is expected to remain the same in 2025. Touch-and-go traffic was modeled for both the 2020 (Existing Conditions) and 2025 (Future Conditions) scenarios and was allocated to each runway in proportion to the operational runway usage of each aircraft.

4.3.4 Aircraft Operations by Time of Day

As discussed previously, aircraft operations are modeled in the AEDT as either occurring during daytime or nighttime. **Table 4-2** summarizes time of day splits in which aircraft arrivals, departures, and touch-and-go operations are expected to occur in 2020 and 2025 (by percent of total operations). The 2018/2019 VNOMS data served as the primary source for the operational splits and time of day information because it captures actual arrival and departure times. While it is expected that the time of day splits for 2025 should be similar to 2020, the expected fleet mix changes result in some small differences, as shown in **Table 4-2**. A detailed breakout of operation times of day, by aircraft type, is provided in **Appendix D**.

Table 4-2 Annual Aircraft Operations (All Aircraft) by Time of Day						
Study Year	Arrivals		Departures		Touch & Go	
	Day	Night	Day	Night	Day	Night
2020	96.96%	3.04%	97.83%	2.17%	98.03%	1.97%
2025	96.96%	3.04%	97.83%	2.17%	98.03%	1.97%

4.3.5 Departure Stage Length

Noise exposure from aircraft departures varies, depending on takeoff weight. For example, a fully-loaded aircraft scheduled for a long-haul flight typically weighs more on departure than the same fully-loaded aircraft departing on a short-haul flight. This is due to the weight of the additional fuel needed to travel a longer distance, as depicted on **Figure 4-1**. A heavier aircraft typically requires higher power (thrust settings) to reach its takeoff speed and uses more runway length. Heavier aircraft also usually climb at a rate slower than lighter aircraft. Therefore, more land area can be exposed to higher levels of aircraft noise associated with departures of heavier aircraft. To account for this variance in aircraft weight, the AEDT contains up to nine departure climb profiles (corresponding to different departure weights), depending on the type of aircraft. These profiles represent aircraft origin-to-destination trip lengths, ranging from 500 nautical miles to over 6,500 nautical miles. The trip distances for each AEDT stage length are shown in **Table 4-3**. It should be noted that for most general aviation aircraft, the model defaults to maximum takeoff weight and Stage 1 regardless of how far an aircraft flies.

Calendar year 2107/2018 VNOMS operations data were analyzed to determine existing departure stage lengths, by aircraft type, and used to project stage lengths in 2020 and 2025, as shown in **Table 4-4**, respectively. A breakout of stage length, by aircraft type, is provided in **Appendix D**.

FIGURE 4-1
STAGE LENGTH COMPARISON FOR BOEING 777-300

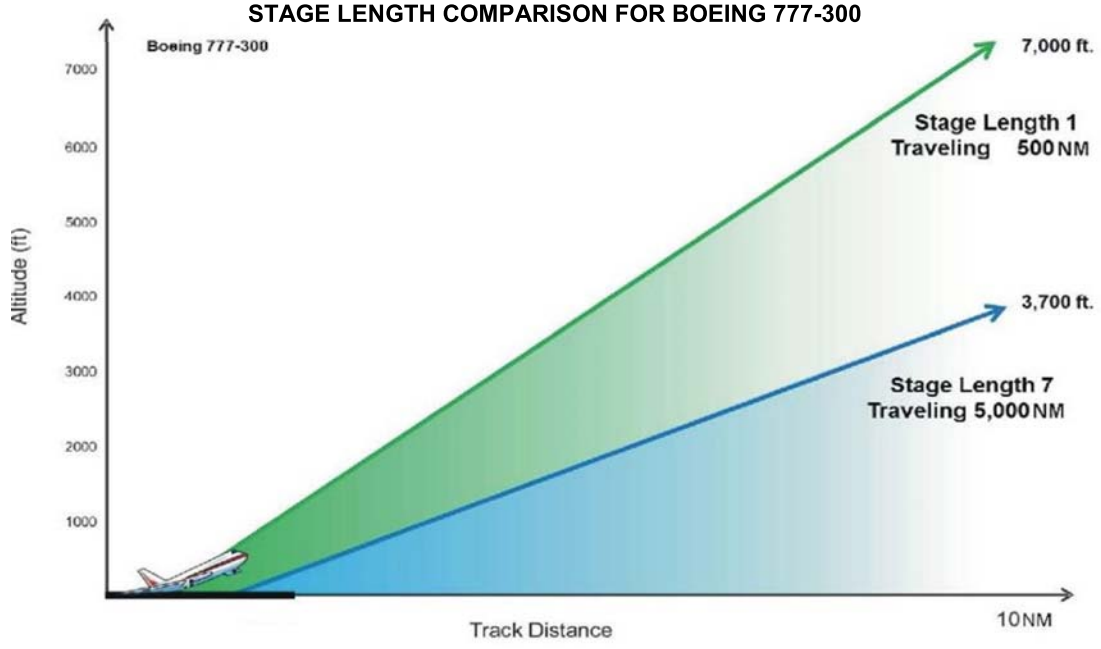

TABLE 4-3 AEDT DEPARTURE STAGE LENGTH CATEGORIES	
Stage Length Category	**Departure Route/ Trip Length (nautical miles)**
1	0 - 500
2	500 – 1,000
3	1,000 - 1,500
4	1,500 - 2,500
5	2,500 - 3,500
6	3,500 - 4,500
7	4,500 - 5,500
8	5,500 - 6,500
9	6,500 - 11,000
SOURCE: Federal Aviation Administration, 2019	

Table 4-4 Departure Stage Length (All Aircraft)				
Study Year	**Stage Length Category**			
	1	**2**	**3**	**4**
2020	**99.59%**	**0.35%**	**0.04%**	**0.01%**
2025	**99.59%**	**0.35%**	**0.04%**	**0.01%**
NOTE: Values may not add to 100 percent due to rounding. No aircraft exceeded a departure stage length of 4. **SOURCE:** Environmental Science Associates, 2018; Martin County Airport, Vector Noise and Operations Management System (VNOMS) data for July 2017-June 2018.				

4.4 Meteorological Conditions

The AEDT accounts for the influences of meteorological conditions on aircraft performance and atmospheric sound absorption, using temperature and relative humidity to calculate atmospheric absorption coefficients, which, in turn, are used to adjust standard aircraft performance noise-power-distance curve levels. For example, hotter temperatures reduce the climb performance of aircraft and result in more land area exposed to higher levels of aircraft noise by departures. For both the 2020 (Existing Conditions) and 2025 (Future Conditions) NEMs, the AEDT default meteorological data for the Airport was used. This included the following 30-year averages recorded at the station: 73 degrees Fahrenheit, 77.06% relative humidity, and sea level pressure of

1017.64 millibars. AEDT default meteorological data for the Airport also included a default headwind of 6.06 knots.

4.5 Airport Operational Information

4.5.1 Runway Use

Runway use refers to the frequency with which aircraft utilize each runway end for departures and arrivals. The more often a runway is used, the more noise is generated in areas located off each end of the runway. Runway utilization data were derived from VNOMS data from July 2017-June 2018. **Tables 4-5, 4-6, and 4-7** provide a summary of arrival, departure, and touch-and-go runway utilization, respectively. For 2020 and 2025, Runway 12/30 was projected to be used for approximately 80% of daytime activity and more than 90% of nighttime activity. The runway utilization is expected to remain constant between 2020 and 2025. A detailed breakout of arrival and departure runway utilization, by aircraft category, is provided in **Appendix D**.

Table 4-5
2020 and 2025 Arrival Runway Use

Arrivals (Time of Day)	Runway End					
	7	12	16	25	30	34
2020						
Daytime	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%
2025						
Daytime	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%

NOTE: Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

Table 4-6 2020 and 2025 Departure Runway Use						
Departures (Time of Day)	Runway End					
	7	12	16	25	30	34
2020						
Daytime	**10.44%**	**49.19%**	**4.86%**	**2.63%**	**29.05%**	**3.83%**
Nighttime	**3.68%**	**46.59%**	**3.50%**	**1.10%**	**42.54%**	**2.58%**
2025						
Daytime	**10.44%**	**49.19%**	**4.86%**	**2.63%**	**29.05%**	**3.83%**
Nighttime	**3.68%**	**46.59%**	**3.50%**	**1.10%**	**42.54%**	**2.58%**

NOTE: Values may not add to 100% due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

Table 4-7 2020 and 2025 Touch-and-Go Runway Use						
Touch-and-Gos (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Touch-and-Gos	**10.87%**	**39.38%**	**18.00%**	**3.87%**	**25.63%**	**2.26%**
Nighttime Touch-and-Gos	**4.00%**	**72.00%**	**5.33%**	**0.00%**	**18.67%**	**0.00%**
2025						
Daytime Touch-and-Gos	**10.87%**	**39.38%**	**18.00%**	**3.87%**	**25.63%**	**2.26%**
Nighttime Touch-and-Gos	**4.00%**	**72.00%**	**5.33%**	**0.00%**	**18.67%**	**0.00%**

NOTE: Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

4.5.2 Flight Tracks and Utilization

Flight tracks refer to the route an aircraft travels when arriving to or departing from a runway. To identify flight tracks that represent AAD conditions at the Airport, July 2017 to June 2018 aircraft arrival and departure data from VNOMS were reviewed, which served as the basis for the flight tracks for use in the AEDT. This data provided information on the following parameters:

- Arrival and departure paths;
- Arrival and departure times;
- Arrival and departure profiles; and
- Departure stage lengths.

Flight corridors utilized by arriving and departing aircraft, to and from each runway end, were used to develop the centerlines of each flight corridor, or backbone track. The backbone tracks were dispersed within the AEDT to generate sub-tracks within each of the primary flight corridors to reflect the actual distribution of aircraft radar tracks. The AEDT flight tracks are depicted on **Figures 4-2 through 4-4**. A more detailed depiction of aircraft arrival and departure radar tracks, which were used to generate the flight tracks, are provided in **Appendix F**. The flight tracks and their respective utilization rates are forecast to remain constant for the 2020 (Existing Conditions) and 2025 (Future Conditions) study years. Flight track utilization, by time of day, is provided in **Appendix D**.

4.5.3 Departure and Arrival Profiles

Aircraft arrival and departure flight profile data contained in VNOMS were reviewed to confirm that no modifications to AEDT's existing standard departure and arrival profiles were necessary for the SUA 14 CFR Part 150 Study.

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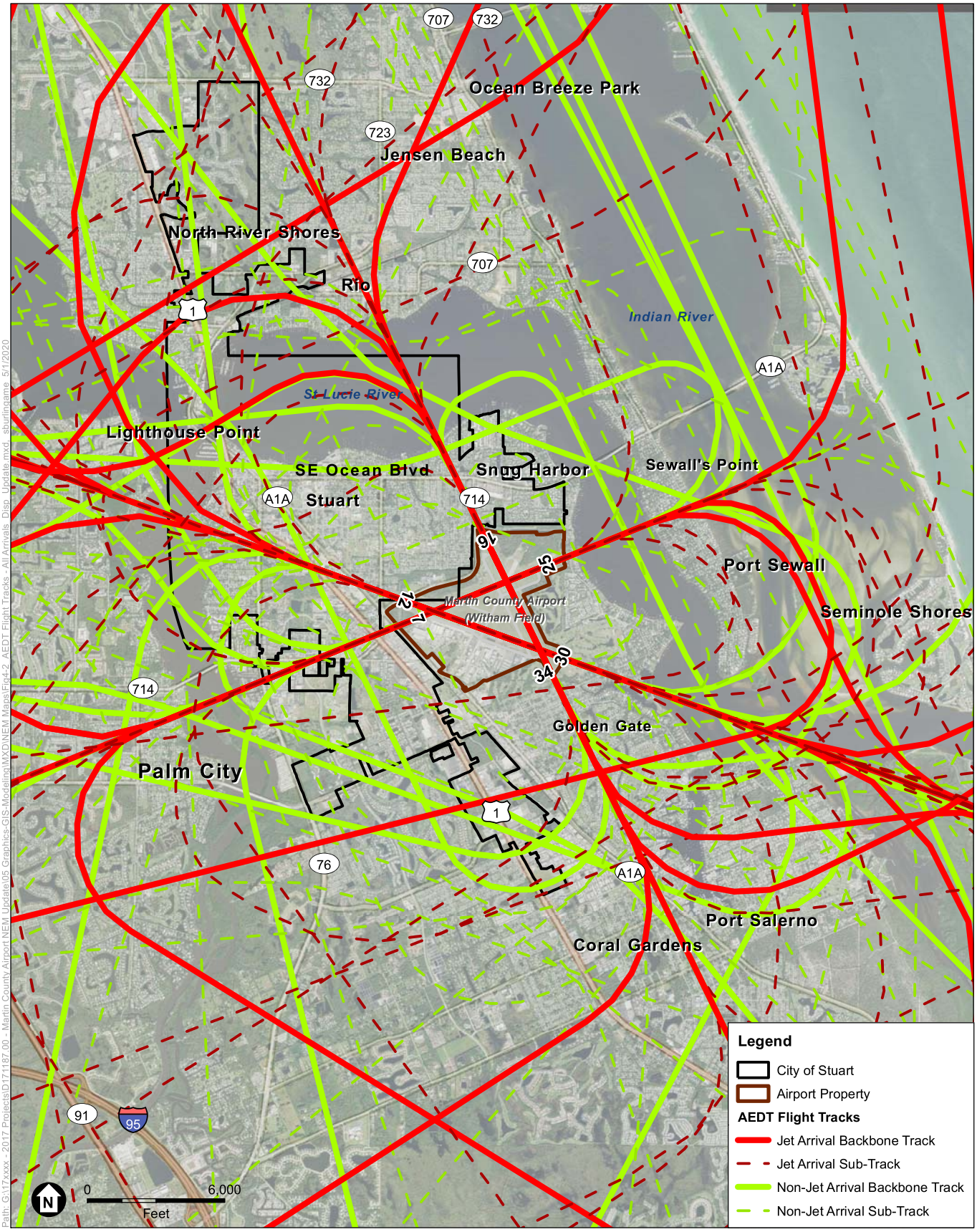

SOURCE: Esri; AEDT 3b; ESA, 2020

Martin County Airport NEM Update

Figure 4-2
Modeled AEDT Flight Tracks - All Arrivals
Martin County Airport (Witham Field)

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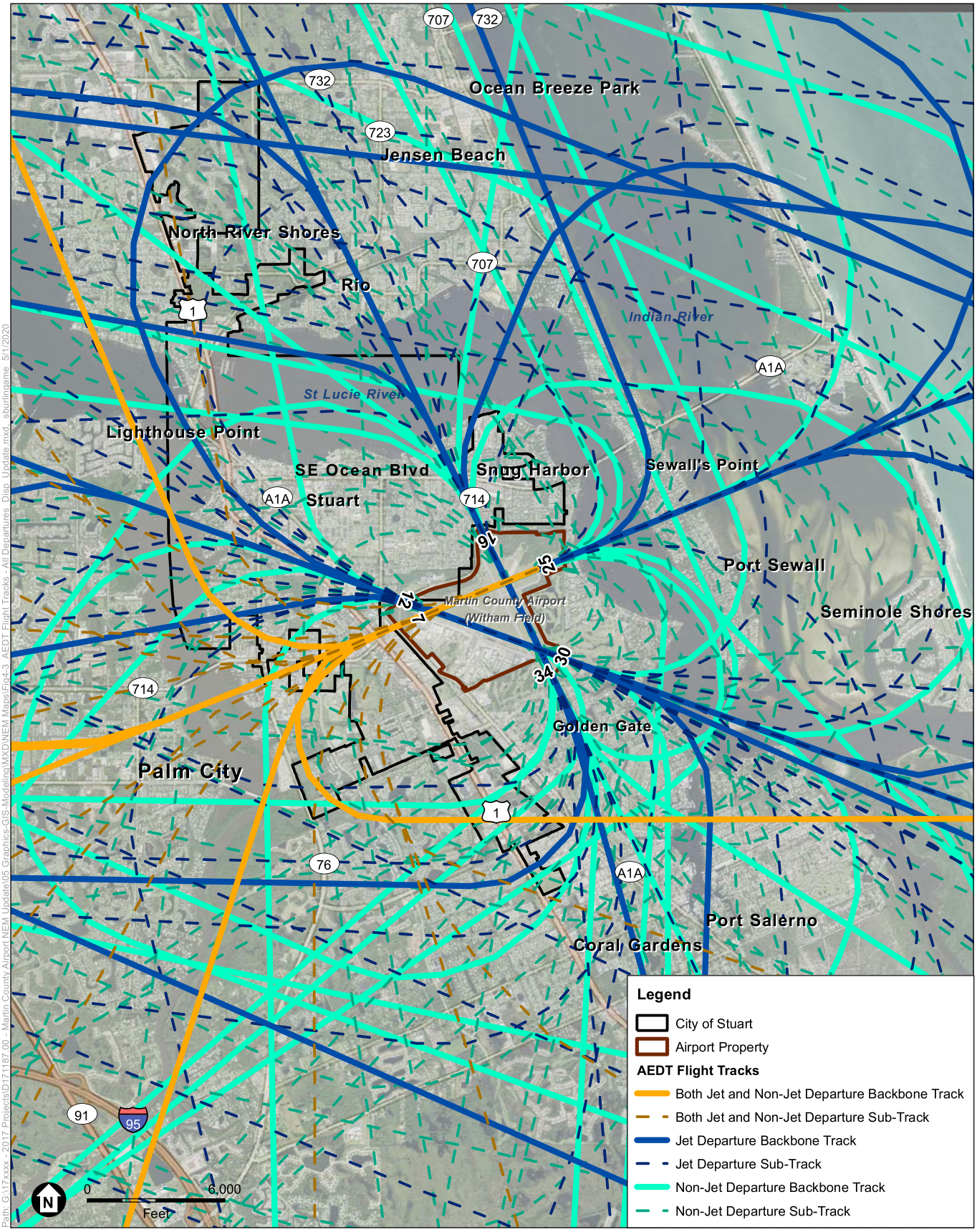

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SOURCE: Esri; AEDT 3b; ESA, 2020

Martin County Airport NEM Update

Figure 4-3
Modeled AEDT Flight Tracks - All Departures
Martin County Airport (Witham Field)

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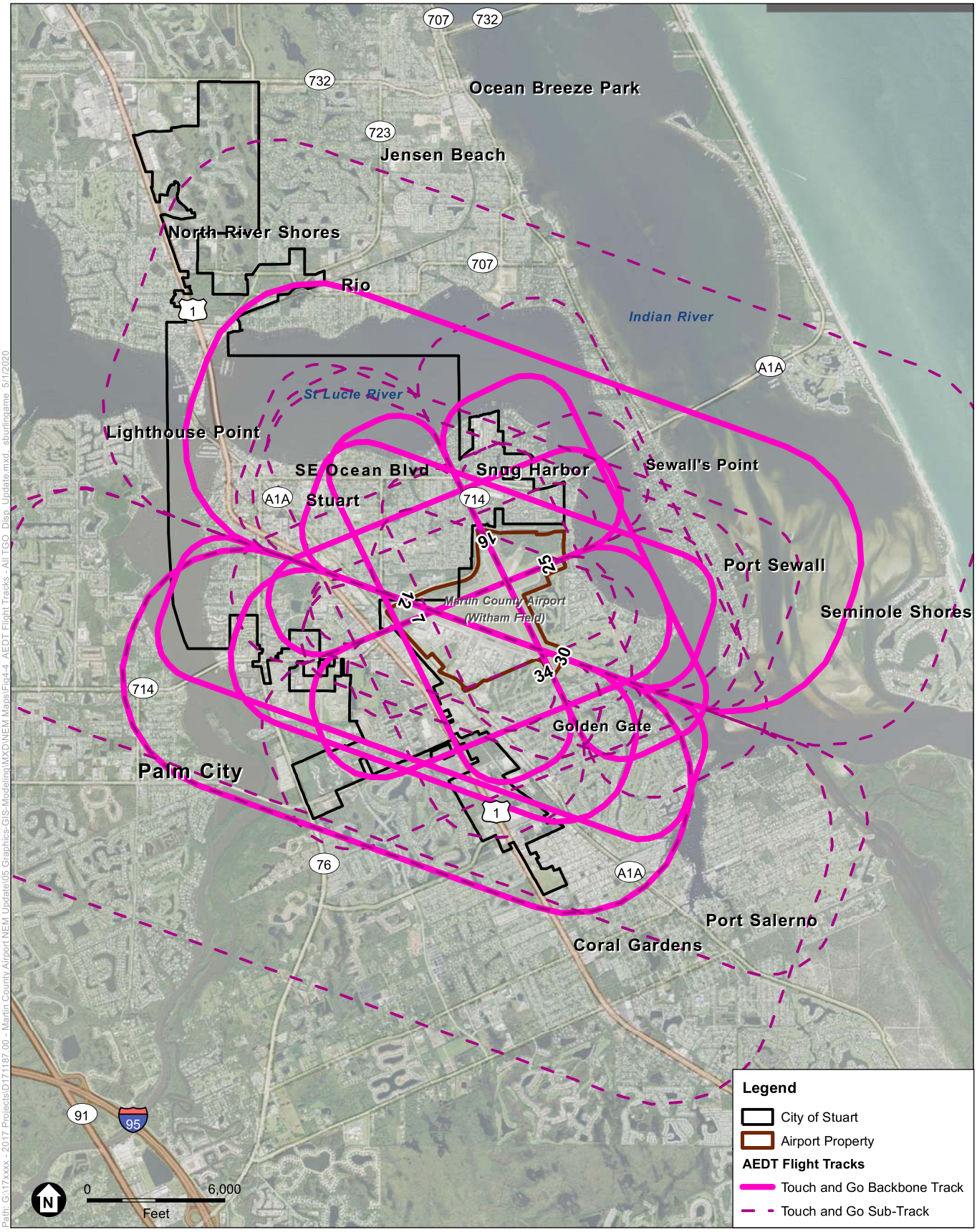

Path: G:\17xxxx - 2017 Projects\D1711187.00 - Martin County Airport NEM Update\05 Graphics-GIS-Modeling\MXD\NEM Maps\Fig4-4 AEDT Flight Tracks - All TGO Disp Update.mxd sburlingame 5/1/2020

SOURCE: Esri; AEDT 3b; ESA, 2020

Martin County Airport NEM Update

Figure 4-4
Modeled AEDT Flight Tracks - All Touch and Go
Martin County Airport (Witham Field)

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CHAPTER 5
2020 and 2025 Noise Exposure

5.1 Introduction

This chapter presents the 2020 Existing Conditions and 2025 Future Conditions DNL contours for SUA. As discussed in **Chapter 4**, the contours show how noise from aircraft operations is distributed over the surrounding area. This chapter identifies land use compatibility using FAA guidelines, identifies noise sensitive locations, and quantifies the types of land uses and population within the DNL 60 and higher contours.

14 CFR Part 150 requires that the aircraft noise exposure for the year of submittal (2020) and for a future year (2025) be developed. The DNL 65, DNL 70, and DNL 75 contours are the only contours required by the FAA for inclusion in a 14 CFR Part 150 Study and for the agency's acceptance of the NEMs. However, Martin County has adopted the DNL 60 for land use compatibility as reflected in local zoning ordinances; therefore, the DNL 60 is included in the NEMs in accordance with 14 CFR Part 150, which allows for lower standards adopted by municipalities. The City of Stuart has not adopted a lower threshold so the DNL 65 will be used for land use compatibility purposes within the City. This approach for determining land use compatibility is in line with the approach used in the prior Part 150 Study conducted at SUA. The subtotals within the DNL 60 in unincorporated Martin County are provided in each table throughout the following sections. Specific elements that are required to be included on the existing and future NEMs and required supplemental graphics are identified in 14 CFR Part 150. These include depictions of noise sensitive sites within the DNL 60 contour. The official SUA 2020 and 2025 NEMs are included in **Appendix K** of this report.

5.2 2020 Noise Exposure

Figure 5-1 depicts the 2020 Existing Conditions DNL contours superimposed on an existing land use map. In accordance with 14 CFR Part 150, the DNL 60, DNL 65, DNL 70, and DNL 75 contours are shown. Furthermore, the contours accurately represent noise based on airport and operational data that are representative of the year 2020, as described in **Section 4.3**. The figure also depicts community and geographic reference points, such as SUA's boundary and runways, political boundaries, area roads and highways, and waterbodies. This figure assists in understanding the geographic relationship of SUA's DNL contours to the surrounding community.

The largest portions of the contours extend off of Runway 12-30, which is consistent with this being the primary runway at SUA. While the DNL 60 contour extends off airport, the DNL 65 contour is nearly completely on airport property. The DNL 70 and 75 contours remain entirely on Airport property.

5.2.1 Land Use Compatibility – 2020

The total area encompassed by the 2020 DNL 60 and greater contour is approximately 323 acres. Land uses located within the 2020 DNL 60 and higher contours were identified by overlaying the contours on parcel-level land use data provided by Martin County. Using geographic information system (GIS) software, the types and amount of land uses were calculated. The total acres for each land use category within the DNL 60 and higher contours are shown in **Table 5-1.**

The FAA's Land Use Compatibility Guidelines discussed in Section 3.3 show that noise-sensitive land uses such as residential, mobile home parks, transient lodging (e.g., hotels and motels), schools, and outdoor music venues are not compatible with noise levels of DNL 65 or higher. Other noise-sensitive land uses such as hospitals, nursing homes, churches, auditoriums, and concert halls are generally compatible with noise levels between DNL 65 and DNL 75 when measures that achieve an outdoor-to-indoor Noise Level Reduction (NLR) of 25 to 30 decibels are incorporated into the structures.[24] Commercial, manufacturing, and recreational land (parks, amusement parks, zoos, etc.) are generally less sensitive to noise and considered compatible with noise levels up to DNL 70 (parks are compatible up to DNL 75). Commercial and manufacturing properties are compatible with noise levels up to DNL 80 with NLR of 25 to 30 decibels.

As shown in **Table 5-1**, the 2020 NEM DNL 60 and higher contours contain approximately 40 acres of Single Family & Duplex residential land use. Aside from water (approximately 4 acres), the majority of the non-residential land uses exposed to aircraft noise of DNL 60 and higher in 2020 are classified as Transportation & Utilities (approximately 416 acres), Industrial & Manufacturing (approximately 37 acres), and Public Facilities and Institutions (approximately 28 acres). There are approximately 72 acres of Recreation areas within the 2020 DNL 60 contour located to the southeast of SUA. Land uses within the DNL 65 and greater contours are limited to four land use categories: Recreation, Industrial & Manufacturing, Transportation & Utilities, and Public Facilities and Institutions.

[24] Normal residential construction can be expected to provide an outdoor to indoor NLR of 20 dB.

Table 5-1
Land Uses Exposed to DNL 60 and Higher - 2020

Land Use Category[1]	Land Uses exposed to DNL 60 and Higher (acres)[2]							Housing Units[1]	Population[3]
	DNL 60-65	DNL *60-65 (Unincorporated Martin County)*	DNL *60-65 (Stuart Only))*	DNL 65-70	DNL 70-75	DNL 75+	Total		
Recreation	72.49	*72.49*	*0.00*	13.09	1.62	0.07	**87.28**	0	0
Single Family & Duplex	39.85	*23.34*	*16.52*	0.00	0.00	0.00	**39.85**	139	316
Retail and Office	0.90	*0.00*	*0.90*	0.00	0.00	0.00	**0.90**	0	0
Mixed Use	0.30	*0.00*	*0.30*	0.00	0.00	0.00	**0.30**	0	0
Industrial & Manufacturing	27.90	*18.83*	*9.07*	8.68	0.13	0.00	**36.72**	0	0
Transportation & Utilities	169.62	*144.28*	*25.34*	118.16	73.67	54.69	**416.15**	0	0
Public Facilities and Institutions	24.78	*4.55*	*20.23*	3.41	0.00	0.00	**28.18**	0	0
Vacant	1.32	*0.57*	*0.74*	0.00	0.00	0.00	**1.32**	0	0
Water Bodies	3.86	*3.86*	*0.00*	0.00	0.00	0.00	**3.86**	0	0
Total	**341.03**	*267.93*	***73.11***	**143.34**	**75.43**	**54.76**	**614.56**	**153**	**351**

SOURCES:
[1] Housing unit counts and Land Use Categories derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018). It should be noted that 97 of these units fall within the DNL 60 within the City of Stuart. Because the City of Stuart has not adopted the DNL 60 as its level of significance, they are not considered noncompatible.
[2] Noise contours from Environmental Science Associates (ESA)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

5.2.2 Population within 2020 DNL Contours

Table 5-2 presents the estimated number of households, population, and the noise sensitive sites exposed to DNL 60 and higher in noncompatible areas in 2020. Based on demographic data by census block from the U.S. Census Bureau's 2010 Decennial Census and parcel data gathered through the Florida Geographic Data Library (FGDL), 139 housing units are exposed to aircraft noise of DNL 60 and higher in 2020 with 43 of these units in unincorporated Martin County. A housing unit was considered within a contour if any portion of the parcel boundary fell within that contour.

The population exposed to aircraft noise of DNL 60 and higher was determined by calculating the average number of persons per household in each individual census block within the DNL 60-65

and higher contours and multiplying that number by the number of households within each census block (or portion thereof located within the DNL 60-65 and higher contours). The population within each individual block (or portion thereof) was then summed to quantify the total number of persons within the DNL 60 and higher contours. The total population exposed to aircraft noise of DNL 60 and higher was estimated to be approximately 316 persons. However, since Martin County has adopted the DNL 60 while Stuart has not, only the housing units and population within unincorporated Martin County are considered noncompatible. Within unincorporated Martin County, the total population exposed to aircraft noise of DNL 60 and higher was estimated to be approximately 107 persons. There is no estimated population exposed to aircraft noise of DNL 65 and higher in 2020.

Table 5-2
Noise Sensitive Sites Exposed to DNL 60 and Higher - 2020

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	341.03	139	316	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	*267.93*	*43*	*107*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
DNL 65-70	143.34	0	0	0	0	0	0	0	0	0	0
DNL 70-75	75.43	0	0	0	0	0	0	0	0	0	0
DNL 75+	54.76	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**267.93**	**43**	**107**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:

[1] Noise contours from Environmental Science Associates (ESA)

[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)

[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

[4] School locations obtained from Martin County School Board and St. Lucie County School Board

5

Figure 5-2 depicts the 2020 Existing Conditions DNL contour off of Runway 30 relative to each of the residential parcel boundaries. Residential parcels included in the previous NCP sound insulation program are identified. Of the 43 housing units in unincorporated Martin County exposed to aircraft noise of DNL 60 and higher in 2020,[25] 16 housing units (population 40) were already considered as part of Phase 2 of the sound insulation program implemented under the previous NCP. The remaining 27- housing units (population 67) within the DNL 60-65 contour have not been considered or addressed previously and are therefore considered noncompatible (see **Section 2.6.1**).

TABLE 5-3
HOUSING UNITS AND POPULATION NOT PREVIOUSLY SOUND INSULATED[1] - 2020

Noise Level[2]	Housing Units[3]	Population[3]
DNL 60-65	27	67
DNL 65-70	0	0
DNL 70-75	0	0
DNL 75+	0	0
TOTAL:	27	67

SOURCES:
[1] SUA Sound Insulation Program housing unit data from Martin County Airport. All housing units within the existing Sound Insulation boundary were excluded from this table regardless if they received treatment, elected to not participate or were deemed compatible through interior testing or determined ineligible.
[2] Noise contours from Environmental Science Associates (ESA)
[3] Housing units and population estimates derived from 2010 Census block-level data.

[25] A housing unit was included in the counts if any part of the related parcel is located within the DNL 65 dB contour boundary. These counts may include residences that are part of the existing sound insulation program as well as those deemed compatible due to noise testing. Potential eligibility for any future noise program consideration will depend on the specific recommendations of the NCP and may include increases in the number of units due to block rounding (etc.), and decreases due to testing and consideration of other factors (year of construction, etc.).

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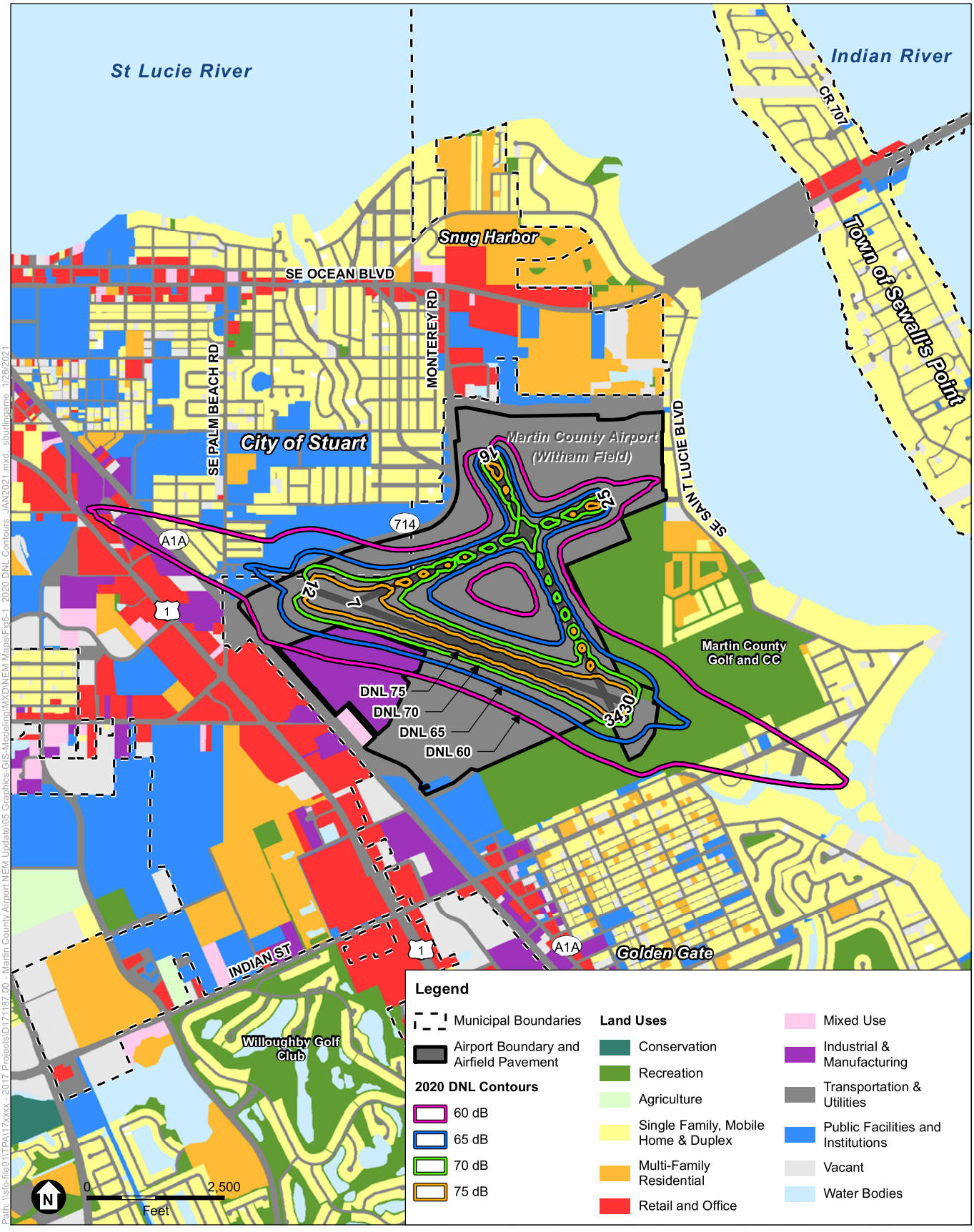

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-1
2020 DNL Contours
Martin County Airport (Witham Field)

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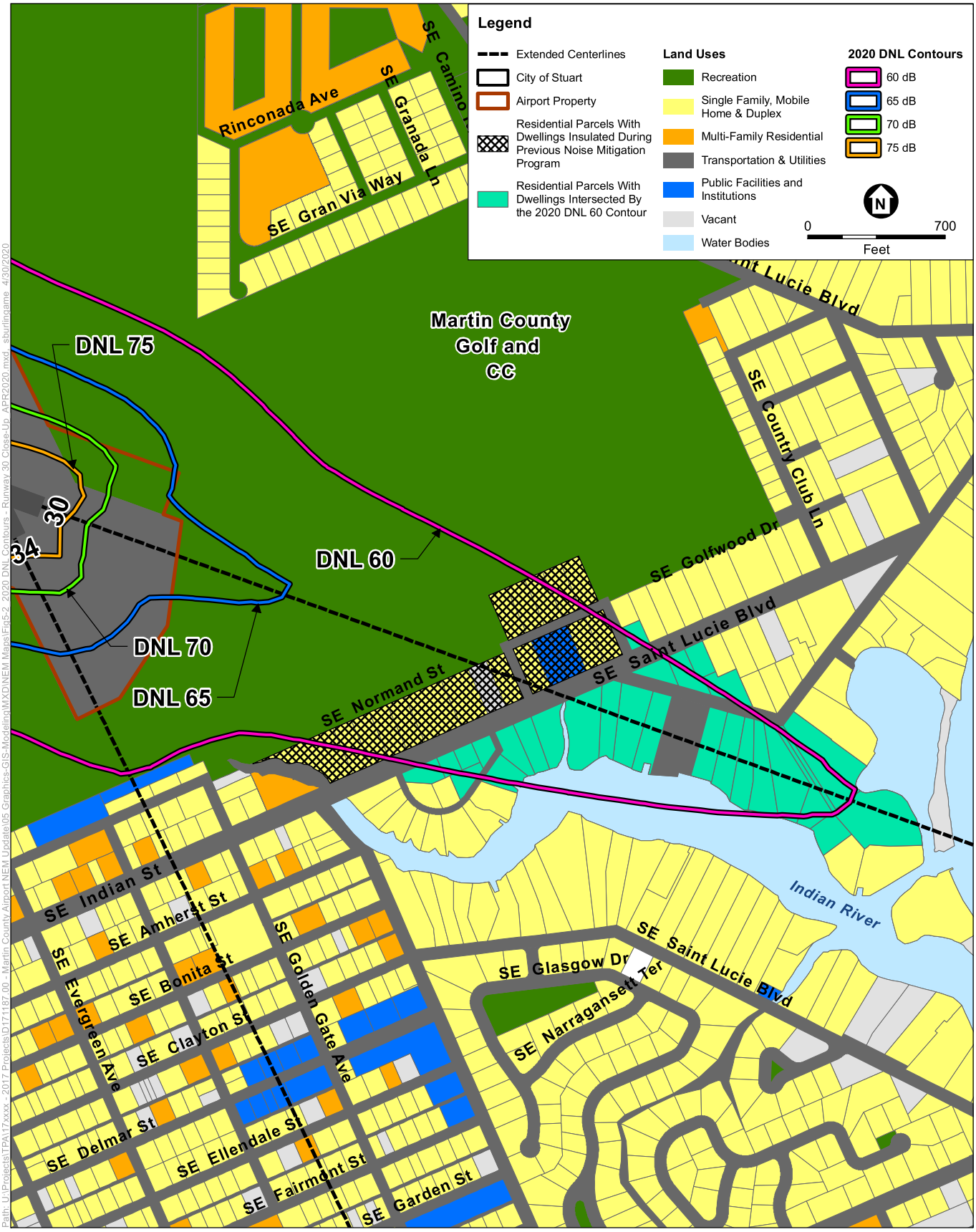

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-2
2020 DNL Contours and Residential Dwellings Within the Contours
Runway 30 Close-Up
Martin County Airport (Witham Field)

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5.3 2025 Noise Exposure

The 2025 Future Conditions DNL contours are depicted on **Figure 5-3**. Similar to **Figure 5-1**, the 2025 contours are superimposed over a future land use map. In accordance with 14 CFR Part 150, the 2025 contours reflect the anticipated noise conditions based on airport and operational data that are representative of the year 2025, as described in **Section 4.3**. Compared to the 2020 contours, the size and shape of the 2025 contours are similar, but reflect an increase in noise exposure due to the relative increase in aircraft operations compared to 2020. This is the only change between the 2020 and 2025 contours so the general shape is expected to remain similar.

5.3.1 Land Use Compatibility – 2025

The total area encompassed by the 2025 DNL 60 and higher noise contours is approximately 388 acres. The type and amount of land uses within the DNL 60 and higher contours are provided in **Table 5-4**. As shown the table, the 2025 DNL 60 and higher contours contain approximately 51 acres of Single Family and Two-Family Residential land use, and no acres of Multi-Family Residential.

The majority of the non-residential land uses exposed to aircraft noise of DNL 60 and higher in 2025 are Transportation & Utilities (approximately 442 acres), Recreation (approximately 97 acres), Industrial and Manufacturing (approximately 50 acres) and Public Facilities and Institutions (approximately 33 acres). There are approximately 9 acres of Water Bodies, 3 acres of Retail & Office, and 0.6 acres of Mixed Use. There is additionally approximately 2 acres of Vacant space within the DNL 60 and higher contours.

Table 5-4
Land Uses Exposed to DNL 60 and Higher - 2025

Land Use Category[1]	Land Uses exposed to DNL 60 and Higher (acres)[2]							Housing Units[1]	Population[3]
	DNL 60-65	DNL *60-65 (Unincorporated Martin County)*	DNL *60-65 (Stuart Only)*	DNL 65-70	DNL 70-75	DNL 75+	Total		
Recreation	77.11	*77.11*	*0.00*	17.91	2.10	0.14	**97.26**	0	0
Single Family & Duplex	50.99	*32.62*	*18.36*	0.00	0.00	0.00	**50.99**	167	384
Retail and Office	3.00	*0.00*	*3.00*	0.00	0.00	0.00	**3.00**	0	0
Mixed Use	0.59	*0.00*	*0.59*	0.00	0.00	0.00	**0.59**	0	0
Industrial & Manufacturing	39.22	*20.02*	*19.19*	10.14	0.36	0.00	**49.72**	0	0
Transportation & Utilities	179.87	*151.32*	*28.55*	121.90	79.95	60.70	**442.42**	0	0
Public Facilities and Institutions	26.98	*5.30*	*21.68*	5.64	0.00	0.00	**32.62**	0	0
Vacant	1.54	*0.60*	*0.94*	0.00	0.00	0.00	**1.54**	0	0
Water Bodies	8.56	*8.56*	*0.00*	0.00	0.00	0.00	**8.56**	0	0
Total	**387.84**	*295.53*	***92.31***	**155.59**	**82.40**	**60.85**	**686.69**	**167**	**384**

SOURCES:

[1] Housing unit counts and Land Use Categories derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018). It should be noted that 104 of these units fall within the DNL 60 within the City of Stuart. Because the City of Stuart has not adopted the DNL 60 as its level of significance, they are not considered noncompatible.
[2] Noise contours from Environmental Science Associates (ESA)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

5.3.2 Population within 2025 DNL Contours

Table 5-5 presents the estimated number of households, population and the noise sensitive sites exposed to DNL 60 and higher in 2025. Based on demographic data by census block from the U.S. Census Bureau's 2010 Decennial Census and parcel data gathered through the FGDL, the total population exposed to aircraft noise of DNL 60-65 is estimated to be 384. However, since Martin County has adopted the adopted the DNL 60 standard for significance while Stuart maintains the DNL 65 standard, only the housing units and population within unincorporated Martin County are considered noncompatible. Within unincorporated Martin County, the total housing units and population exposed to aircraft noise of DNL 60-65 was estimated to be 63 housing units and 157 persons. The majority of the noncompatible housing units (97%) in the DNL 60-65 are located off of Runway 30 with 2 residential units located off of Runway 25. When compared to 2020, this represents an increase of approximately 20 housing units and 50 people.

TABLE 5-5
NOISE SENSITIVE SITES EXPOSED TO DNL 60 AND HIGHER - 2025

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[2]	Religious	Schools[3]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	387.84	167	384	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	*295.53*	*63*	*157*	0	0	0	0	0	0	0	0
DNL 65-70	155.59	0	0	0	0	0	0	0	0	0	0
DNL 70-75	82.40	0	0	0	0	0	0	0	0	0	0
DNL 75+	60.85	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**295.53**	**63**	**157**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:

[1] Noise contours from Environmental Science Associates (ESA)

[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)

[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

[4] School locations obtained from Martin County School Board and St. Lucie County School Board

Figures 5-4, 5-5, and 5-6 depict the 2025 Future Conditions DNL contour off of Runway 12, Runway 30, and Runway 25 respectively. The same 16 housing units off of Runway 30 (population 40) that were considered as part of Phase 2 of the previous sound insulation program are included in the overall counts. This leaves 47 total residential units (population 117) within the DNL 60-65 contour that are considered noncompatible (**Section 2.6.1**). There are 2 noncompatible residential units within the DNL 60 contour directly off the Runway 25 approach end. The remaining noncompatible residential units within the DNL 60 contour are located within unincorporated Martin County near the Runway 30 approach end.

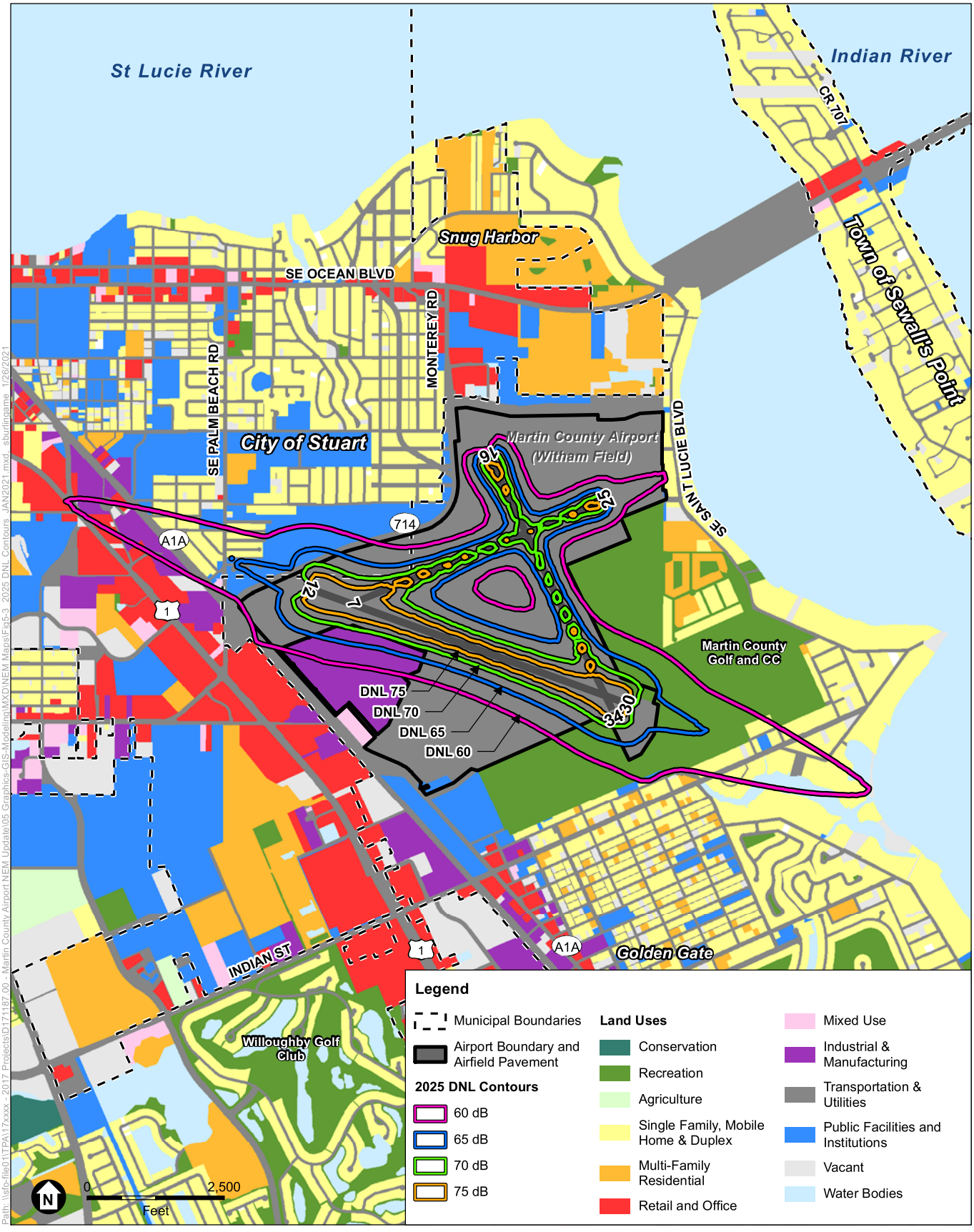
TABLE 5-6
HOUSING UNITS AND POPULATION NOT ALREADY INSULATED IN CURRENT SOUND INSULATION PROGRAM[1] - 2025

Noise Level[2]	Housing Units[3]	Population[3]
DNL 60-65	47	117
DNL 65-70	0	0
DNL 70-75	0	0
DNL 75+	0	0
TOTAL:	47	117

SOURCES:
[1] SUA Sound Insulation Program housing unit data from Martin County Airport. All housing units within the existing Sound Insulation boundary were excluded from this table regardless if they received treatment, elected to not participate or were deemed compatible through interior testing or determined ineligible.
[2] Noise contours from Environmental Science Associates (ESA)
[3] Housing units and population estimates derived from 2010 Census block-level data.

5.4 Noise Sensitive Sites Within the DNL Contours

There are no noise sensitive facilities (e.g., schools, religious facilities, hospitals, and structures listed in the National Register of Historic Places) exposed to noise levels of DNL 60 and higher in either the 2020 or 2025 contours.



SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-3
2025 DNL Contours
Martin County Airport (Witham Field)

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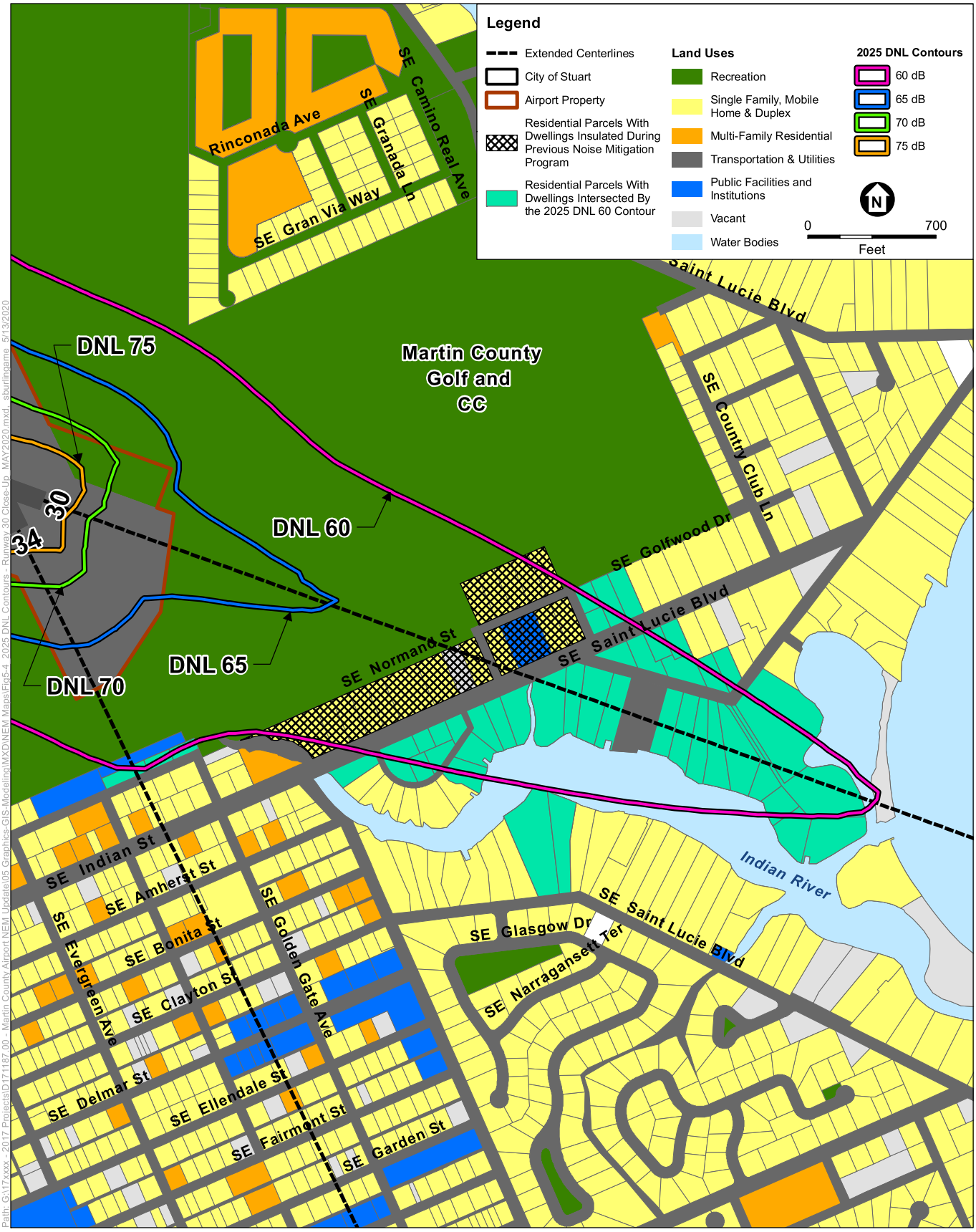

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-4
2025 DNL Contours and Residential Dwellings Within the Contours
Runway 30 Close-Up
Martin County Airport (Witham Field)

ESA

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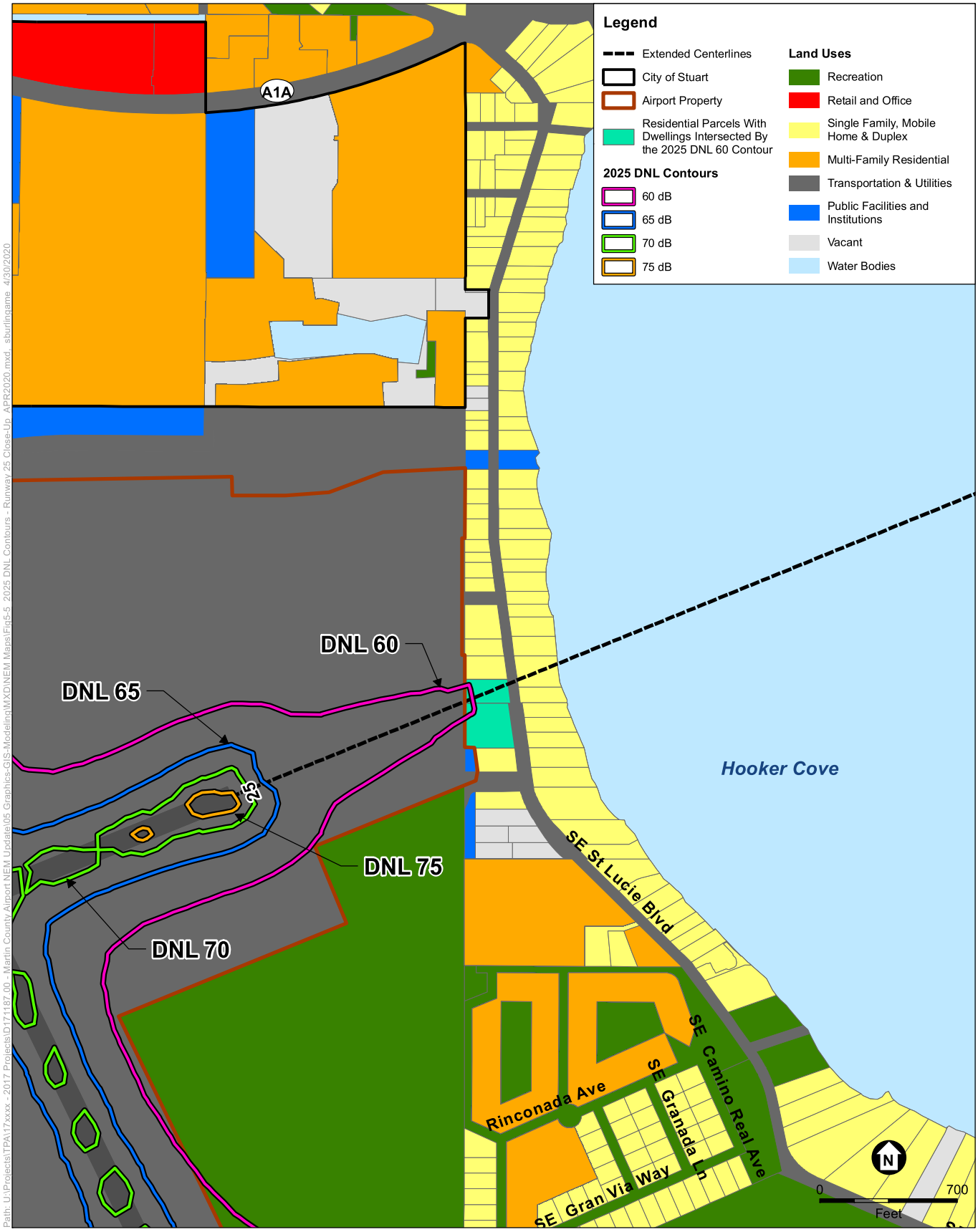

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-5
2025 DNL Contours and Residential Dwellings Within the Contours
Runway 25 Close-Up
Martin County Airport (Witham Field)

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5.5 Comparison of 2020 and 2025 NEMs

A comparison of the 2025 to the 2020 contours shows that the land area encompassed by the DNL 60-65 contours is projected to increase by 46 acres (see **Table 5-7**). Within that contour, 28 additional residential units and 67 people would be exposed to noise levels of DNL 60 or higher in 2025. When only considering the 60-65 contour in unincorporated Martin County, the area within contours are projected to increase by 27.8 acres by 2025. With respect to housing units, approximately 20 more units and 50 more people in noncompatible areas would be exposed to noise levels of DNL 60-65 in 2025, when compared to 2020 (see **Table 5-8**). **Figure 5-6** shows a comparison of the 2020 and 2025 DNL contours and the areas where sound exposure is expected to increase based on projected operating conditions. **Figures 5-7 and 5-8** show the 2020 and 2025 contours with a close-up of the Runway 30, and Runway 25 ends respectively.

Table 5-7
Land Uses Exposed to DNL 60 and Higher - 2020-2025 change

Land Use Category[1]	Land Uses exposed to DNL 65 and Higher (acres)[2]							Housing Units[1]	Population[3]
	DNL 60-65	DNL *60-65 (Unincorporated Martin County)*	DNL *60-65 (Stuart Only)*	DNL 65-70	DNL 70-75	DNL 75+	Total		
Recreation	4.62	*4.62*	*0.00*	4.82	0.48	0.07	**9.98**	0	0
Single Family & Duplex	11.13	*9.29*	*1.84*	0.00	0.00	0.00	**11.13**	28	67
Retail and Office	2.09	*0.00*	*2.09*	0.00	0.00	0.00	**2.09**	0	0
Mixed Use	0.29	*0.00*	*0.29*	0.00	0.00	0.00	**0.29**	0	0
Industrial & Manufacturing	11.31	*1.19*	*10.12*	1.46	0.23	0.00	**13.01**	0	0
Transportation & Utilities	10.25	*7.03*	*3.22*	3.73	6.27	6.01	**26.27**	0	0
Public Facilities and Institutions	2.20	*0.75*	*1.45*	2.24	0.00	0.00	**4.44**	0	0
Vacant	0.22	*0.03*	*0.19*	0.00	0.00	0.00	**0.22**	0	0
Water Bodies	4.70	*4.70*	*0.00*	0.00	0.00	0.00	**4.70**	0	0
Total	**46.81**	*27.61*	***19.20***	**12.25**	**6.98**	**6.08**	**72.13**	**28**	**67**

TABLE 5-8
NOISE SENSITIVE SITES EXPOSED TO DNL 60 AND HIGHER – 2020-2025 CHANGE)

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[2]	Religious	Schools[3]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	46.81	28	67	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	*27.61*	*20*	*50*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
DNL 65-70	12.25	0	0	0	0	0	0	0	0	0	0
DNL 70-75	6.98	0	0	0	0	0	0	0	0	0	0
DNL 75+	6.08	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**27.61**	**20**	**50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

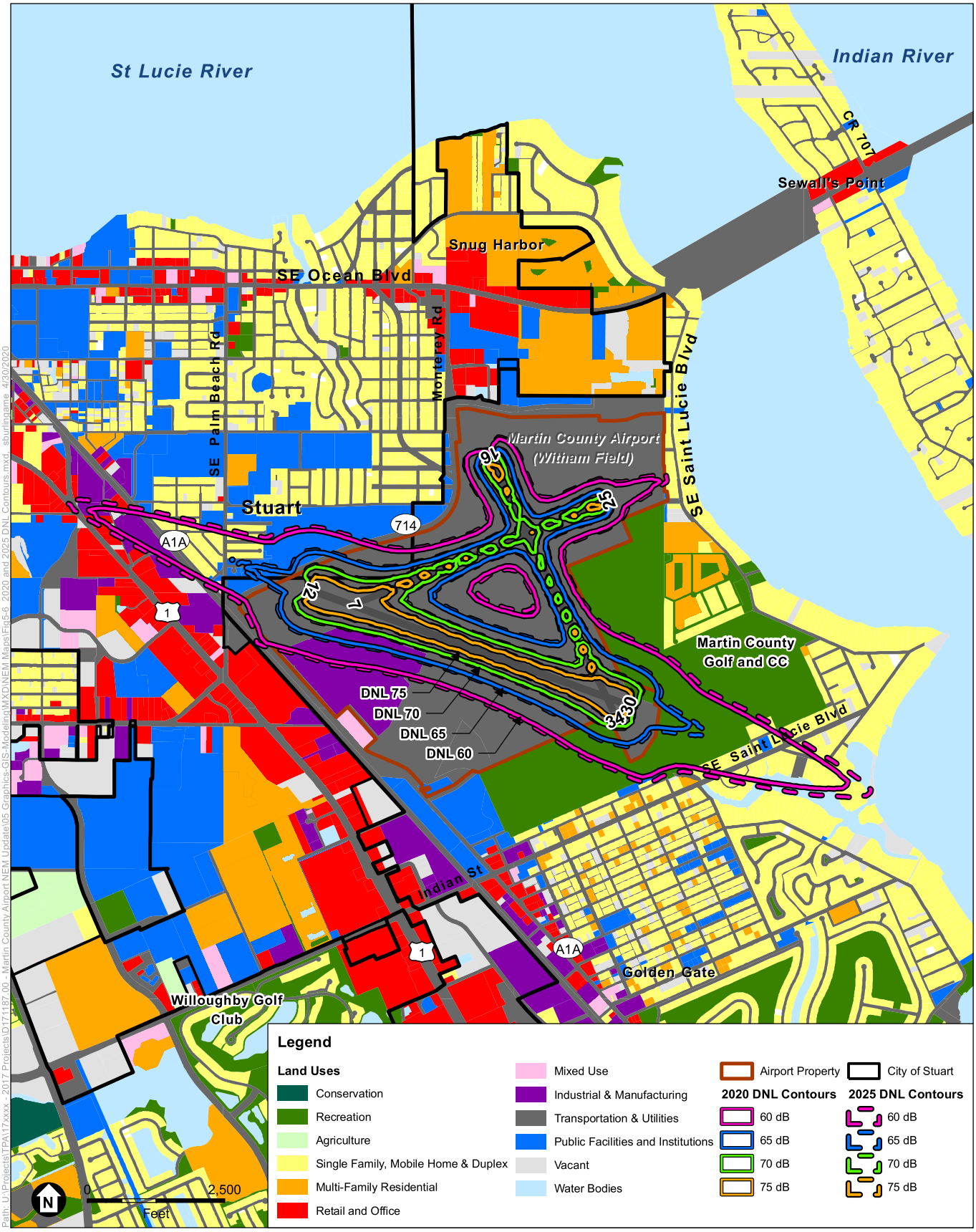
SOURCES:

[1] Noise contours from Environmental Science Associates (ESA)

[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)

[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

[4] School locations obtained from Martin County School Board and St. Lucie County School Board



SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-6
2020 and 2025 DNL Contours
Martin County Airport (Witham Field)

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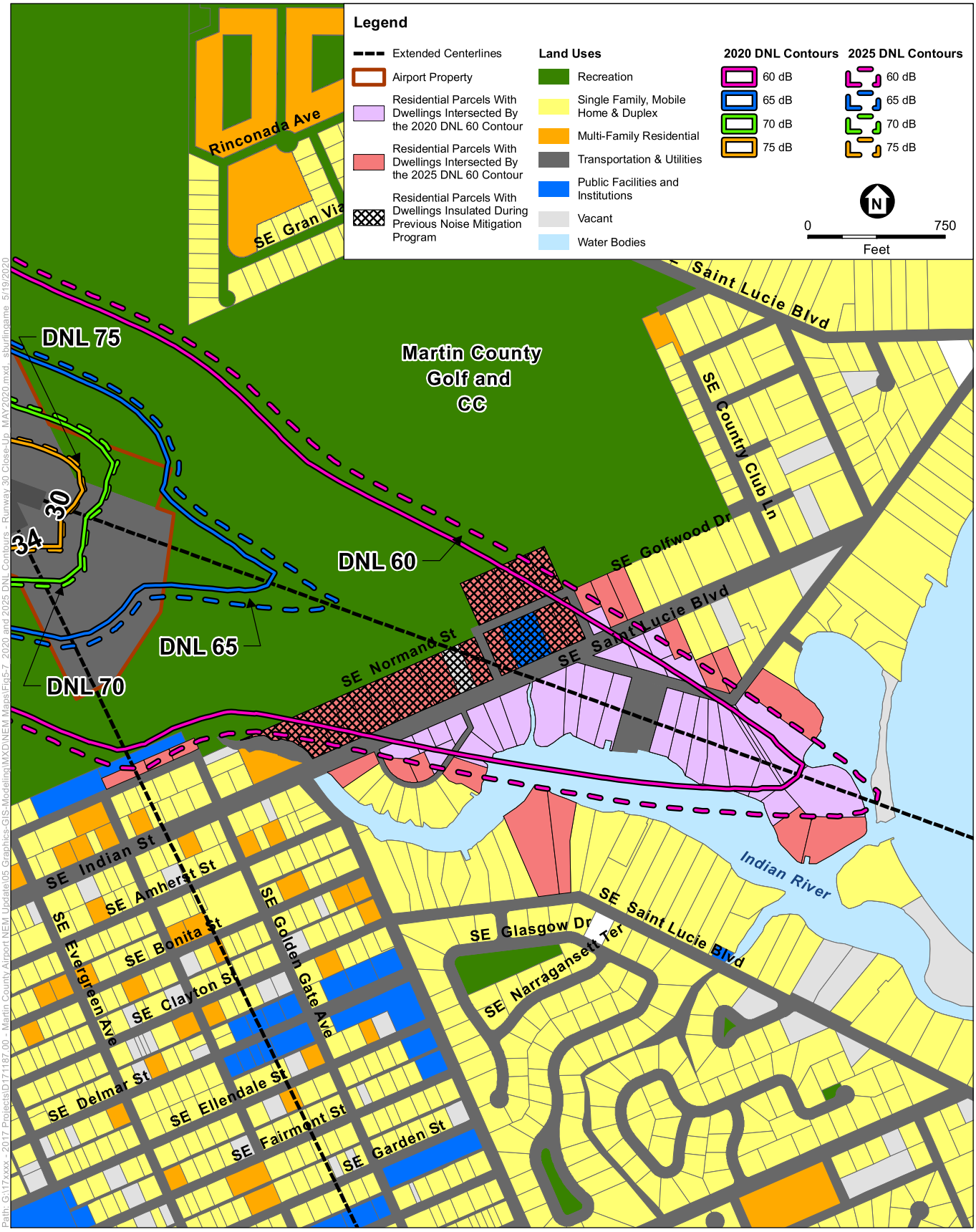

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-7
2020 and 2025 DNL Contours and Residential Dwellings Within the Contours
Runway 30 Close-Up
Martin County Airport (Witham Field)

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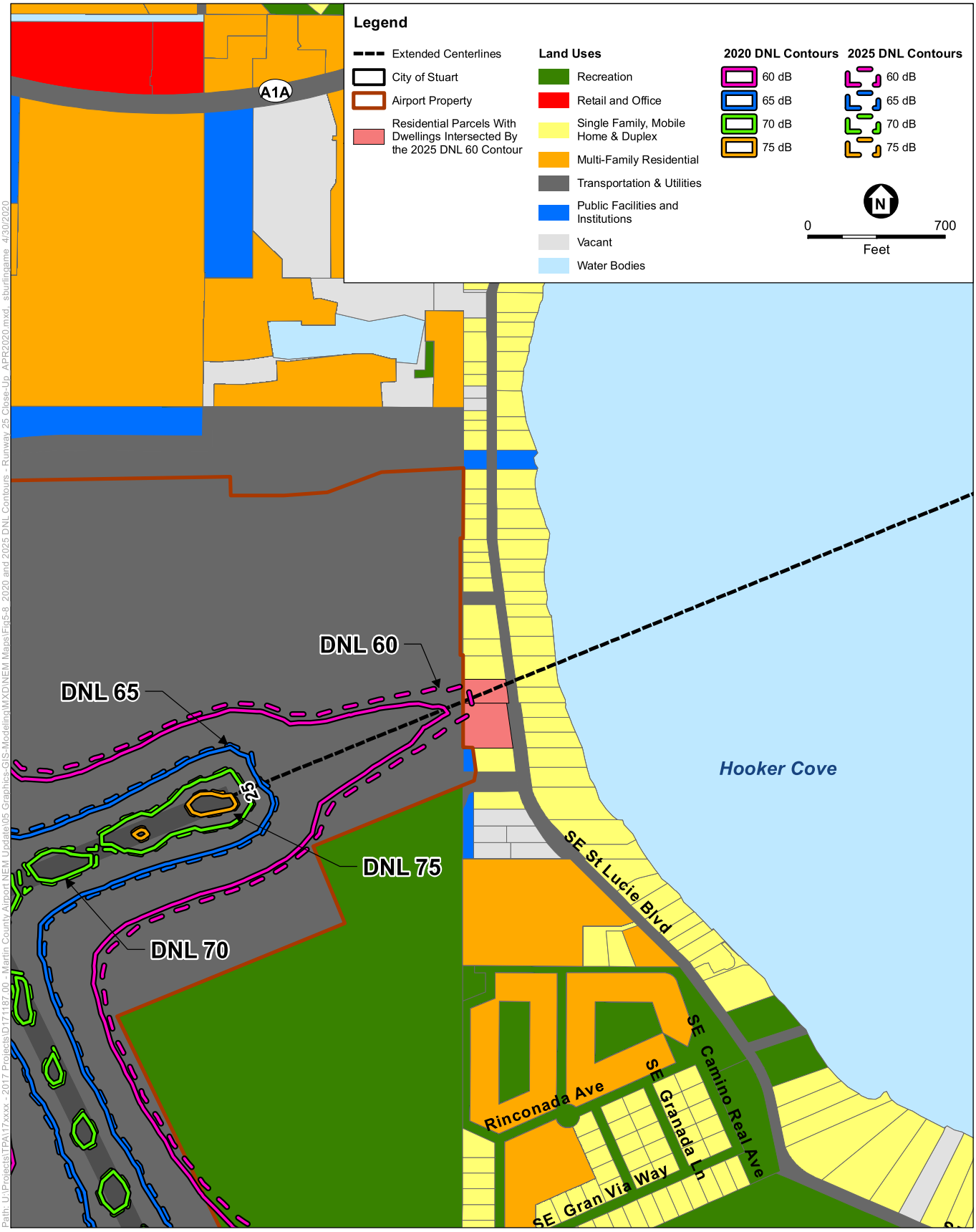

SOURCE: Esri; AEDT 3b; Martin County Property Appraiser, 8/2018; GAI, 2020, ESA, 2020
DNL = Day-Night Average Sound Level

Martin County Airport NEM Update

Figure 5-8
2020 and 2025 DNL Contours and Residential Dwellings Within the Contours
Runway 25 Close-Up
Martin County Airport (Witham Field)

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CHAPTER 6
Consultation and Public Involvement

6.1 Introduction

Title 14 CFR Part 150 §150.21(b) and §A150.105(a) require that NEMs and documentation submitted be developed and prepared

> *"in consultation with states, public agencies and planning agencies whose area, or any portion of whose area, of jurisdiction is within the DNL 65 dB contour depicted on the map, FAA regional officials, and other Federal officials having local responsibility for land uses depicted on the map. This consultation must include regular aeronautical users of the airport."*

Consultation required by 14 CFR Part 150 includes the following entities:

- Aviation users (e.g., fixed base operators, based aircraft operators, etc.);
- Jurisdictional authorities with land located within the DNL 60 dB or greater contours (i.e., the City of Stuart and unincorporated Martin County contain property within the DNL 60 dB and higher contours); and
- Interested parties (i.e., the public).

The BOCC implemented a proactive agency consultation and public involvement program that exceeded the requirements of 14 CFR Part 150 and provided opportunities for meaningful public engagement and participation in development of the NEMs. Agency consultation and public involvement efforts undertaken for this 14 CFR Part 150 Study are discussed in this chapter.

6.2 Public Workshop, Draft NEM Report, and Public Comments

During the course of the Part 150 Study, the BOCC accepted comments from the public and held multiple public information workshops. The first workshop was held at the beginning of the Study, and an additional workshop was held after the release of the Draft NEM Report. Details of the workshops, release of the Draft NEM Report, and public comments are provided below.

6.2.1 Study Kick-Off Public Workshop

The initial workshop was held on September 19, 2018 from 5:30 P.M. to 7:00 P.M. at the Martin County Airport Maintenance Building Conference Room. The workshop was announced to the public in the Treasure Coast Newspapers and the ANAC members were informed about the meeting.

In attendance were a number of members of the general public and representative of ANAC. The purpose of this Workshop was to inform the public about the details of the Part 150 Study, and how to provide comments on the results. The information presented at the Workshop included an overview of the Study process, the need for the Study, what the potential outcomes could be, how to provide comments and stay involved, and other relevant information related to the Study. Workshop informational materials included presentation boards and a handout. Copies of the Workshop notice, sign-in sheets, presentation materials, handouts, and comments received are provided in **Appendix F.**

6.2.2 ANAC Briefings

The Martin County Airport Airport Noise Advisory Committee or ANAC was briefed regularly on the status of the Part 150 process. ANAC serves as a platform to discuss and share Airport-related information with interested parties in the surrounding community. ANAC includes one representative from each of the following entities/organizations.

- Resident from within the DNL 65 noise exposure contour
- Resident from within the DNL 60 noise exposure contour
- Resident from within the DNL 65 or 60 noise exposure contour
- Flight Instructor representative
- Witham Field charter operator representative
- Witham Field based aircraft aircraft owner
- Witham Field Fixed Base Operator representative
- City of Stuart Council member
- Sewall's Point Town Council representative
- Friends of Witham Field representative
- Member of the Martin County Board of County Commissioners
- Witham Aero Club representative
- Witham Airport Action Majority (WAAM) representative

The details of the Part 150 briefings to ANAC are summarized below.

July 26, 2018

Members of the Study Team attended the regular ANAC meeting on July 26, 2018 to brief the members about the upcoming Part 150 Study. The briefing introduced the Study Team members, gave an overview of Part 150 regulations, a history of noise issues at the Airport, and an outline of the expected community outreach process for the project.

January 23, 2019

Members of the Study Team briefed the ANAC on the status of the Part 150 Study and on the forecast assumptions prepared for the Part 150 Study.

October 24, 2019

Members of the Study Team attended the regular ANAC meeting on October 24, 2019 to update the committee on the preliminary findings of the Part 150 Study. The briefing detailed the assumptions and calculations performed to generate the Study's noise contours, presented the details of these contours, and shared an updated schedule for the rest of the project.

April 22, 2021

Members of the Study Team provided the ANAC with a summary of the Draft NEM Report. After a brief discussion of Part 150 Studies in general and an aircraft noise overview, the draft noise exposure maps were presented along with the operational data that was used to prepare the maps. The briefing covered the same information presented to the public as the May, 2021 Public Workshop.

6.2.3 Draft NEMs and Public Workshop

A Notice of Availability of the Draft Part 150 Study and Notice of a Public Information Workshop was published in the Treasure Coast Newspapers on May 15th and 16th, 2021.

The Notice of Availability and the Draft Part 150 Study were available electronically (in PDF format) for download on the Airport's website at https://www.martin.fl.us/martin-county-services/notice-draft-noise-exposure-maps-public-information-workshop. Copies of the Draft Part 150 Study were also made available for public review during regular business hours at the airport.

The second Part 150 Study Workshop was held on June 15th, 2021 from 5:30 P.M. to 6:30 P.M. in a virtual format to maximize the opportunity to attend. The purpose of this meeting was to educate the public about the NEM results and encourage them to comment on the information and assumptions outline in the Draft NEM Report. The virtual Workshop began with a presentation that gave background about the 14 CFR Part 150 process and aircraft noise, presented the presented the study assumptions and resulting Noise Exposure Maps, and a summary of the major takeaways of the Draft NEM Report. Attendees were encouraged to provide comments on the Draft NEM Report by both regular mail and e-mail. The Workshop materials including newspaper notices and the presentation can be viewed in **Appendix F**.

6.2.4 Public Comments

The Study team received two comments in response to the Draft NEM Report. The first comment mentions an overall increase in noise out of the Airport, specifically the noise from increased air traffic in the mornings, and the impact of this noise on real estate. The second comment also mentions on the overall increase in noise out of the Airport but this comment focuses on the size of jet aircraft, sound issues from nighttime operations, and believes that departing aircraft should stay straight when departing the runway. This second comment also mentions the air quality impact of the aircraft on the surrounding area. These comments and the comment responses can be found in **Appendix G.**

APPENDIX A-1
Glossary of Terms

Term	Definition
14 CFR PART 77	This regulation, titled "Safe, Efficient Use and Preservation of the Navigable Airspace," establishes standards for determining obstructions and their potential effects on aircraft operations. Objects are considered to be obstructions to air navigation according to 14 CFR Part 77 if they exceed certain heights or penetrate certain imaginary surfaces established in relation to airport operations. Objects classified as obstructions are subject to an FAA aeronautical analysis to determine their potential effects on aircraft operations.
14 CFR PART 150	This regulation, titled "Airport Noise Compatibility Planning," sets forth criteria for developing a 14 CFR Part 150 Noise Compatibility Program, an FAA-assisted program designed to increase the compatibility of land and land uses in the areas surrounding an airport that are most directly affected by operation of the airport. The specific purpose is to reduce the adverse effects of noise as much as possible by implementing both on-airport noise abatement measures and off-airport noise mitigation measures. The basic products of an 14 CFR Part 150 program typically include (1) noise exposure maps for the existing condition and for 5 years in the future; (2) workable on-airport noise abatement measures (preferential runway use programs, new or preferential flight tracks), (3) off-airport noise mitigation measures (land acquisition, soundproofing, or special zoning); (4) an analysis of the costs and the financial feasibility of the recommended measures; and (5) policies and procedures related to the implementation of on- and off-airport programs. Community involvement opportunities are provided throughout all phases of noise compatibility program development.
A-WEIGHTED SOUND LEVEL (dBA)	The ear does not respond equally to different frequencies of sound. It is less efficient at low and high frequencies than it is at medium or speech-range frequencies. Thus, to obtain a single number representing the sound level of a noise having a wide range of frequencies in a manner representative of the ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to the medium frequencies. The resultant sound level is said to be A-weighted, and the units are decibels (dB); hence, the abbreviation is dBA. The A-weighted sound level is also referred to as the noise level. Sound level meters have an A-weighting network for measuring noise in A-weighted decibels.
ABSORPTION	Absorption is a property of materials that reduces the amount of sound energy reflected. Thus, introduction of an “absorbent” into the surfaces of a room will reduce the sound pressure level in that room because sound energy striking the room’s surfaces will be partially absorbed rather than totally reflected. The process of absorption is different from that of transmission loss through a material, which determines how much sound enters a room via the walls, ceiling, and floor. Absorption reduces the resultant sound level in the room produced by energy that has already entered the room.
ACCEPTABLE	Relating to noise Day-Night Average Sound Level (DNL) not exceeding 65 decibels. Noise exposure may be of some concern, but common building construction will make the indoor environment acceptable, and the outdoor environment will be reasonably pleasant for recreation and play. As defined by 14 CFR Part 150, *Airport Noise Compatibility Planning*.
ADVISORY CIRCULAR (AC)	An external Federal Aviation Administration (FAA) publication consisting of non-regulatory material of a policy, guidance, or informational nature.
AIRCRAFT OPERATION	An aircraft arrival (landing) or an aircraft departure (takeoff) each represent one aircraft operation; therefore, an arrival and departure is counted as two operations. A low approach, below traffic pattern or a touch-and-go operation is counted as both a landing and a takeoff, i.e., two operations. The FAA records aircraft operations in four categories: air carrier, air taxi, general aviation, and military.
GENERAL AVIATION	All civil aircraft operations not classified as air carrier or air taxi operations.
MILITARY	Operations performed by military groups, such as the Air National Guard, the U.S. Air Force, or the U.S. Marine Corps. Aircraft operations may also be described as local or itinerant:

Term	Definition
LOCAL	Local operations are performed by aircraft that (1) operate in the local traffic pattern or within sight of the airport, (2) are known to be departing for, or arriving from, local practice areas within a 20-mile radius of the airport, or (3) execute simulated or practice instrument approaches or low passes at the airport. Touch-and-go operations are counted as two local operations.
ITINERANT	All aircraft operations other than local operations.
AIR NAVIGATION FACILITY (NAVAID)	A facility designed for use as an aid to air navigation, including landing aids, lights, any apparatus or equipment for disseminating weather information; for signaling for radio direction-finding or for radio or other electronic communication; and any other structure or mechanism having a similar purpose for guiding and controlling flight in the air or the landing or takeoff of aircraft.
AIRPORT ENVIRONS	The area surrounding an airport that is considered to be directly affected by the presence and operation of the airport.
AIRPORT TRAFFIC CONTROL TOWER (ATCT)	A central operations facility in the terminal area air traffic control system, consisting of a tower cab structure and an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling, and other devices, to provide safe and expeditious movement of terminal area air traffic.
AIRSPACE	Space in the air above the surface of the earth or a particular portion of such space, usually defined by the boundaries of an area on the surface projected upward.
AIR TRAFFIC CONTROL (ATC)	A service operated by appropriate authority (the FAA) to promote the safe, orderly, and expeditious flow of air traffic.
ATTENUATION	Acoustical phenomenon whereby a reduction of sound energy is experienced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, man-made features, and natural features.
AVIATION ENVIRONMENTAL DESIGN TOOL (AEDT)	A computer model developed by the FAA and required by the FAA for use in 14 CFR Part 150 studies, environmental assessments, and environmental impact statements for developing existing and future aircraft noise exposure maps.
BUILDING CODE	A legal document that sets forth requirements to protect the public health, safety, and general welfare as they relate to the construction and occupancy of buildings and structures. The code establishes the minimum acceptable conditions for matters found to be in need of regulation. Topics generally covered are exits, fire protection, structural design, sanitary facilities, lighting, and ventilation. Sound insulation may also be included.
CONTROLLED AIRSPACE	Airspace of defined dimensions within which air traffic control service is provided to IFR and to Visual Flight Rule (VFR) flights in accordance with the airspace classification.
DAY-NIGHT AVERAGE SOUND LEVEL (DNL)	A measure used to predict, by a single number rating, cumulative aircraft noise that affects communities in airport environs. DNL represents decibels of noise as measured by an A-weighted sound-level meter. In the DNL procedure, the noise exposure from each aircraft takeoff or landing is calculated at ground level around an airport, and these noise exposure levels are accumulated for a typical 24-hour period. (The 24-hour period often used is the average day of the peak month for aircraft operations during the year being analyzed.) Daytime and nighttime noise exposure is considered separately. A weighting factor equivalent to a penalty of 10 decibels is applied to operations between 10:00 p.m. and 7:00 a.m. to account for the increased sensitivity of people to nighttime noise. DNLs can be expressed graphically on maps using either contours or grid cells.
DECIBEL (dB)	A unit for measuring the volume of a sound, equal to the logarithm of the ratio of the intensity of the sound to the intensity of an arbitrarily chosen standard sound.
DISTANCE MEASURING EQUIPMENT (DME)	Equipment (ground and airborne) used to measure and report to the pilot the slant range distance, in nautical miles, of an aircraft from the DME navigational aid.

Term	Definition
FEDERAL AVIATION ADMINISTRATION (FAA)	The FAA, an agency of the U.S. Department of Transportation, is charged with (1) regulating air commerce to promote its safety and development; (2) achieving the efficient use of navigable airspace of the United States; (3) promoting, encouraging, and developing civil aviation; (4) developing and operating a common system of air traffic control and air navigation for both civilian and military aircraft; and (5) promoting the development of a national system of airports.
FLIGHT TRACK	The average flight path flown by aircraft within specific corridors. Deviation from these tracks occurs because of weather, pilot technique, air traffic control, and aircraft weight. Individual flight tracks within a corridor are "averaged" for purposes of modeling noise exposure using the FAA's Integrated Noise Model.
GLOBAL POSITIONING SYSTEM (GPS)	A navigational system that uses a series of satellites orbiting the earth to provide non-precision guidance in azimuth, elevation, and distance measurement.
INCOMPATIBLE LAND USE	Residential, public, recreational, and certain other noise-sensitive land uses that are designated as unacceptable within specific ranges of cumulative (DNL) noise exposure as set forth in 14 CFR Part 150, Appendix A, Table 1.
INSTRUMENT APPROACH	An aircraft approach to an airport, with intent to land, by a pilot flying in accordance with an IFR flight plan, when the visibility is less than 3 miles and/or when the ceiling is at or below the minimum initial approach altitude.
INSTRUMENT FLIGHT RULES (IFR)	Rules specified by the FAA for flight under weather conditions that do not meet the minimum requirements for VFR (see also). Under these conditions the pilot must rely on instruments to fly and navigate.
INSTRUMENT LANDING SYSTEM (ILS)	A system that provides, in the aircraft, the lateral and longitudinal (localizer), and vertical (guidance) electronic guidance necessary for an instrument landing.
LAND USE COMPATIBILITY	The compatibility of land uses surrounding an airport with airport activities and particularly with the noise from aircraft operations.
LAND USE CONTROLS	Controls established by local or state governments to implement land use planning. The controls include zoning, subdivision regulations, land acquisition (in fee simple, lease-back, or easements), building codes, building permits, and capital improvement programs (to provide sewer, water, utilities, or other service facilities).
LAND USE PLANNING	Comprehensive planning carried out by units of local government, for all areas under their jurisdiction, to identify the optimum uses of land and to serve as a basis for the adoption of zoning or other land use controls.
NOISE	Noise is any sound that is considered to be undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.
NOISE CONTOURS	Lines drawn on a map that connect points of equivalent noise exposure levels. For aircraft noise analyses conducted using DNL, noise contours are usually drawn in 5-DNL intervals, such as connections of DNL 75 exposure, DNL 70 exposure, DNL 65 exposure, and so forth.
NOISE COMPATIBILITY PROGRAM (NCP)	The NCP can consist of a combination of preferred noise abatement procedures, land use controls, and administrative measures; as well as a plan for the implementation. For planning purposes, the implementation plan also includes the estimated cost for each of the recommended measures to the airport sponsor, the FAA, airport users, and the local units of government.
NOISE EXPOSURE MAP (NEM)	A map prepared in accordance with 14 CFR Part 150 or other FAA environmental regulation that depicts actual (existing or historical conditions) or anticipated (future conditions) aircraft noise exposure and the affected land uses. NEMs for future conditions may take into account anticipated land use changes around the airport.

Term	Definition
NOISE LEVEL REDUCTION (NLR)	The noise reduction between two areas or rooms is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. Noise reduction is measured by combining the effect of the transmission loss performance of structures separating the two areas or rooms and the effect of acoustic absorption in the receiving room.
NOISE-SENSITIVE LAND USE	A land use that can be adversely affected by high levels of aircraft noise. Residences, schools, hospitals, religious facilities, libraries, and other similar uses are typically considered to be noise-sensitive.
PRECISION APPROACH PATH INDICATOR (PAPI)	An airport lighting facility in the terminal area navigation system used under VFR conditions, through a single row of two to four lights, radiating high intensity red or white beams to indicate whether the aircraft is on, above, or below the required runway glide slope.
RUNWAY	A defined rectangular area on an airport for the purpose of landing and taking off of aircraft. Runways are numbered in relation to their magnetic direction, rounded to the nearest 10 degrees (i.e., Runway 14, Runway 32).
SOUND INSULATION	(1) The use of structures and materials designed to reduce the transmission of sound from one room or area to another, or from the exterior to the interior of a building. (2) The degree of reduction in sound transmission, or noise level reduction, by means of sound insulating structures and materials.
SOUND LEVEL (NOISE LEVEL)	The weighted sound pressure level obtained by the use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.
STANDARD TERMINAL ARRIVAL ROUTE (STAR)	A preplanned and published instrument arrival route.
TERMINAL AREA FORECAST (TAF)	The Terminal Area Forecast (TAF) is the official FAA forecast of aviation activity for U.S. airports. Forecasts are prepared for major users of the National Airspace System including air carrier, air taxi/commuter, general aviation, and military.
TERMINAL RADAR APPROACH CONTROL (TRACON)	Radar approach facility generally serving more than one airport, providing separation; safety alerts; and sequencing of arrival, departure, and transitioning air traffic.
UNACCEPTABLE	DNL above 75 decibels-Noise exposure at the site is so severe that the construction cost to make the indoor noise environment acceptable may be prohibitive and the outdoor environment would still be unacceptable.
VERY HIGH FREQUENCY (VHF) OMNIDIRECTIONAL RANGE (VOR)	A radio transmitter facility in the navigation system radiating a VHF radio wave modulated by two signals, the relative phases of which are compared, resolved, and displayed by a compatible airborne receiver to give the pilot a direct indication of bearing relative to the facility.
ZONING AND ZONING ORDINANCES	Ordinances that divide a community into zones or districts according to the current and potential use of properties for the purpose of controlling and directing the use and development of those properties. Zoning is concerned primarily with the use of land and buildings, the height and bulk of buildings, the proportion of a lot that buildings may cover, and the density of population of a given area. As an instrument for noise compatibility plan implementation, zoning deals principally with the use and development of privately owned land and buildings. The objectives of zoning are to establish regulations that provide locations for all essential uses of land and buildings and ensure that each use is located in the most appropriate place. In noise compatibility planning, zoning can be used to achieve two major aims: (1) to reinforce existing compatible land uses and promote the location of future compatible uses in vacant or underdeveloped land, and (2) to convert existing incompatible uses to compatible uses over time.

SOURCE: Environmental Science Associates, 2018.

APPENDIX A-2
Acronyms List

ACRONYMS LIST

AAD	Average Annual Day
AC	Advisory Circular
AEDT	Aviation Environmental Design Tool
ANAC	Airport Noise Abatement Committee
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
BOCC	Board of County Commissioners, Martin County
CAT	Category
CBP	Customs and Border Protection
CFR	Code of Federal Regulations
dB	Decibel
dBA	A-weighted decibel
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DP	Departure Procedure
EMAS	Engineered Material Arresting System
ESA	Environmental Science Associates
FAA	Federal Aviation Administration
FBO	Fixed Base Operator
FDOT	Florida Department of Transportation
FGDL	Florida Geographic Data Library
GA	General Aviation
GIS	Geographic Information System
GPS	Global Positioning System
HIRL	High Intensity Runway Lighting
Hz	Hertz
IAP	Instrument Approach Procedures
IFR	Instrument Flight Rules
ILS	Instrument Landing System
MALSR	Medium Intensity Approach Light System with Runway Alignment Indicator Lights
MSL	Mean Sea Level
MRO	Maintenance, Repair and Overhaul
NAVAIDS	Navigational Aids
NCP	Noise Compatibility Program
NDB	Non-Directional Beacon
NEM	Noise Exposure Map
NLR	Noise Level Reduction
NPIAS	National Plan of Integrated Airport Systems
PAPI	Precision Approach Path Indicator
PBI	Palm Beach International Airport
RNAV	Area Navigation
STAR	Standard Terminal Arrival
SUA	Martin County Airport, Witham Field
TAF	Terminal Area Forecast
TRACON	Terminal Radar Approach Control
VHF	Very High Frequency
VNOMS	Vector Noise and Operations Management System
VOR	VHF Omni Directional Radar Beacon
VOR/DME	VHF Omni Directional Radar Beacon with Distance Measuring Equipment

APPENDIX B

Forecast Memorandum

This Appendix includes the forecast approval for the Martin County Airport Part 150 Study. Documentation in this Appendix includes FAA approval of the forecast and the memorandum explaining the generation of the forecast..

- Appendix B-1 FAA Approval of Forecast
- Appendix B-2 Forecast Memorandum and Technical Memorandum related to the COVID-19 Pandemic

U.S. Department
of Transportation
**Federal Aviation
Administration**

ORLANDO AIRPORTS DISTRICT OFFICE
8427 SouthPark Circle, Suite 524
Orlando, Florida 32819
Phone: (407) 487-7220 Fax: (407) 487-7135

August 26, 2019

Mr. Sam Carver
Airport Manager
Martin County Airport/Witham Field
2401 S.E. Monterey Road
Stuart, Florida 34996

Dear Mr. Carver:

RE: Martin County Airport/Witham Field (SUA)
Approval of Forecast of Aviation Activity for NEM Update

This letter responds to your submittal of revised Aviation Activity Forecasts for the Noise Expsoure Maps (NEMs) for Martin County Airport/Witham Field submitted July 31, 2019. The operations forecasts shown in Table 5 of the report are approved to be used in update to the NEMs.

If you have any questions, please feel free to contact me at (407) 487-7231.

Sincerely,

Marisol C. Elliott

Marisol C. Elliott
Community Planner

cc: Laurie McDermott, FDOT/4
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APPENDIX B
Forecast Memorandum

This document outlines a future activity estimate for use in updating the Noise Exposure Maps (NEMs) for Martin County Airport/Witham Field (SUA). The following sections review the trends and factors influencing aircraft activity at the airport and current agency activity projections. Based on this information, a reasonable estimate of future activity was developed for use in the NEM update.

1.0 Historic Activity and Current Trends

Aircraft activity at SUA was reviewed over the past 20 years to provide insight into historic and current trends (**Table 1**). It was noted that the airport experienced its highest activity levels during the 20-year period in 2002 with nearly 125,000 operations. Subsequently, aircraft operations experienced a decline across every category of activity to a low of just under 56,000 operations in 2011. This decline, following the events of September 11, 2001 and the subsequent Great Recession, fueled similar activity changes at other GA airports nationally. The largest change at SUA on a percentage basis through 2011 was in the local activity category with a decrease of nearly 68 percent.

In 2012, activity began to rebound as a result of an improving economy and has continued an upward trend over the last eight years. For the recent 12-month period ending June 2019, the airport experienced 114,291 operations, a 9.7 percent increase over FY2018. With three months left in FY2019, the airport is tracking at 12.4 percent growth relative to the same 9-month period in FY 2018. Every category of aircraft activity has doubled at the airport since 2011 with air taxi outpacing GA local and itinerant operations on a percentage basis.

TABLE 1
HISTORIC AIRCRAFT OPERATIONS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year[1]	Historic Aircraft Operations								Total Operations	Annual Change
	Itinerant Operations					Local Operations				
	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total		
2000	0	3,568	58,527	739	62,834	52,366	135	52,501	115,335	
2001	1	4,325	63,367	629	68,322	51,562	237	51,799	120,121	4.1%
2002	0	6,197	66,979	717	73,893	50,752	320	51,072	124,965	4.0%
2003	0	7,217	65,777	736	73,730	43,024	530	43,554	117,284	-6.1%
2004	0	7,079	67,925	574	75,578	36,480	457	36,937	112,515	-4.1%
2005	0	6,790	58,555	531	65,876	30,395	367	30,762	96,638	-14.1%
2006	176	6,172	54,292	433	61,073	23,694	479	24,173	85,246	-11.8%

2007	0	6,487	52,090	446	59,023	18,900	220	19,120	78,143	-8.3%
2008	1	5,616	42,882	136	48,635	18,775	44	18,819	67,454	-13.7%
2009	0	3,890	39,262	91	43,243	15,995	364	16,359	59,602	-11.6%
2010	0	4,917	40,550	145	45,612	16,939	305	17,244	62,856	5.5%
2011	0	4,113	35,076	169	39,358	16,440	122	16,562	55,920	-11.0%
2012	0	4,260	32,558	83	36,901	19,247	30	19,277	56,178	0.5%
2013	0	4,485	35,669	148	40,302	23,550	50	23,600	63,902	13.7%
2014	9	4,981	42,749	86	47,825	31,925	24	31,949	79,774	24.8%
2015	4	4,380	45,517	241	50,142	33,523	92	33,615	83,757	5.0%
2016	0	5,700	48,470	272	54,442	34,949	136	35,085	89,527	6.9%
2017	0	7,066	58,219	157	65,442	38,607	58	38,665	104,107	16.3%
2018	0	8,775	60,732	401	69,908	34,247	96	34,343	104,251	0.1%
2019[2]	0	9,466	65,711	361	75,538	38,701	152	38,853	114,391	**9.7%**
2009-2019 CAAGR	**0**	**9.3%**	**5.3%**	**14.8%**	**5.7%**	**9.2%**	**-8.4%**	**9.0%**	**6.7%**	

Source: FAA 2018 TAF, Issued February 2019,
Notes: 1. The TAF report's data based on the FAA's fiscal year (October 1 through September 30) – not calendar year.
2. Preliminary 2019 data reflect 12-month period ending June 2019, FAA Air Traffic Data Activity System (ATADS)
CAAGR = Compound Annual Average Growth Rate

In addition to the strong national and regional economies, demand by high end users in northern Palm Beach County and Martin County has also resulted in the sustained growth. The airport and fixed based operators, Atlantic Aviation and Stuart Jet Center, continue to make significant investments in new facilities and services that make the airport increasingly attractive for aircraft operators. Recent changes contributing to continued growth include:

- 2015 - Stuart Jet Center completed construction of a new LEED certified green FBO building
- 2016 – Stuart Jet Center completed construction of a 24,000 square foot hangar (6-8 aircraft)
- 2018 - Treasure Coast Flight Training expanded fleet from 15 to 30 based aircraft
- February 2019 – SUA opened a new US Customs and Border Protection Facility
- March 2019 –The Dassault Aircraft Service Center was relocated from Palm Beach International into a new 25,000-square-foot facility at SUA (double the hangar capacity of PBI facility)
- April 2019 – Stuart Jet Center was ranked among the top 4,500 FBO's in the world by Aviation International News including No. 1 for line service, No 3 for customer service representatives and number 9 for most improved FBO.
- 2019 - Atlantic Aviation, which took over Galaxy Aviation in 2014, is adding a 25,000 square-foot hangar (6-8 aircraft) at the same time it's renovating its main customer-service center.
- 2019 - Stuart Jet Center is currently constructing a new 20,000 square foot storage hangar (5-6 aircraft)

Other projects underway or planned during the next five years which will continue to drive growth include two additional 20,000 square foot hangars (5-6 aircraft each).

2.0 Aircraft Operations – Forecast Activity

Based on discussions with airport management, SUA will continue to generate moderate growth in activity. However, this growth is expected to be somewhat less than the 6.7 percent annual average growth rate that the airport experienced over the last 10 years. Agency forecasts were reviewed and an alternative forecast was developed based on current and ongoing development at the airport.

2.1 FAA and FDOT Forecasts

The FAA Terminal Area Forecast (TAF) is the official forecast of aviation activity used by the FAA for airports in the National Plan of Integrated Airport Systems (NPIAS). TAF forecasts are prepared for both towered and non-towered facilities to meet the budget and planning needs of FAA. These forecasts are issued annually by the FAA (in this case, February 2019) and reflect the FAA's forecast of aircraft operations based on the FAA's fiscal year (October 1 through September 30). For towered airports, the TAF projects activity based on the historic air traffic control tower (ATCT) counts included in FAA's Air Traffic Data Activity System (ATADS).

The Florida Department of Transportation (FDOT) Aviation and Spaceports Office supports aviation planning efforts through various programs including the development of several aviation forecasts for airports within the state System Plan. This includes development of activity forecasts for operations at SUA.

The projected annual aircraft operations for SUA, as published in the 2018 TAF and in the 2015 FDOT forecast, are presented in **Table 2**.

TABLE 2
2018 TERMINAL AREA FORECAST (TAF) – PROJECTED AIRCRAFT OPERATIONS
FDOT GENERAL AVIATION OPERATIONS FORECAST – PROJECTED AIRCRAFT OPERATIONS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year[1]	FAA 2018 TAF Forecasted Aircraft Operations								Total Operations	FDOT 2015 Forecasted Total Operations
	Itinerant Operations					Local Operations				
	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total		
2018	0	8,775	60,732	401	69,908	34,247	96	34,343	104,251	90,677
2019	0	8,775	63,165	401	72,341	33,136	96	33,232	105,573	92,109
2020	0	8,775	63,370	401	72,546	33,302	96	33,398	105,944	93,565
2021	0	8,775	63,576	401	72,752	33,469	96	33,565	106,317	95,043
2022	0	8,775	63,783	401	72,959	33,637	96	33,733	106,692	96,545
2023	0	8,775	63,990	401	73,166	33,805	96	33,901	107,067	98,070
2024	0	8,775	64,198	401	73,374	33,974	96	34,070	107,444	99,620
2025	0	8,775	64,407	401	73,583	34,144	96	34,240	107,823	101,194
2018-2025 CAAGR	0%	0.0%	0.8%	0.0%	0.7%	0.0%	0.0%	0.0%	0.5%	1.6%

Notes: 1. The TAF report's data based on the FAA's fiscal year (October 1 through September 30) – not calendar year.
2. 2018 TAF values are historical data while 2019 and future dates are forecasted. All FDOT value are forecasted.
Source: FAA 2018 TAF issued February 2019, FDOT 2015 General Aviation Operations Forecast.

While the FAA and FDOT's forecasts both project increases in operations in the future years, neither is suitable for direct use in this analysis. The FAA forecast reflects a relatively low annual growth rate of 0.5 percent throughout the planning period. When comparing the TAF to the current operational levels, it can be determined that SUA is already exceeding the activity level projected by the FAA for the airport in 2041.

While the FDOT average annual growth rate of 1.6 percent is higher than the FAA's rate , the FDOT forecast is not re-indexed annually (unlike the TAF) to adjust the projected growth from current levels. As a result, its projection is dated and does not reflect current activity levels or trends at the airport.

2.2 Alternative Forecast Approach

Since neither the FAA TAF or FDOT forecasts appear suitable for use for the NEM update, an alternative approach was taken for the purposes of estimating the future operational conditions. This approach used the most recent 12-month period as the 2019 activity baseline and estimated growth based on ongoing and expected improvements at the airport. Facilities including the Dassault Aircraft Service Center and the US Customs and Border Protection Facility were completed in early 2019 and are not currently reflected in the 2019 baseline. Additionally, while Treasure Coast Flight Training doubled its fleet in 2018, it will take some time before the training operation reaches its potential and the aircraft are fully utilized. Ongoing improvements and the world class ranking of the FBOs has potential to attract additional demand to the airport. The FBOs continue to respond to demand by higher end business and recreational aircraft with ongoing and planned construction of bulk hangar facilities. **Table 3** estimates the potential additional activity that might be expected at the airport if demand is consistent with current and planned improvements.

TABLE 3
POTENTIAL INCREASE RESULTING FROM CHANGES
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year	Year Completed	Estimated Increase in Operations through 2025[1]	Average Operations
Dassault Aircraft Service Center	2019	1,200-1,800	1,500
US Customs and Border Protection facility[2]	2019	3,000-4,000	3,500
FBO Upgrades and improvements	Ongoing	2,000-3,000	2,500
Training fleet expansion	2018	6,000-10,000	8,000
Hangar (20,000)	2019/2020	1,000-1,200	1,100
Hangar (25,000)	2019/2020	1,200-1,600	1,400
Hangar (20,000)	2023	1,000-1,200	1,100
Hangar (20,000)	2024	1,000-1,200	1,100
TOTALS		**16,400—24,000**	**20,200**

Sources: ESA, estimated.
[1] Reflects anticipated range of additional induced operations either not or only partially reflected in current 2019 baseline.
[2] Feasibility study estimates an increase in airport activity of 3-5 percent (Witham Field – US Customs Program Feasibility Study, July 29,2014

Table 3 indicates that an additional 20,200 operations might be reasonably expected by 2025 if demand is consistent with improvements. This equates to an annual average growth rate of 2.75 percent. For the

purposes of this analysis, the growth was assumed to be consistent throughout the period as facilities come on line and transition toward full utilization. Given the recent growth trends at the airport and the types of facilities that are being developed, it is expected that growth will be higher in the air taxi and GA itinerant categories of activity versus the local activity. **Table 4** reflects the projected growth in operations based on recent and expected trends.

TABLE 4
FORECAST AIRCRAFT OPERATIONS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year[1]	Historic Aircraft Operations								Total Operations	Annual Change
	Itinerant Operations					Local Operations				
	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total		
2019[1]	0	9,466	65,711	361	75,538	38,701	152	38,853	114,391	
2020	0	9,736	67,682	374	77,792	39,599	136	39,735	117,527	2.74%
2021	0	10,013	69,713	374	80,100	40,518	136	40,654	120,755	2.75%
2022	0	10,299	71,804	374	82,477	41,459	136	41,595	124,072	2.75%
2023	0	10,593	73,958	374	84,925	42,421	136	42,557	127,482	2.75%
2024	0	10,895	76,177	374	87,446	43,406	136	43,542	130,987	2.75%
2025	0	11,205	78,462	374	90,042	44,413	136	44,549	134,591	2.75%
2019-2025 CAAGR	0%	2.85%	3.00%	0%	2.97%	2.32%	0%	2.31%	2.75%	

Source: FAA 2018 TAF, Issued February 2019,
1. Preliminary 2019 data reflect 12-month period ending June 2019, FAA Air Traffic Data Activity System (ATADS)

3.0 Forecast Comparison

If an airport is included in the FAA TAF, any new forecasts need to be reviewed and approved by the agency before they can be applied to further analyses. During this review the FAA looks to see if the passenger enplanements, annual operations, or based aircraft forecasts differ from the TAF by more than 10 percent in the five-year and/or 15 percent in the ten-year planning periods.

When compared to the 2018 TAF (**Table 5**), the alternative forecast differs by 8.4 percent in the base year (2019) and 24.8 percent in 2025. While these forecasts vary more than 10 percent from the TAF in 2025, the TAF does not reflect current activity and existing and planned improvement at the airport and would therefore, underestimate the noise exposure relative to the community. For informational purposes, the 2018 TAF was adjusted to reflect a revised 2019 baseline using the actual activity experienced during the 12-month period ending June 2019. The alternative forecast developed for the SUA NEM Update varies by 14.2 percent in 2025 relative to this adjusted 2018 TAF. Because the alternative forecasts better represent both recent activity at the airport and the anticipated activity that would result from ongoing improvements, use of the activity levels outlined in Table 4 is recommended for the purposes of the Part 150 NEM Update.

TABLE 5
COMPARISON OF FORECASTS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year	2018 TAF	Recommended Activity Forecast	Difference	TAF adjusted for 2019 Baseline	Adjusted Difference
2019	105,573	114,391	8.4%	114,391	0.0%
2020	105,944	117,527	10.9%	114,963	2.2%
2021	106,317	120,755	13.6%	115,538	4.5%
2022	106,692	124,072	16.3%	116,115	6.9%
2023	107,067	127,482	19.1%	116,696	9.2%
2024	107,444	130,987	21.9%	117,280	11.7%
2025	107,823	134,591	24.8%	117,866	14.2%

Sources: FAA 2018 TAF, published February 2019 and ESA, 2019.
Adjusted TAF has been re-indexed to a new 2019 baseline based on activity during the 12-month period ending June 2019.

TECHNICAL MEMORANDUM

SUA Activity Review

This memorandum reviews the forecast used in the development of the Noise Exposure Maps (NEMs) for Martin County Airport/Witham Field (SUA) to determine if it remains reasonable in light of the effects of the recent COVID-19 pandemic.

1.0 FAA Approved Activity Forecast

The activity forecast developed for the purposes of development of the NEMs reviewed to 20-year historic activity trends at SUA including recent growth trends for the airport. This review determined that every category of aircraft activity has doubled at the airport since 2011 with air taxi outpacing GA local and itinerant operations on a percentage basis. It also noted a number of recent and ongoing investments in new facilities and services that make the airport increasingly attractive for aircraft operators. The forecast ultimately used the most recent 12-month period (through June 2019) as the 2019 activity baseline and estimated growth based on ongoing and expected improvements at the airport. **Table 1** reflects the resulting forecast which was approved by the FAA for use in developing the NEMs on August 26th, 2019.

TABLE 1
FAA NEM APPROVED FORECAST OF AIRCRAFT OPERATIONS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Fiscal Year[1]	Historic Aircraft Operations								Total Operations	Annual Change
	Itinerant Operations					Local Operations				
	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total		
2019[1]	0	9,466	65,711	361	75,538	38,701	152	38,853	114,391	
2020	0	9,736	67,682	374	77,792	39,599	136	39,735	117,527	2.74%
2021	0	10,013	69,713	374	80,100	40,518	136	40,654	120,755	2.75%
2022	0	10,299	71,804	374	82,477	41,459	136	41,595	124,072	2.75%
2023	0	10,593	73,958	374	84,925	42,421	136	42,557	127,482	2.75%
2024	0	10,895	76,177	374	87,446	43,406	136	43,542	130,987	2.75%
2025	0	11,205	78,462	374	90,042	44,413	136	44,549	134,591	2.75%
2019-2025 CAAGR	0%	2.85%	3.00%	0%	2.97%	2.32%	0%	2.31%	2.75%	

Source: FAA 2018 TAF, Issued February 2019,
1. Preliminary 2019 data reflect 12-month period ending June 2019, FAA Air Traffic Data Activity System (ATADS)

2.0 Current Activity

As a result of the COVID-19 pandemic, the airport experienced a significant decrease in activity in April, but rebounded quickly and exceeded 2019 levels by June. Airport activity was reviewed for the most recent 12-month periods for both the federal fiscal year (FY, 12-month period ending September 2020) and most recent period of available data (CY 12-month period ending October 2020). It was determined that the forecast used in developing the 2020 NEM is within .8 percent of the actual FY activity level and 2.8 percent of the available CY activity level (see **Table 2**). In reviewing the various components of activity, it can be determined that actual air taxi and GA itinerant activity exceeded the forecast activity for the periods reviewed while local activity during the same period roughly offset those increases. This trend is consistent with similar communities in south Florida where the near term demand for private air travel has increased as the public seeks alternatives to commercial air travel.

TABLE 2
POST COVID-19 PANDEMIC AIRCRAFT OPERATIONS
MARTIN COUNTY AIRPORT/WITHAM FIELD

Period	Historic Aircraft Operations							Total Operations	Total Difference from Forecast
	Itinerant Operations				Local Operations				
	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total		
2020 Forecast	9,736	67,682	374	77,792	39,599	136	39,735	117,527	
2020 FY	10,005	75,182	249	85,437	31,078	62	31,140	116,577	-.8%
2020 CY[1]	10,075	74,319	246	84,641	29,636	52	29,688	114,329	-2.8%

Source: FAA ATADS.
1. Preliminary data reflects 12-month period ending October 2020, FAA Air Traffic Data Activity System (ATADS)

3.0 Conclusion

Operational demand continues to be strong at SUA in spite of effects of the ongoing COVID-19 pandemic. While current activity is down slightly when reviewed on a 12 month rolling calendar basis, this is primarily due to a decrease in flight training operations (local activity). This decrease in flight training activity is nearly completely offset by an increase in itinerant activity. Overall, activity at the airport is generally consistent with the forecast activity level used to develop the 2020 NEM. Activity growth moving forward is expected to continue to be driven by both recent and ongoing investments in new facilities and services as well as near term public use of private air transport as an alternative to travel on commercial airlines. Based on these considerations, it appears that the forecast approved on August 26th, 2019 remains reasonable for use in the development of the SUA NEMs.

APPENDIX C
Airspace and Procedures

The Appendix provides a detailed overview of SUA's facilities, airspace, and approach and departure procedures.

- Appendix C Airspace and Procedures
- Attachment 1 Published Instrument Approach and Departure Procedures

APPENDIX C
Airspace and Procedures

1.1 Airspace

The FAA has six classifications of airspace under the National Airspace System (NAS). These classifications, which are designated Class A, B, C, D, E, and G and shown on **Figure C-1**, are critical to the safety of all flights and to the efficient operation of all air traffic control facilities and the NAS. The airspace in the southeast Florida region is highly congested and complex with many airports, both commercial service and general aviation. Martin County Airport is in a Class D airspace.

FIGURE C-1
AIRSPACE CLASSIFICATIONS

SOURCE: FAA Course ALC-42, *Airspace, Special Use Airspace and TFRs*, 2016.

The following paragraphs describe each airspace classification in the vicinity of SUA. **Figure C-2** depicts the airspace in the vicinity of the Airport.

Class A Airspace

Class A airspace is designated for positive control of aircraft and ranges from 18,000 feet above mean sea level (MSL) to 60,000 feet MSL. Within Class A airspace, only aircraft operating under instrument flight rules (IFR) that are on instrument flight plans are authorized. The aircraft must have specific equipment and Air Traffic Control (ATC) clearance before entering the airspace. This airspace is controlled by the FAA's Air Route Traffic Control Center (ARTCC).

Class B Airspace

Class B airspace is generally defined as the airspace from the ground surface up to 10,000 feet MSL. Class B airspace can sometimes be described as an "upside down wedding cake" designed to contain all published instrument procedures once an aircraft enters the airspace. ATC clearance is

required for all aircraft to operate in Class B airspace. All aircraft that are so cleared also receive separation services from other aircraft within the airspace.

Aircraft operating under Visual Flight Rules (VFR) or IFR are permitted into Class B airspace; however, the aircraft must be equipped with a two-way radio capable of communicating with ATC on appropriate frequencies and an operable radar beacon transponder with automatic altitude reporting equipment. For IFR operations, the aircraft must have an operable VOR or TACAN receiver. The pilot must hold at least a private pilots certificate.

Further surrounding the Class B airport is a 30-nautical mile (nm) Mode C veil that is designated by a thin, solid magenta line that circles the Class B airspace and extends from the surface upward to 7,000 feet MSL. Unless otherwise authorized, an aircraft operating within the Mode C veil must be equipped with automatic pressure altitude reporting equipment having Mode C radar capability. This allows controllers to see all aircraft operating close to the Class B airspace and provide adequate aircraft separation minimums.

Class C Airspace

Class C airspace is the airspace from the surface up to 4,000 feet above the airport elevation charted in MSL surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Class C airspace is represented by solid magenta lines. Like Class B airspace, Class C airspace is individually tailored to meet the needs of the respective airport. As shown on **Figure C-2**, the layers are identified with magenta numbers representing the base and ceiling altitudes of the airspace. The airspace usually consists of a surface area with a 5-nm radius from the surface up to 4,000 feet above airport elevation, and a 10-nm radius that extends from 1,200 feet to 4,000 above the airport. Pilots must establish two-way radio communications with the ATC facility providing air traffic control services prior to entering the airspace. VFR aircraft are separated from IFR aircraft in Class C airspace.

Class D Airspace

The airspace immediately surrounding SUA is classified as a Class D airspace.

Class D airspace is generally that airspace from the surface to 2,500 feet AGL. The configuration of Class D airspace is individually tailored and shown as a dashed blue line with an altitude representing the extent of the airspace from the surface. When instrument procedures are published, the airspace will normally be designed to contain the procedures with either Class D or E airspace. Class D airspace only surrounds airports that have an operational control tower; pilots are required to establish and maintain two-way radio communication with the ATC facility.

Class E Airspace

Class E airspace is generally controlled airspace that is not Class A, B, C, or D. Class E airspace extends upward from either the surface or designated altitude to the overlying or adjacent controlled airspace. Also in this class are Victor airways (airspace beginning at either 700 feet or 1,200 feet AGL used to transition to/from the terminal or enroute environments) and offshore

airspace areas designated below 18,000 feet MSL. Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL over the United States, including that airspace overlying the water within 12 nm off the coast of the 48 contiguous states and Alaska. It does not include airspace at or above 18,000 feet MSL. Class E airspace ensures that IFR aircraft remain in controlled airspace when approaching airports without Class D airspace or when flying on Victor airways that are below 18,000 feet MSL.

Most of the U.S. has a Class E airspace limit of 1,200 feet AGL. Where it decreases to 700 feet AGL is depicted on **Figure C-2** by a shaded, gradient magenta line. The floor of the vast majority of Class E airspace is 700 feet around the Southeast Florida area. The more defined side of the magenta line indicates areas where the floor of Class E airspace rises to 1,200 feet AGL. When Class E airspace extends down to the surface, it is depicted by a dashed magenta line. Class E airspace extending down to the surface usually abuts Class D airspace surrounding an airport.

Class G Airspace

Where the lower level of Class E airspace is not depicted, the airspace beneath is considered uncontrolled or Class G airspace. Class G airspace begins at ground level and, in very remote areas, it has an upper limit of up to but not including 14,500 feet MSL. The top of Class G airspace is usually where Class E airspace begins, usually either 700 foot AGL depicted by magenta shading or 1,200 foot AGL areas depicted by blue shading. Class G airspace begins at the surface throughout much of the area surrounding the Class B, C, D, and E airspaces throughout the Southeast Florida area. Uncontrolled airports located in Class G airspace are depicted in magenta since they do not have a control tower.

Special Use Airspace

Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed on aircraft operations that are not a part of those activities, or both.

1.2 Terminal Procedures Publications

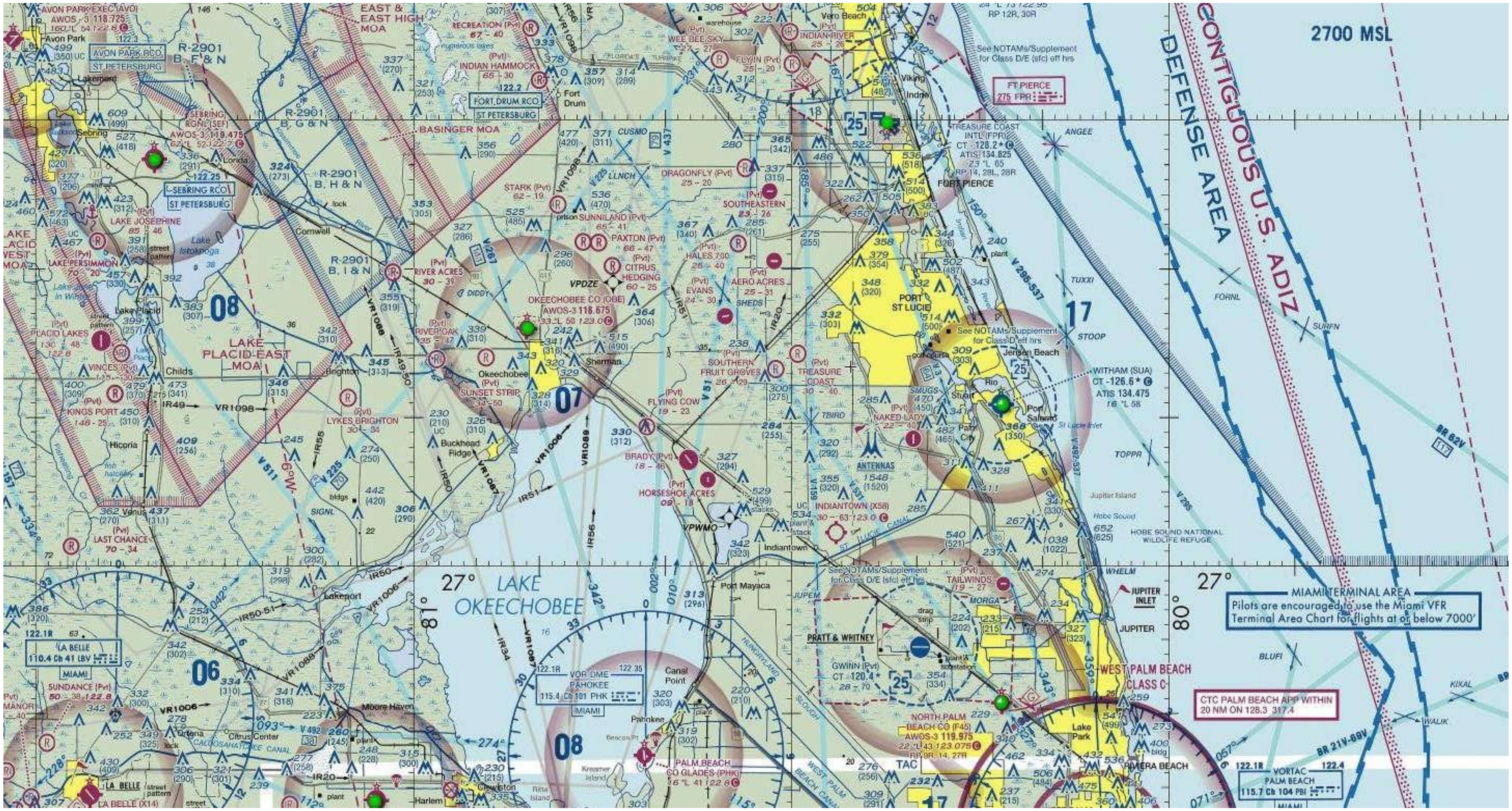
U.S. Terminal Procedures Publications (TPP) are published on a regular, periodic basis by the FAA. Collectively, the instrument approach procedures (IAPs), standard terminal arrival routes (STARs), and departure procedures (DPs) published within provide a system of procedures to move aircraft through the airspace into and out of an airport.

1.2.1 Instrument Approach Procedures

Instrument approach procedures are flight procedures developed and published by the FAA that pilots use to navigate their aircraft to the runway. The IAPs currently published for SUA are provided in **Attachment 1.**

1.2.2 Standard Terminal Arrival Routes and Departure Procedures

When flying a standard terminal arrival route or departure procedure, the pilot will follow waypoints or fixes that are either ground-based or RNAV-based depending on aircraft capability. In conventional procedures, fixes are defined by the location of a navigational aid (e.g., VOR) or determined by reference to these navigational aids such as DME intersections. The advantage of the RNAV STARs and DPs are that waypoints are defined by longitude and latitude, and allow aircraft to fly a more direct course from point to point instead of from navigational aid to navigational aid. STARs and DPs may serve more than one airport in an area, and an airport such as SUA may have multiple STARS and DPs. Each of the published procedures is noted in the following sections. Navigational aids and airspace fixes used by aircraft arriving and departing SUA are shown on **Figure C-3**. The STARs and DPs currently published for SUA are provided in **Attachment 1.**


2700 MSL
CONTIGUOUS U.S. ADIZ
DEFENSE AREA
MIAMI TERMINAL AREA
Pilots are encouraged to use the Miami VFR Terminal Area Chart for flights at or below 7000'
CTC PALM BEACH APP WITHIN 20 NM ON 128.3 317.4
WEST PALM BEACH CLASS C
LAKE OKEECHOBEE
PORT ST LUCIE
FORT PIERCE
LAKE PLACID-EAST MOA
BASINGER MOA
EAST & EAST HIGH MOA
R-2901 B, F & N
R-2901 B, G & N
R-2901 B, H & N
R-2901 B, I & N
HOBE SOUND NATIONAL WILDLIFE REFUGE
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Vero Beach

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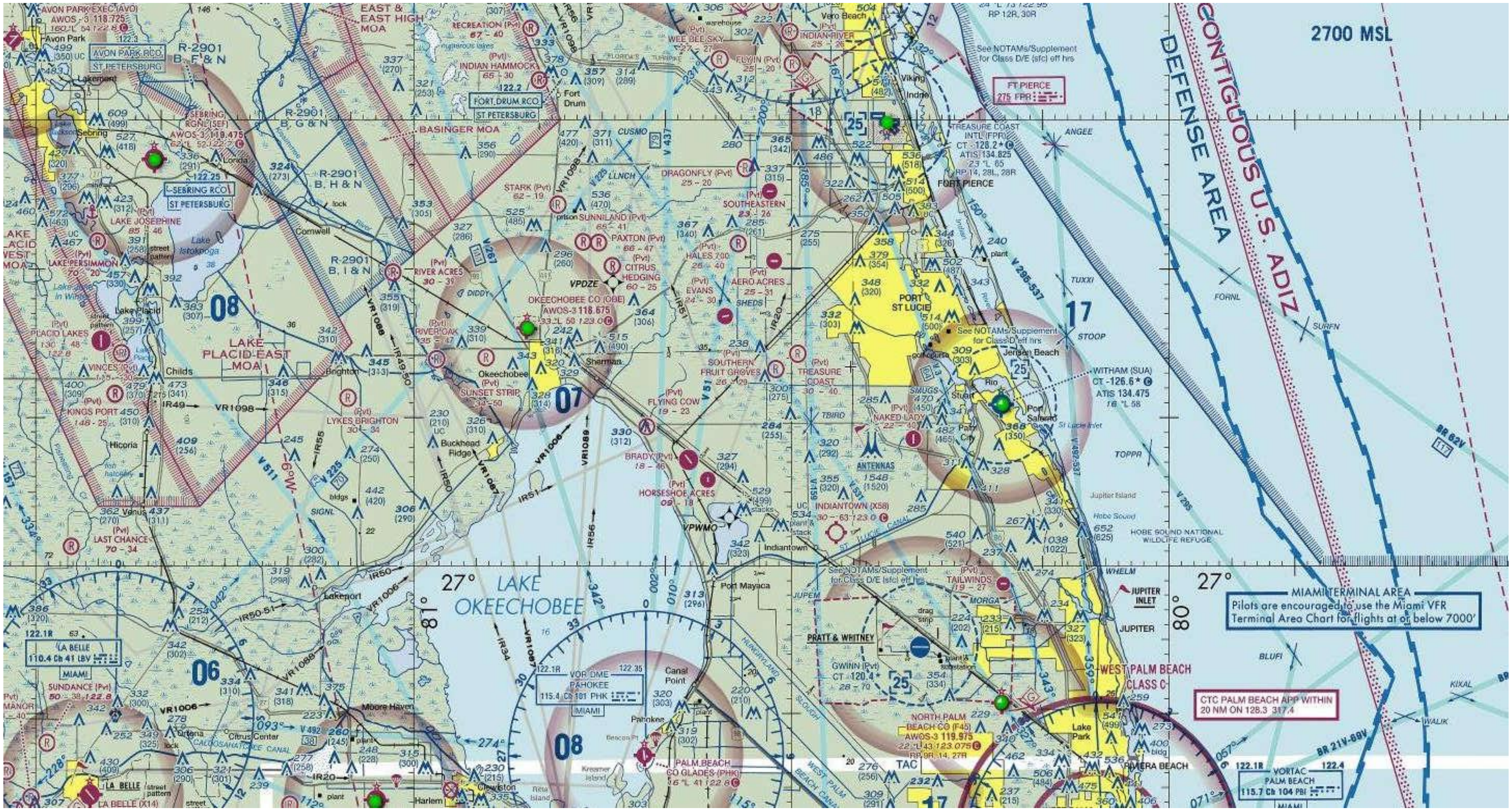
2700 MSL
CONTIGUOUS U.S. ADIZ
DEFENSE AREA
MIAMI TERMINAL AREA
Pilots are encouraged to use the Miami VFR Terminal Area Chart for flights at or below 7000'
CTC PALM BEACH APP WITHIN 20 NM ON 128.3 317.4
LAKE OKEECHOBEE
WEST PALM BEACH
CLASS C
PORT ST LUCIE
FORT PIERCE
Jensen Beach
Stuart
Indiantown
PRATT & WHITNEY
JUPITER
Lake Park
Okeechobee
Lakeport
Clewiston
Pahokee
Canal Point
Port Mayaca
Sebring
Avon Park
Lake Placid
Moore Haven
Harlem
LAKE PLACID-EAST MOA
BASINGER MOA
EAST & EAST HIGH MOA
R-2901 B, F & N
R-2901 B, G & N
R-2901 B, H & N
R-2901 B, I & N
TREASURE COAST INTL (FPR)
WITHAM (SUA)
OKEECHOBEE CO (OBE)
NORTH PALM BEACH CO (F45)
PALM BEACH GLADES (PHK)
INDIANTOWN (X58)
SEBRING RGNL (SEF)
AVON PARK EXEC (AVO)
LA BELLE (X14)
HOBE SOUND NATIONAL WILDLIFE REFUGE
27°
80°
81°

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BRNGR TWO DEPARTURE (RNAV)

BRNGR TWO DEPARTURE (RNAV)

SE-3, 27 FEB 2020 to 26 MAR 2020

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RWY 7: Climb heading 073° to 520, then direct BRDEE, then via depicted route to BRNGR. Thence....

TAKEOFF RWY 12: Climb heading 115° to 520, then left turn direct PINGL, then right turn direct BRNGR. Thence....

TAKEOFF RWY 16: Climb heading 159° to 520, then left turn direct BRNGR. Thence....

TAKEOFF RWY 25: Climb heading 253° to 520, then right turn direct MKLEE, then left turn direct BRNGR. Thence....

TAKEOFF RWY 30: Climb heading 295° to 520, then right turn direct SUMEE, then right turn direct AHERN, then via depicted route to BRNGR. Thence....

TAKEOFF RWY 34: Climb heading 339° to 520, then right turn direct BAGZZ, then via depicted route to BRNGR. Thence....

....via JOEWY transition, maintain 3000 or as assigned by ATC. Expect clearance to filed altitude/flight level ten minutes after departure.

JOEWY TRANSITION (BRNGR2.JOEWY):

SE-3, 27 FEB 2020 to 26 MAR 2020

SE-3, 27 FEB 2020 to 26 MAR 2020

(SNDLR2.SNDLR) 18088 AL-9217 (FAA)

SNDLR TWO DEPARTURE (RNAV)

WITHAM FIELD (SUA)
STUART, FLORIDA

SE-3, 27 FEB 2020 to 26 MAR 2020

SE-3, 27 FEB 2020 to 26 MAR 2020

SNDLR TWO DEPARTURE (RNAV)

WITHAM FIELD (SUA)
STUART, FLORIDA

(SNDLR2.SNDLR) 21JUL16

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RWY 7: Climb heading 073° to 520, then direct BRDEE, then left turn direct OLADY, then via depicted route to SNDLR. Thence....

TAKEOFF RWY 12: Climb heading 115° to 520, then left turn direct PINGL, then right turn direct SPYKS, then via depicted route to SNDLR. Thence....

TAKEOFF RWY 16: Climb heading 159° to 520, then right turn direct SPYKS, then via depicted route to SNDLR. Thence....

TAKEOFF RWY 25: Climb heading 253° to 520, then right turn direct MKLEE, then via depicted route to SNDLR. Thence....

TAKEOFF RUNWAY 30: Climb heading 295° to 520, then direct SNDLR. Thence....

TAKEOFF RUNWAY 34: Climb heading 339° to intercept the 281° course to SNDLR. Thence....

....via SHEDS transition, maintain 3000 or as assigned by ATC. Expect clearance to filed altitude/flight level ten minutes after departure.

SHEDS TRANSITION (SNDLR2.SHEDS):

SE-3, 27 FEB 2020 to 26 MAR 2020

SE-3, 27 FEB 2020 to 26 MAR 2020

WLACE FOUR ARRIVAL (RNAV)
(RSTAA.WLACE4) 13SEP18
WEST PALM BEACH, FLORIDA

(RSTAA.WLACE4) 18256
WLACE FOUR ARRIVAL (RNAV)
AL-449 (FAA)
WEST PALM BEACH, FLORIDA

PALM BEACH APP CON
127.35 343.6
PALM BEACH INTL D-ATIS
123.75

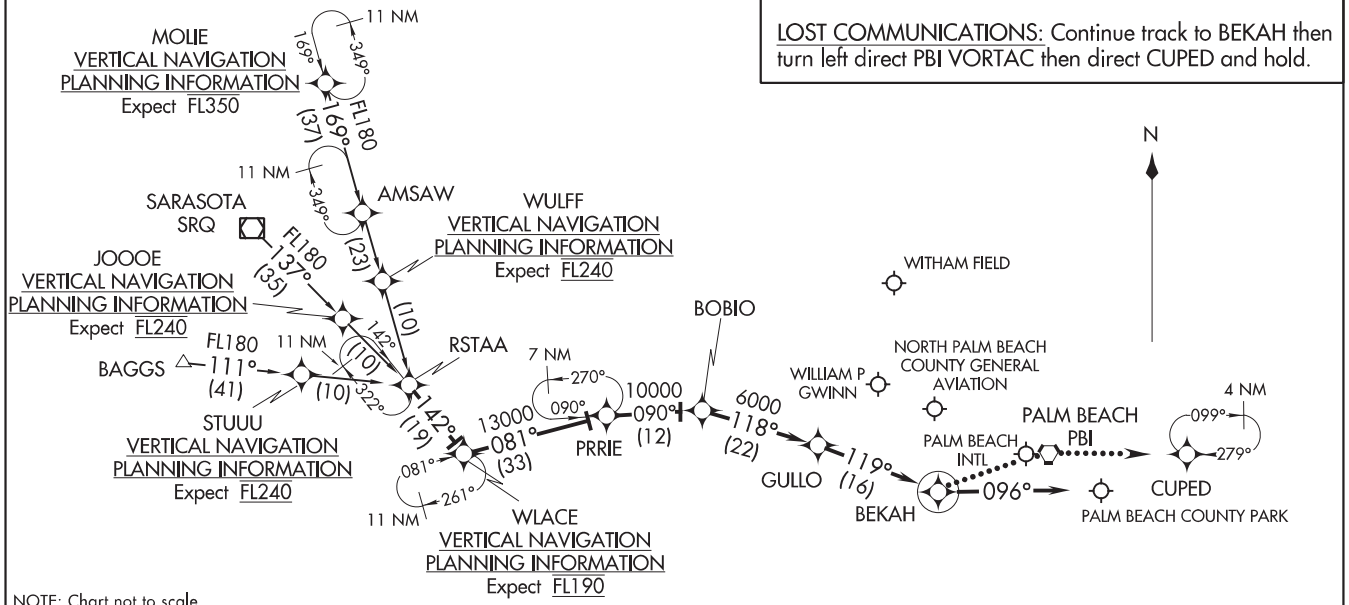
NOTE: RADAR required.
NOTE: RNAV 1.
NOTE: DME/DME/IRU or GPS required.
NOTE: Turbojet and Turboprop aircraft only.
NOTE: For non-GPS equipped aircraft, DHP must be operational.
NOTE: PBI landing east: expect to cross BOBIO at 10000 and 250K.
NOTE: PBI landing west: expect to cross BOBIO at 10000.

ARRIVAL ROUTE DESCRIPTION

BAGGS TRANSITION (BAGGS.WLACE4)
MOLIE TRANSITION (MOLIE.WLACE4)
SARASOTA TRANSITION (SRQ.WLACE4)

From RSTAA on track 142° to WLACE, then on track 081° to PRRIE, then on track 090° to BOBIO, then on track 118° to GULLO, then on track 119° to BEKAH, then on heading 096°or as assigned by ATC.
Expect RADAR vectors to final approach course.

LOST COMMUNICATIONS: Continue track to BEKAH then turn left direct PBI VORTAC then direct CUPED and hold.



NOTE: Chart not to scale.

RNAV (GPS) RWY 12
WITHAM FIELD (SUA)

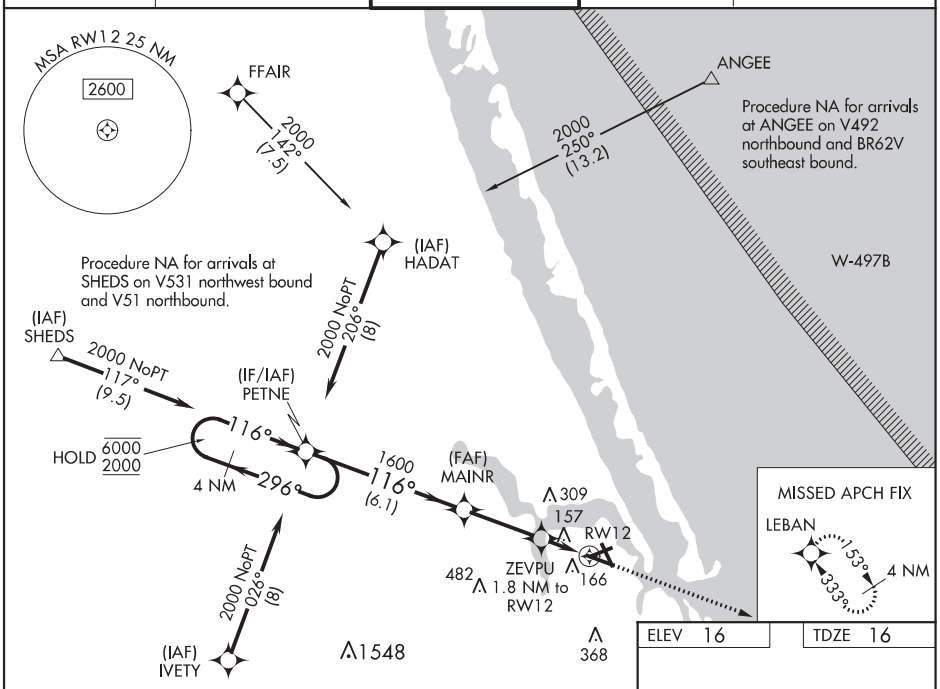
WAAS	APP CRS	Rwy Idg	5368
CH 70516 W12A	116°	TDZE	16
		Apt Elev	16

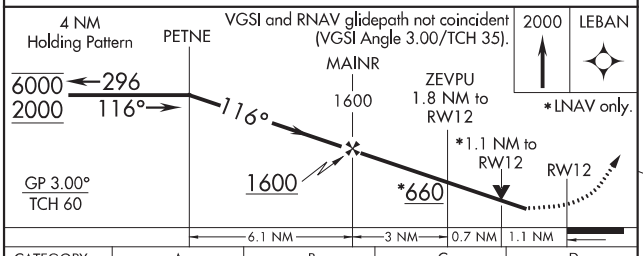
RNP APCH.

Circling Rwy 7, 16, 25, 30, 34 NA at night. Rwy 12 helicopter visibility reduction below ¾ SM NA. For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -15°C or above 54°C.

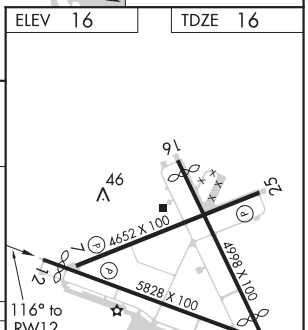
MISSED APPROACH: Climb to 2000 direct LEBAN and hold.

ATIS	PALM BEACH APP CON	STUART TOWER ★	GND CON	CLNC DEL
134.475	132.8	126.6 (CTAF) L	121.7	121.025





CATEGORY	A	B	C	D
LPV DA	268-¾ 252 (300-¾)			
LNAV/VNAV DA	466-1⅜ 450 (500-1⅜)			
LNAV MDA	420-1 404 (500-1)		420-1⅛ 404 (500-1⅛)	
C CIRCLING	480-1 464 (500-1)		680-1¾ 664 (700-1¾)	680-2 664 (700-2)



REIL Rwys 12-30 L
MIRL Rwys 12-30 and 7-25 L

SE-3, 27 FEB 2020 to 26 MAR 2020
SE-3, 27 FEB 2020 to 26 MAR 2020

STUART, FLORIDA | AL-9217 (FAA) | 19003

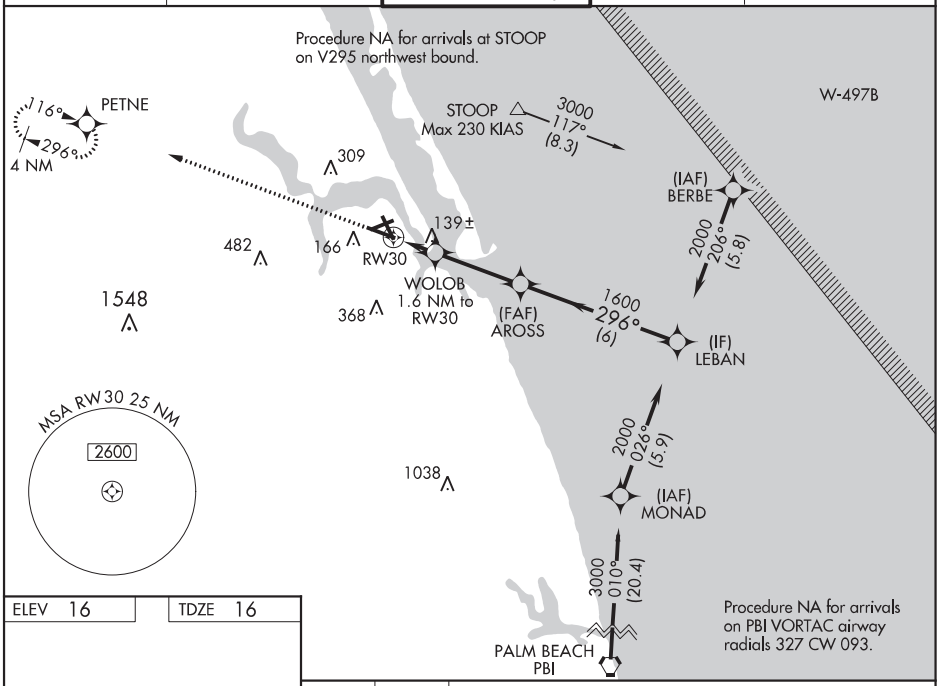
RNAV (GPS) RWY 30
WITHAM FIELD (SUA)

WAAS	APP CRS	Rwy Idg	5828
CH 77716 W30A	296°	TDZE	16
		Apt Elev	16

Circling to Rwy 07 NA at night. Baro-VNAV NA when using Palm Beach Intl altimeter setting. For uncompensated Baro-VNAV systems, LNAV/VNAV NA below 4°C (40°F) or above 54°C (130°F). DME/DME RNP-0.3 NA. Helicopter visibility reduction below ¾ SM NA. When local altimeter setting not received, use Palm Beach Intl altimeter setting and increase all DA 71 feet and all MDA 80 feet and increase LPV and LNAV/VNAV all Cats and LNAV Cats C/D visibility ¼ mile.

MISSED APPROACH: Climb to 2000 direct PETNE and hold.

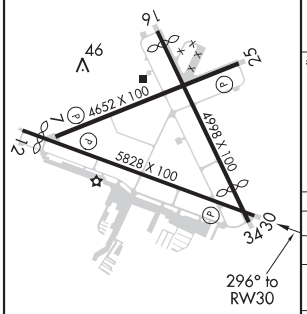
ATIS	PALM BEACH APP CON	STUART TOWER★	GND CON	CLNC DEL
134.475	132.8	126.6 (CTAF) L	121.7	121.025



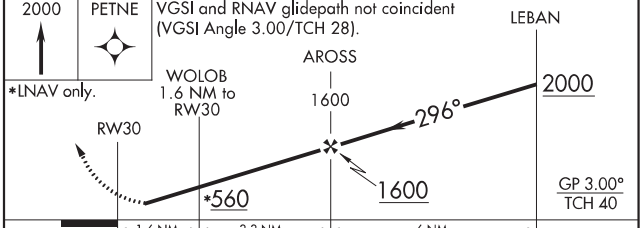
SE-3, 27 FEB 2020 to 26 MAR 2020

SE-3, 27 FEB 2020 to 26 MAR 2020

ELEV 16 | TDZE 16



REIL Rwys 12-30 L
MIRL Rwys 12-30 and 7-25 L

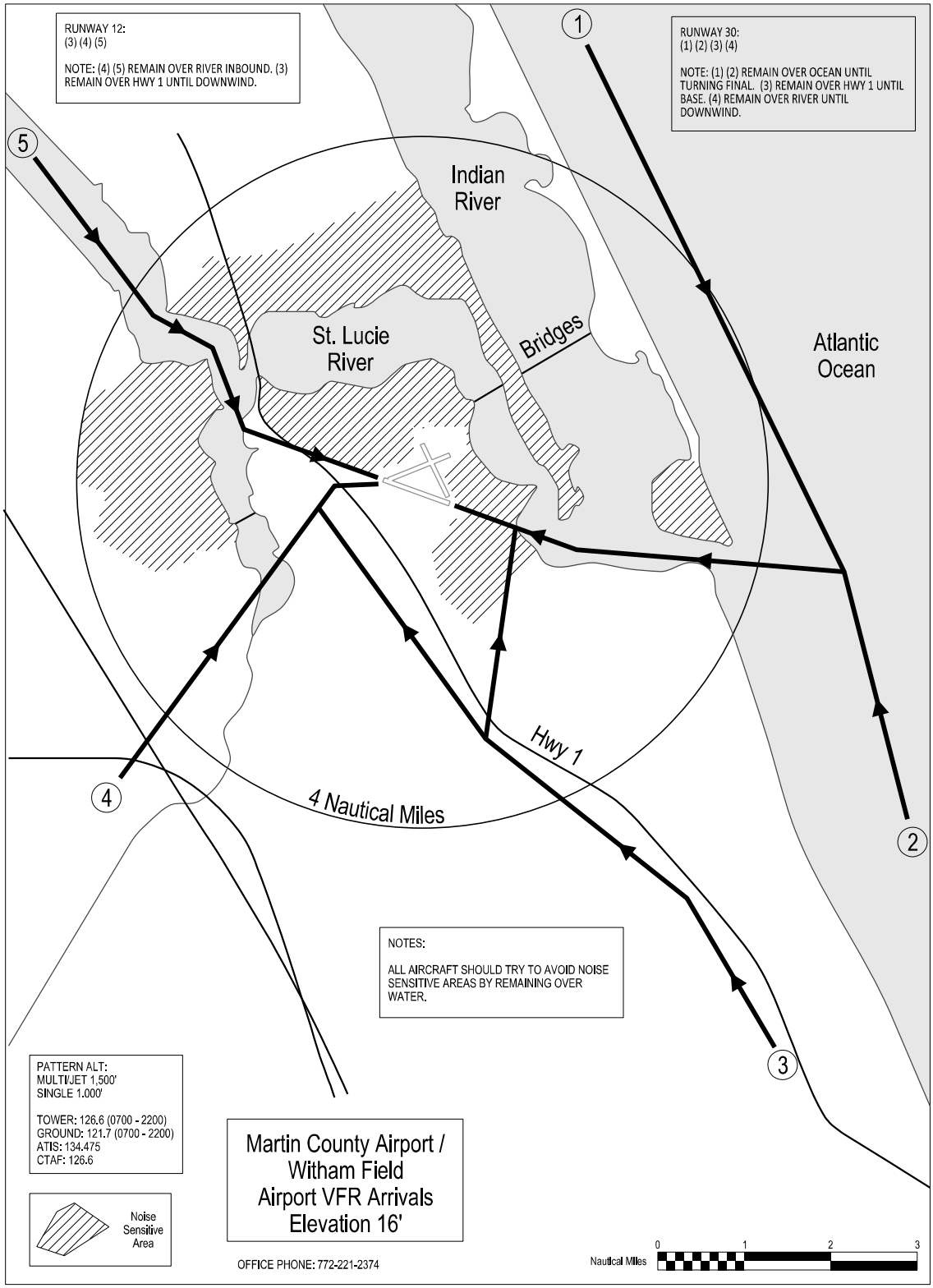


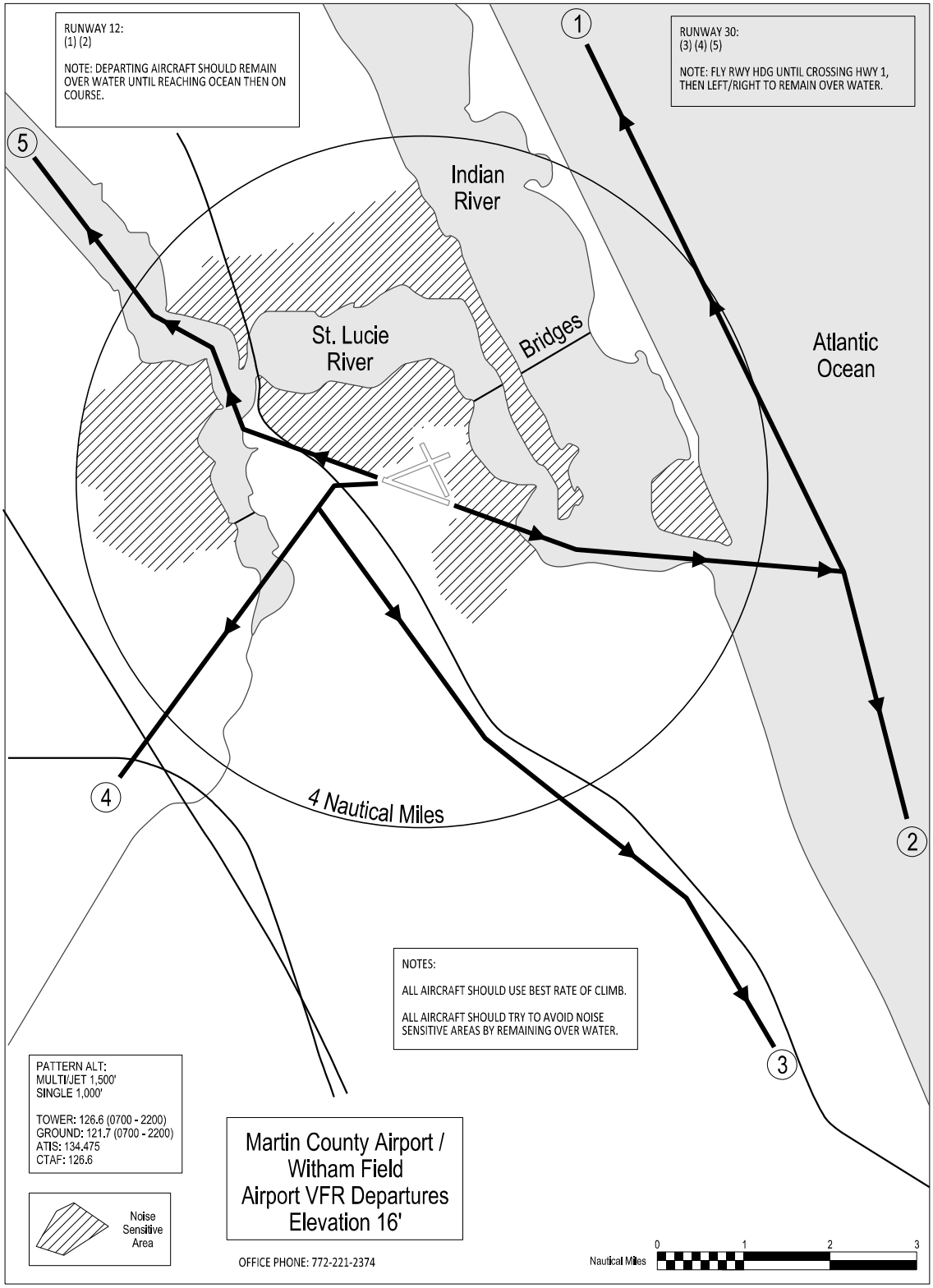
CATEGORY	A	B	C	D
LPV DA	266-⅞ 250 (300-⅞)			
LNAV/VNAV DA	404-1⅜ 388 (400-1⅜)			
LNAV MDA	400-1 384 (400-1)		400-1⅛ 384 (400-1⅛)	
CIRCLING	480-1 464 (500-1)		480-1½ 464 (500-1½)	580-2 564 (600-2)

STUART, FLORIDA
Amdt 1A 26JUN14

27°11'N-80°13'W

WITHAM FIELD (SUA)
RNAV (GPS) RWY 30


RUNWAY 12:
(3) (4) (5)
NOTE: (4) (5) REMAIN OVER RIVER INBOUND. (3) REMAIN OVER HWY 1 UNTIL DOWNWIND.
RUNWAY 30:
(1) (2) (3) (4)
NOTE: (1) (2) REMAIN OVER OCEAN UNTIL TURNING FINAL. (3) REMAIN OVER HWY 1 UNTIL BASE. (4) REMAIN OVER RIVER UNTIL DOWNWIND.
Indian River
St. Lucie River
Bridges
Atlantic Ocean
Hwy 1
4 Nautical Miles
1
2
3
4
5
NOTES:
ALL AIRCRAFT SHOULD TRY TO AVOID NOISE SENSITIVE AREAS BY REMAINING OVER WATER.
PATTERN ALT:
MULTIJET 1,500'
SINGLE 1.000'
TOWER: 126.6 (0700 - 2200)
GROUND: 121.7 (0700 - 2200)
ATIS: 134.475
CTAF: 126.6
Noise Sensitive Area
Martin County Airport / Witham Field
Airport VFR Arrivals
Elevation 16'
OFFICE PHONE: 772-221-2374
0 1 2 3
Nautical Miles


RUNWAY 12:
(1) (2)
NOTE: DEPARTING AIRCRAFT SHOULD REMAIN OVER WATER UNTIL REACHING OCEAN THEN ON COURSE.
RUNWAY 30:
(3) (4) (5)
NOTE: FLY RWY HDG UNTIL CROSSING HWY 1, THEN LEFT/RIGHT TO REMAIN OVER WATER.
Indian River
St. Lucie River
Bridges
Atlantic Ocean
4 Nautical Miles
1
2
3
4
5
NOTES:
ALL AIRCRAFT SHOULD USE BEST RATE OF CLIMB.
ALL AIRCRAFT SHOULD TRY TO AVOID NOISE SENSITIVE AREAS BY REMAINING OVER WATER.
PATTERN ALT:
MULTI/JET 1,500'
SINGLE 1,000'
TOWER: 126.6 (0700 - 2200)
GROUND: 121.7 (0700 - 2200)
ATIS: 134.475
CTAF: 126.6
Noise Sensitive Area
Martin County Airport / Witham Field
Airport VFR Departures
Elevation 16'
OFFICE PHONE: 772-221-2374
Nautical Miles
0 1 2 3

APPENDIX D
Aircraft Noise

1.1 Environmental Noise Fundamentals

The measurement and human perception of sound involve two basic physical characteristics: intensity and frequency. Intensity is a measure of the acoustic energy of sound vibrations, expressed in terms of sound pressure. The higher the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic is sound frequency, which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.

Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level), which is measured in decibels (dB). On this scale, zero dB corresponds roughly to the threshold of human hearing and 120 to 140 dB corresponds to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound. Noise is commonly defined as unwanted sound.

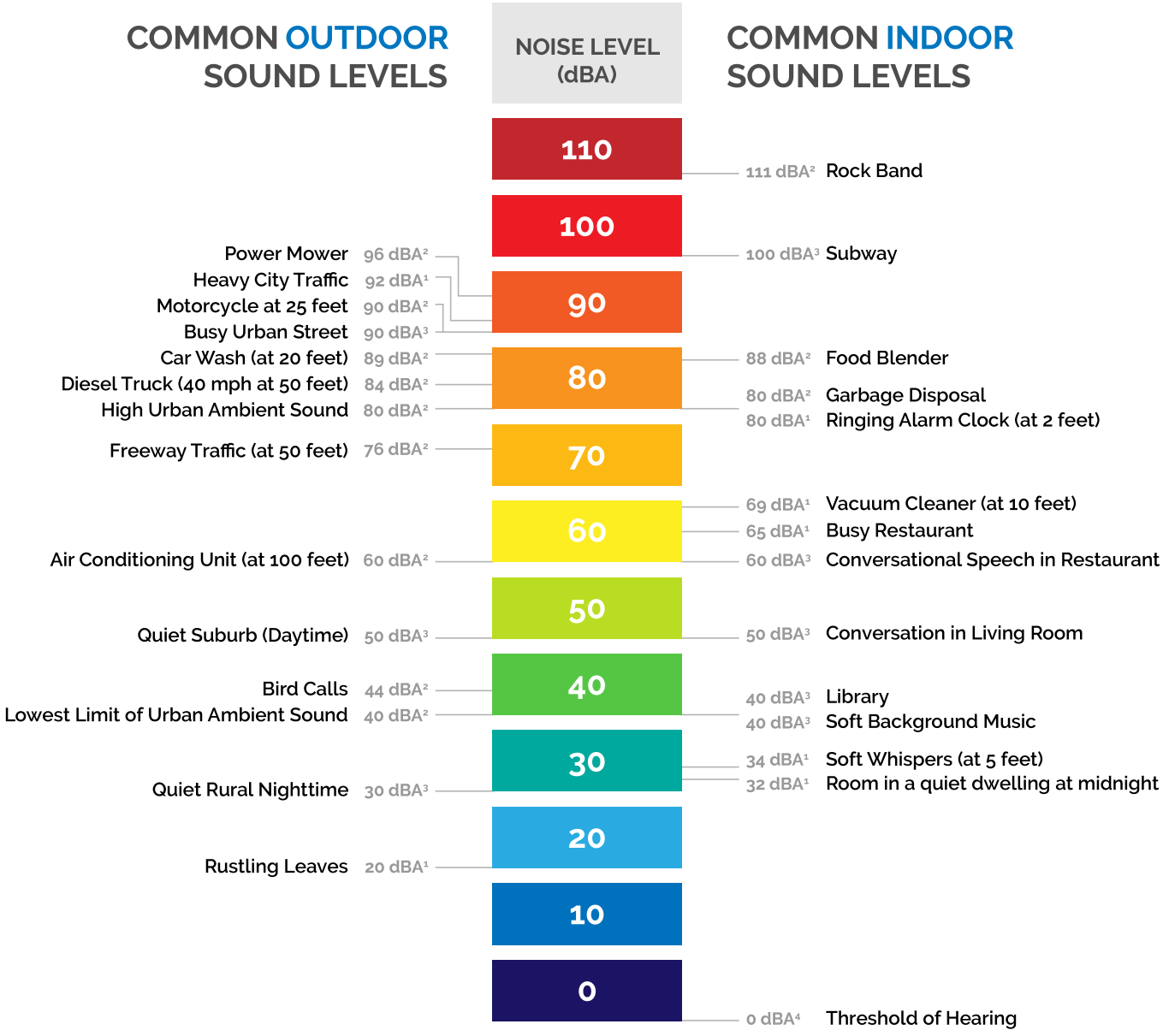
Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequencies spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts on humans, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency weighting and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown on **Figure D-1**.

1.2 General Characteristics of Aircraft Noise

Outdoor sound levels decrease as a function of distance from the source and as a result of wave divergence, atmospheric absorption, and ground attenuation. If sound is radiated from a source in a homogenous and undisturbed manner, the sound travels as spherical waves. As the sound wave travels away from the source, the sound energy is distributed over a greater area, dispersing the sound power of

Comparative Noise Levels (dBA)



1 Aviation Noise Effects, FAA, AEE, March, 1985 (FAA-EE-85-2), Table 1.1
2 Federal Agency Review of Selected Airport Noise Analysis Issues (Federal Interagency Committee on Noise), August 1992, Table B.1
3 Children's health and the environment, A Global Perspective, World Health Organization, 2005. Table 15.1
4 OSHA Technical Manual, TED 01-00-015. Section III (Health Hazards), Chapter 5 (Noise, Updated 8/15/2013)

SOURCE: Prepared by ESA, 2021.

Martin County Airport NEM Update

Figure D-1
Comparative Noise Levels (dBA)
Martin County Airport (Witham Field)

ESA

the wave. Spherical spreading of the sound wave reduces the noise level, for most sound sources, at a rate of 6 dB per doubling of the distance.

Atmospheric absorption also influences the levels that are received by the observer. The greater the distance sound travels, the greater the influence of atmospheric effects. Atmospheric absorption becomes important at distances of greater than 1,000 feet. The degree of absorption is a function of the sound frequency, as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest at high humidity and higher temperatures. Turbulence and gradients of wind, temperature, and humidity also play a significant role in determining the degree of attenuation. Certain conditions, such as inversions, can also result in higher sound levels that would result from spherical spreading as a result of channeling or focusing the sound waves.

Absorption effects in the atmosphere vary with frequency. The higher frequencies are more readily absorbed than the lower frequencies. Over large distances, the lower frequencies become the dominant sound as the higher frequencies are attenuated.

The effects of ground attenuation on aircraft noise propagation are a function of the height of the source and/or receiver and the characteristics of the terrain. The closer the source of the noise is to the ground, the greater the ground absorption. Terrain consisting of soft surfaces, such as vegetation, provide for more ground absorption than hard surfaces, such as a large parking lot.

Aircraft noise originates from both the engines and the airframe of an aircraft, but the engines are, by far, the more significant source of noise. Meteorological conditions affect the transmission of aircraft noise through the air. Wind speed and direction, and the temperature immediately above ground level, cause diffraction and displacement of sound waves. Humidity and temperature materially affect the transmission of air-to-ground sound through absorption associated with the instability and viscosity of the air.

1.3 Aircraft Noise Descriptors

The description, analysis, and reporting of aircraft noise levels is made difficult by the complexity of human response to sound and the myriad of sound-rating scales and metrics that have been developed for describing acoustic effects. Various rating scales have been devised to approximate the human response to the “loudness” or “noisiness” of a sound. Noise metrics have been developed to account for additional parameters, such as duration and cumulative effect of multiple events.

Noise metrics can be categorized as single-event metrics and cumulative metrics. Single-event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure over a period of time. The primary noise descriptors/metrics that are used in SUA’s 14 CFR Part 150 study are described below.

1.3.1 A-Weighted Sound Pressure Level (dBA)

The decibel is a unit used to describe sound pressure level. When expressed in dBA, the sound has been filtered to reduce the effect of very low and very high frequency sounds, much as the human ear filters sound frequencies. Without this filtering, calculated and measured sound levels would include events that the human ear cannot hear (e.g., dog whistles and low frequency sounds, such as the groaning sounds

emanating from large buildings with changes in temperature and wind). With A-weighting, calculations and sound monitoring equipment approximate the sensitivity of the human ear to sounds of different frequencies.

Some common sound levels on the dBA scale are listed in **Table D-1**. As shown, the relative perceived loudness of a sound doubles for each increase of 10 dBA, although a 10-dBA change in the sound level corresponds to a factor of 10 changes in relative sound energy. Generally, single-event sound levels with differences of 2 dBA or less are not perceived to be noticeably different by most listeners.

1.3.2 Maximum A-Weighted Sound Level (Lmax)

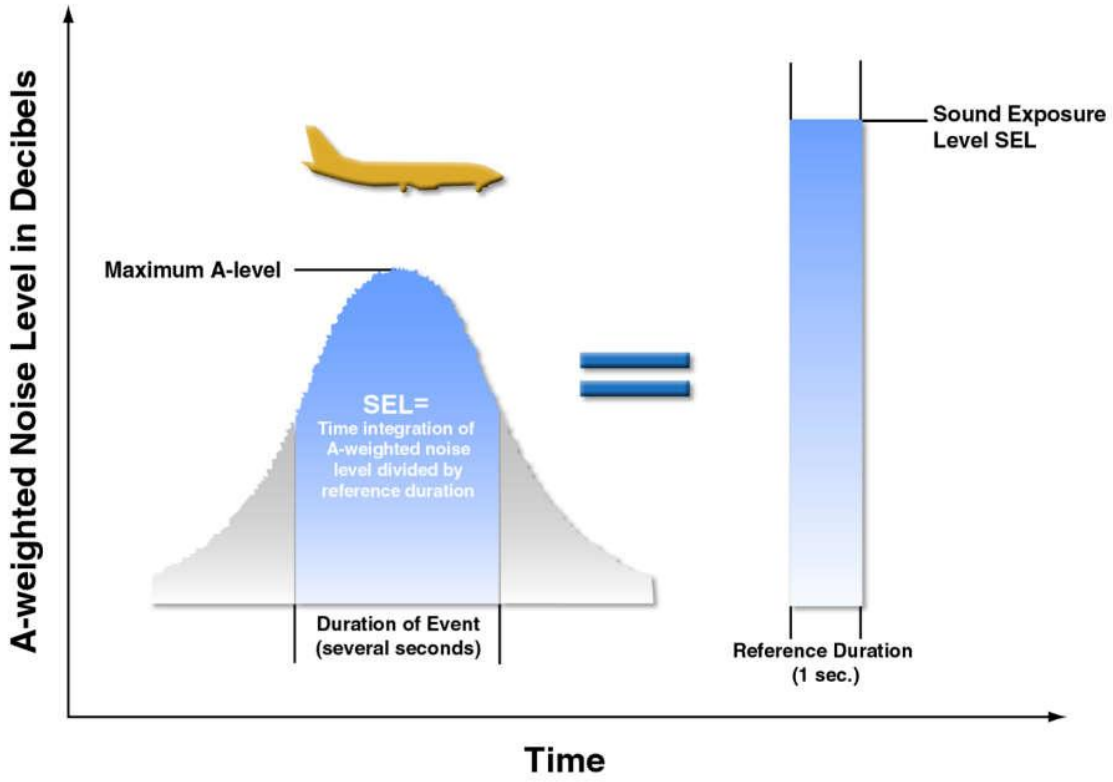
Lmax is the maximum, or peak, sound level during a noise event. The metric only accounts for the highest A-weighted sound level measured during a noise event, not for the duration of the event. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient levels. The closer the aircraft gets, the louder the sound until the aircraft is at its closest point. As the aircraft passes, the sound level decreases until the sound returns to ambient levels. Some sound level meters measure and record the maximum sound level (Lmax). The Lmax for an aircraft flyover is illustrated on **Figure D-2**.

TABLE D-1
COMMON SOUNDS ON THE A-WEIGHTED DECIBEL SCALE

Sound	Sound level (dBA)	Relative loudness (approximate)	Relative sound energy
Rock music, with amplifier	120	64	1,000,000
Thunder, snowmobile (operator)	110	32	100,000
Boiler shop, power mower	100	16	10,000
Orchestral crescendo at 25 feet, noisy kitchen	90	8	1,000
Busy street	80	4	100
Interior of department store	70	2	10
Ordinary conversation, 3 feet away	60	1	1
Quiet automobiles at low speed	50	1/2	.1
Average office	40	1/4	.01
City residence	30	1/8	.001
Quiet country residence	20	1/16	.0001
Rustle of leaves	10	1/32	.00001
Threshold of hearing	0	1/64	.000001

SOURCE: U.S. Department of Housing and Urban Development, Aircraft Noise Impact—Planning Guidelines for Local Agencies, 1972.

FIGURE D-2
SOUND EXPOSURE LEVEL AND MAXIMUM SOUND LEVEL



SOURCE: Brown-Buntin Associates, Inc., November 2004.

1.3.3 Sound Exposure Level (SEL)

Sound Exposure Level (SEL), is a time integrated measure, expressed in decibels, of the sound energy of a single noise event at a reference duration of one second. The sound level is integrated over the period that the level exceeds a threshold. Therefore, SEL accounts for both the maximum sound level and the duration of the sound. The standardization of discrete noise events into a one-second duration allows calculation of the cumulative noise exposure of a series of noise events that occur over a period of time. The SEL of an aircraft noise event is typically 7 to 12 dBA greater than the Lmax of the event. SELs for aircraft noise events depend on the location of the aircraft relative to the noise receptor, the type of operation (landing, takeoff, or overflight), and the type of aircraft. The SEL for an aircraft flyover is also illustrated on **Figure D-2**.

1.3.4 Equivalent Noise Level (L_{eq})

Equivalent Noise Level (Leq) is the sound level corresponding to a steady state, A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. Leq is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. It is the energy sum of all the sound that occurs during that time period. This is graphically illustrated in the middle graph on **Figure D-3**. Leq can be measured for any time period, but is typically measured for 15 minutes, 1 hour, or 24 hours.

1.3.5 Day-Night Average Sound Level (DNL)

Day-Night Average Sound Level (DNL), formerly referred to as Ldn, is expressed in dBA and represents the noise level over a 24-hour period. DNL includes the cumulative effects of a number of sound events rather than a single event. It also accounts for increased sensitivity to noise during relaxation and sleeping hours. DNL is used to estimate the effects of specific noise levels on land uses. The U.S. Environmental Protection Agency (EPA) introduced the DNL metric in 1976 as a single number. In the calculation of DNL, for each hour during the nighttime period (10:00 p.m. to 7:00 a.m.), the sound levels are increased by a 10 decibel-weighting penalty (equivalent to a 10-fold increase in aircraft operations) before the 24-hour value is computed. The weighting penalty accounts for the more intrusive nature of noise during the nighttime hours. The weighting penalty is illustrated on **Figure D-3**.

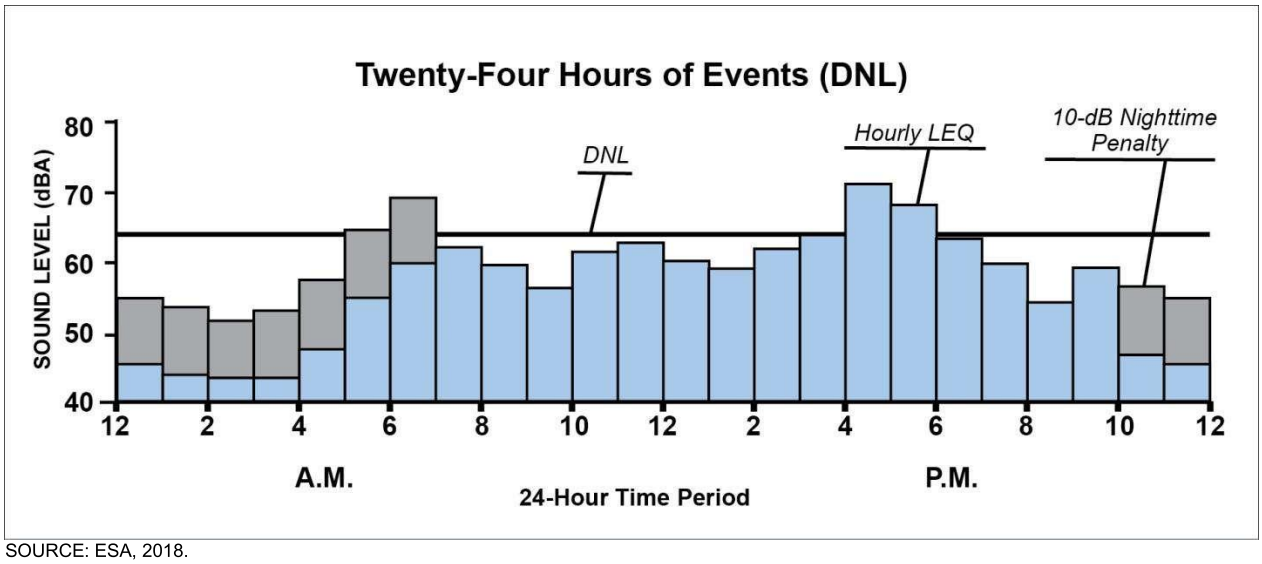
DNL is expressed as an average noise level on the basis of annual aircraft operations for a calendar year. To calculate the DNL at a specific location, the SELs at that location associated with each individual aircraft operation (landing or takeoff) are determined. Using the SEL for each noise event and applying the 10-dB penalty for nighttime operations as appropriate, a partial DNL is then calculated for each aircraft operation. The partial DNLs for each aircraft operation are added logarithmically to determine the total DNL.

DNL is used to describe existing and predicted noise exposure in communities in airport environs based on the average daily operations over the year and the average annual operational conditions at the airport. Therefore, at a specific location near an airport, the noise exposure on a particular day is likely to be higher or lower than the annual average noise exposure, depending on the specific operations at the airport on that day. DNL is widely accepted as the best available method to describe aircraft noise exposure and is the noise descriptor required for aircraft noise exposure analyses and land use compatibility planning under 14 CFR Part 150 and for federal environmental reviews of airport improvement projects (FAA Order 1050.1F).[1]

The DNL metric used for this aircraft noise analysis is based on an average annual day of aircraft operations, generally derived from data for a calendar year. An annual-average day (AAD) activity profile is computed by adding all aircraft operations occurring during the course of a year and dividing the result by 365. As such, AAD does not reflect activities on any one specific day, but represents average conditions as they occur during the course of the year.

[1] U.S. Department of Transportation. Federal Aviation Administration. Order 1050.1F, *Environmental Impacts: Policies and Procedures*. July 16, 2015.

FIGURE D-3
DAY-NIGHT AVERAGE SOUND LEVEL



SOURCE: ESA, 2018.

1.4 Aviation Environmental Design Tool

The noise analyses were conducted using the most current version of the FAA's Aviation Environmental Design Tool (AEDT). The AEDT is the FAA's standard model for evaluating aircraft noise, fuel burn/consumption, and emissions at airports. For this analysis, AEDT, Version 2d, was used to model aircraft noise exposure at SUA for the 2019 Existing Condition and the 2024 Future Condition.

The AEDT produces noise exposure contours that are used for land use compatibility maps. The program includes a built-in Geographic Information System (GIS) platform and tools for comparing contours and utilities that facilitate easy export to other GIS software suites. The model can also calculate predicted noise at specific sites such as hospitals, schools, or other noise-sensitive locations. For these discrete locations, the AEDT has the capability to report noise exposure levels at the specific location.

During an average 24-hour period, the AEDT accounts for each aircraft flight along flight tracks to or from the airport, or aircraft overflying the airport. Flight track definitions are coupled with information in the model's databases relating to noise levels at varying distances and flight performance data for each distinct type of aircraft selected. In general, the model computes noise levels at regularly-spaced grid receptors at ground level around the airport. The distance to each aircraft in flight is computed (slant distance), and the associated noise exposure of each aircraft flying along each flight track within the vicinity of the grid receptor is determined. The logarithmic acoustical energy levels for each individual aircraft single-event are then summed for each grid receptor. The AEDT can create contours of specific noise levels based on the acoustical energy summed at each of the grid receptors for the selected metric. The cumulative values of noise exposure at each grid receptor are used to interpolate contours of equal noise exposure. The AEDT can also compute noise levels at user-defined points on the ground.

Information required to run the AEDT includes:

- A physical description of the airport layout, including location, length and orientation of all runways, and airport elevation.
- The aircraft fleet mix for the average day.
- The number of daytime flight and run-up operations (7:00 a.m. to 9:59 p.m.).
- The number of nighttime flight and run-up operations (10:00 p.m. to 6:59 a.m.).
- Runway utilization rates.
- Primary departure and arrival flight tracks.
- Flight track utilization rates.

1.5 DNL and Noise Exposure Ranges

Noise exposure values of DNL 65, 70, and 75 were used as the criterion levels for the noise analysis. Three specific ranges of noise exposure were modeled: (1) DNL 65 to 70, (2) DNL 70 to 75, and (3) DNL 75 and higher. Although the FAA considers aircraft noise exposure lower than DNL 65 to be compatible with residential land uses, persons residing outside the area exposed to DNL 65 and higher may still be annoyed by aircraft noise. The frequently cited "Schultz Curve"[2] shows that, at an aircraft noise exposure of DNL 65, approximately 15 percent of the population would be expected to be "highly annoyed." At DNL 60, approximately nine percent of the population would be expected to be highly annoyed by aircraft noise. At DNL 55, approximately five percent of the population would be expected to be highly annoyed by aircraft noise.

DNL mapping was developed as a tool to assist in land use planning around airports. The mapping is best used for comparative purposes rather than for providing absolute values. DNL calculations provide valid comparisons between different projected conditions, as long as consistent assumptions and data are used for all calculations.

Sets of DNL calculations can show anticipated changes in aircraft noise exposure over time, or can indicate which series of simulated situations is better, and generally how much better, from the standpoint of noise exposure. However, a line drawn on a map does not imply that a particular noise condition exists on one side of the line and not on the other. DNL calculations are for comparing noise effects, not for precisely defining them relative to specific parcels of land.

DNL contours can be used to: (1) highlight an existing or potential aircraft noise problem that requires attention, (2) assist in the preparation of noise compatibility programs, and (3) provide guidance in developing land use controls, such as zoning ordinances, subdivision regulations, and building codes. DNL is considered to be the best methodology available for depicting aircraft noise exposure by the FAA.

[2] Schultz, T.J. "Synthesis of Social Surveys on Noise Annoyance." *Journal of the Acoustical Society of America*. V. 64 (2). 1978.

1.5.1 Graphic Representation of Aircraft Noise Exposure

Noise exposure contours are lines on a map that connect points of equal DNL values, much like topographic contours are drawn to indicate area of equal ground elevation. For example, a contour may be drawn to connect all points of DNL 70; another may be drawn to connect all points of DNL 65; and so forth. Generally, noise contours are plotted at 5-dB intervals. Noise contours were developed for the Airport in conformance with FAA guidelines included in 14 CFR Part 150.

For this analysis, the AEDT was used to produce contours to delineate areas exposed to DNL 65, 70, and 75. These contours were used in conjunction with U.S. Census data and land use data provided by Broward County. These data were also used to determine land uses and estimate the number of dwelling units, residents, and noise-sensitive facilities located within the areas exposed to aircraft noise levels of 1) DNL 65 to 70, 2) between DNL 70 and 75, 3) DNL 75 and higher, and 4) the sum of the previous, totaling the impacts within DNL 65 and higher.

APPENDIX E

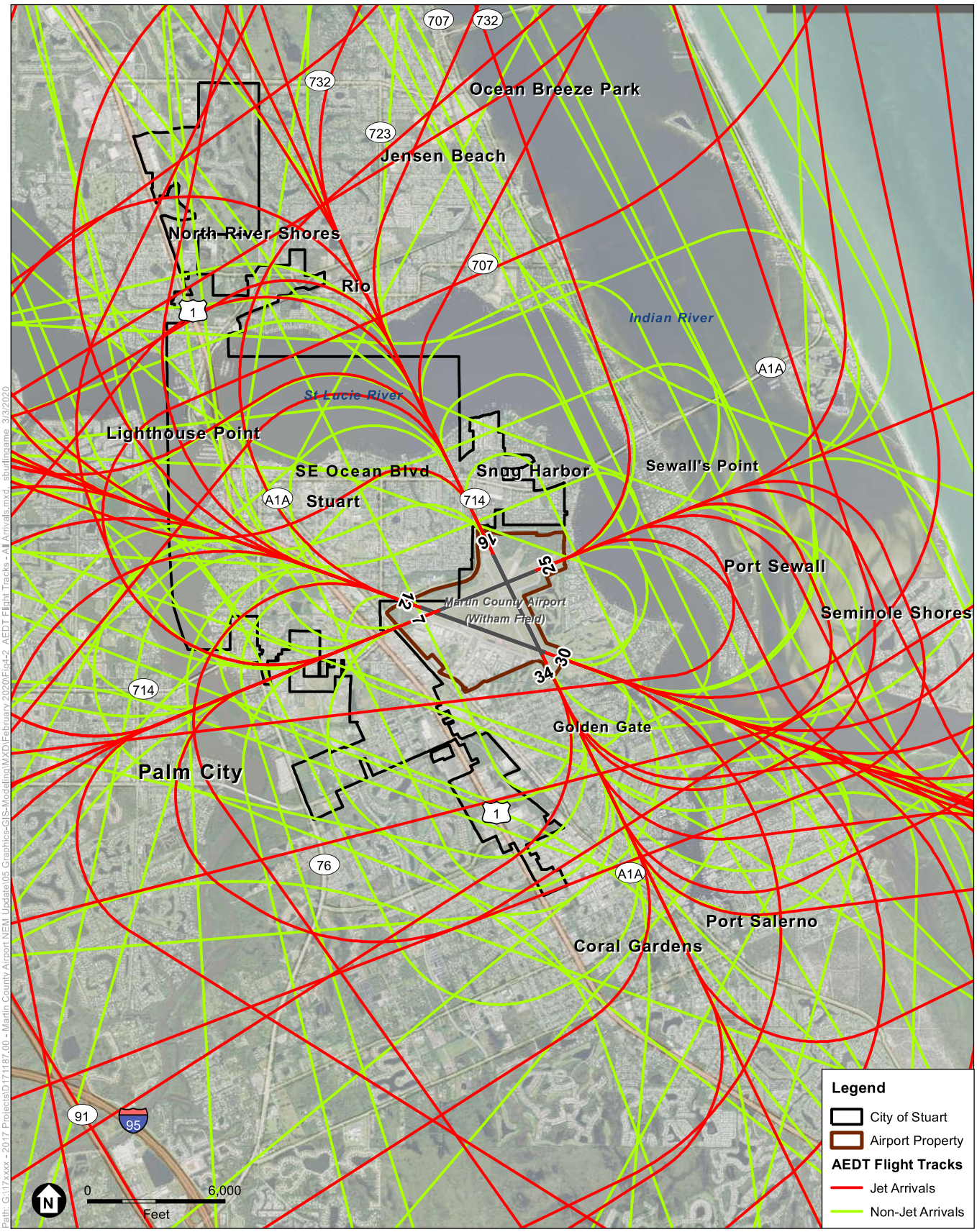
Arrival and Departure Flight Tracks

This Appendix includes the flight tracks used in the Martin County Airport Part 150 Study.

- Appendix E-1 AEDT Flight Tracks
- Appendix E-2 Radar Flight Tracks

APPENDIX E-1

AEDT Flight Tracks

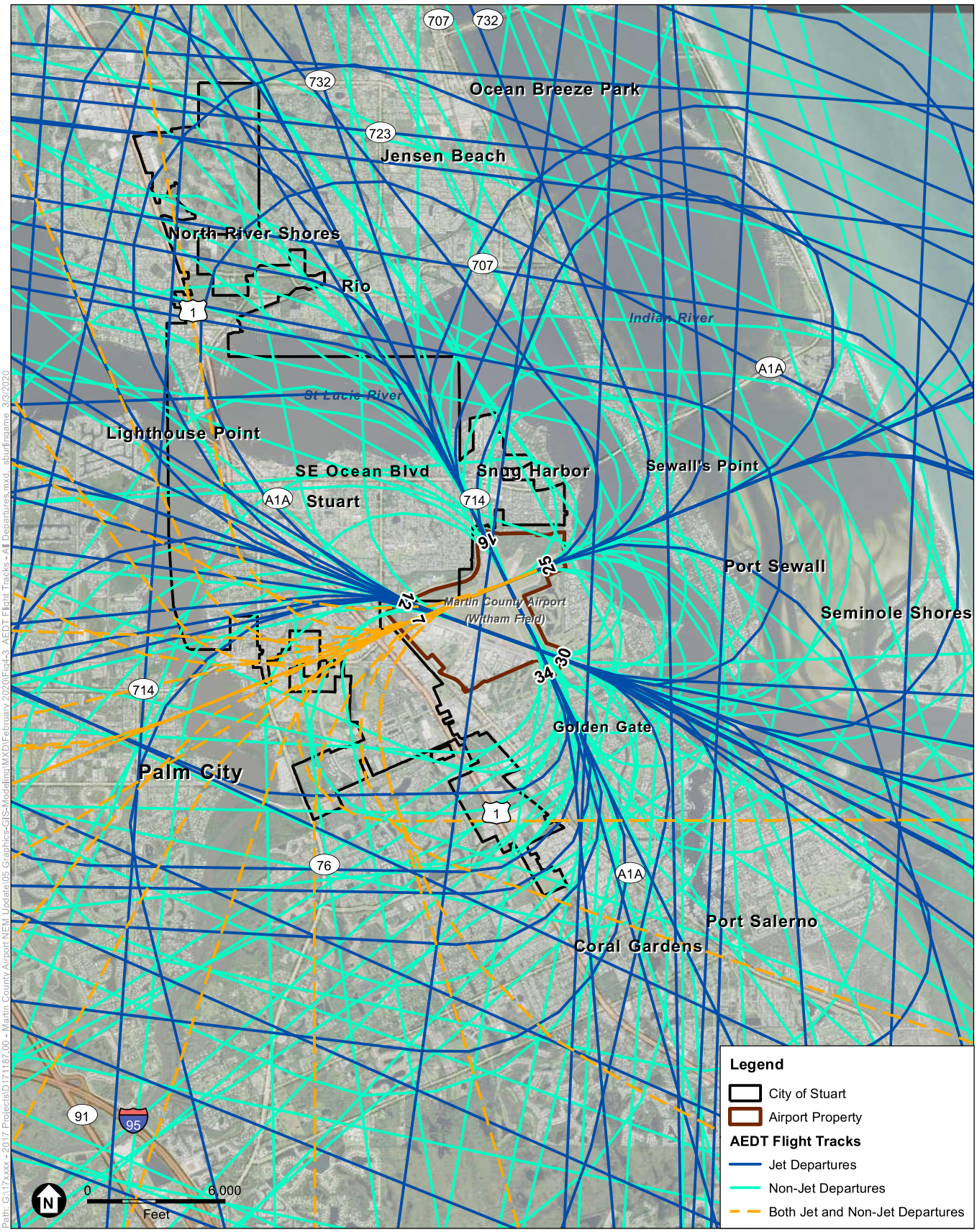


SOURCE: Esri; AEDT 3b; ESA, 2020

Martin County Airport NEM Update

Figure 4-2
Modeled AEDT Flight Tracks - All Arrivals
Martin County Airport (Witham Field)

ESA



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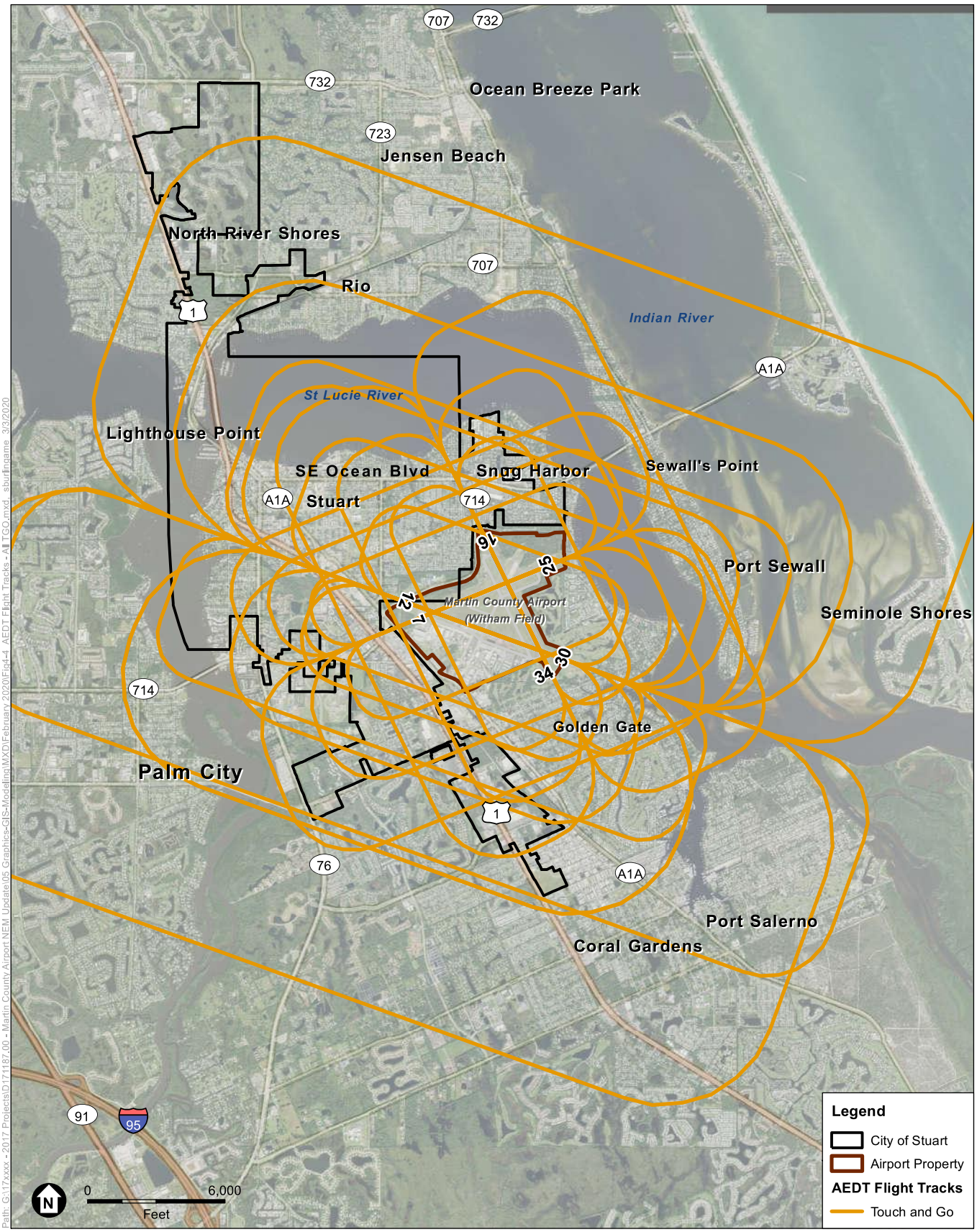
SOURCE: Esri; AEDT 3b; ESA, 2020

Martin County Airport NEM Update

Figure 4-3
Modeled AEDT Flight Tracks - All Departures
Martin County Airport (Witham Field)

ESA



SOURCE: Esri; AEDT 3b; ESA, 2020

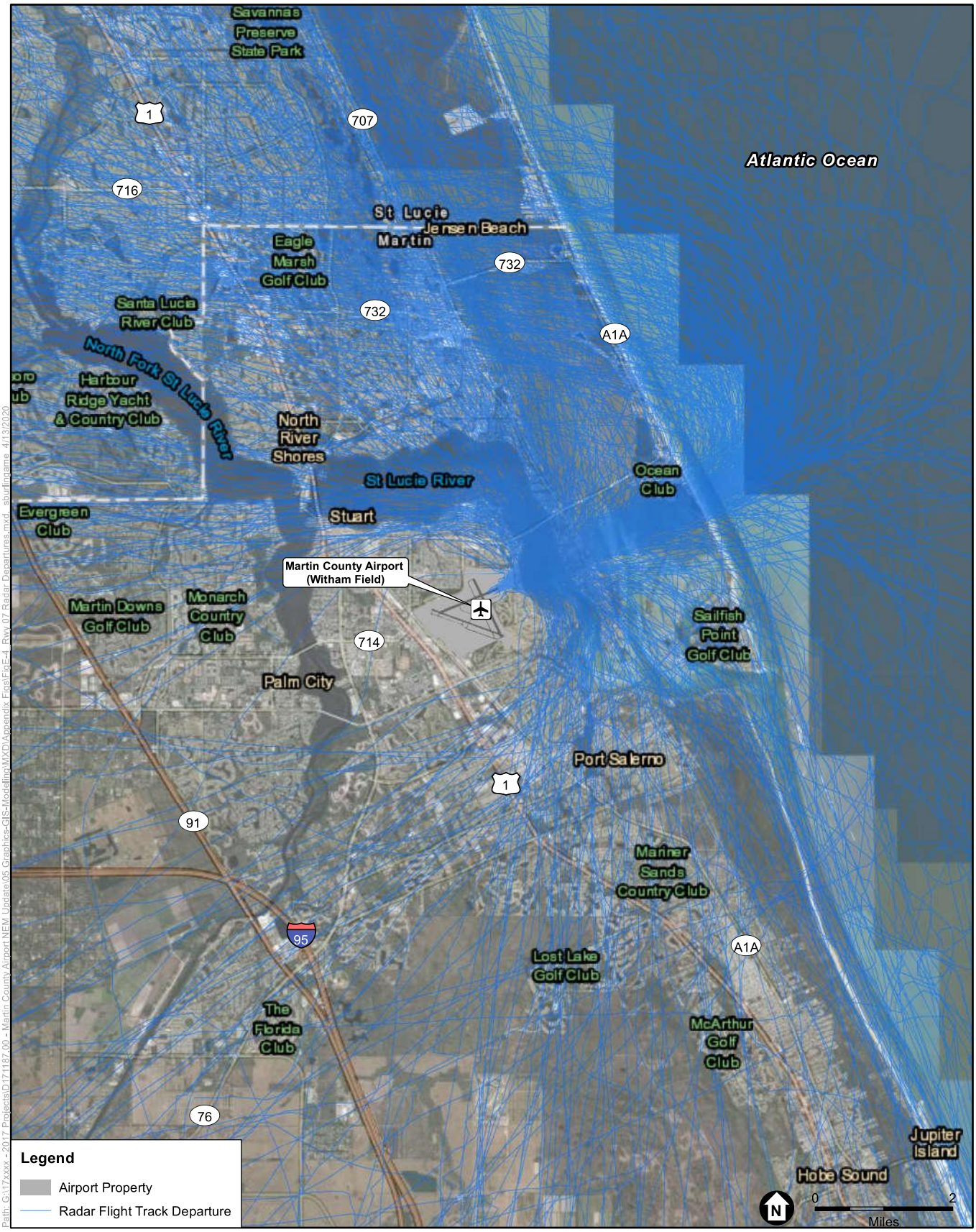
Martin County Airport NEM Update

Figure 4-4
Modeled AEDT Flight Tracks - All Touch and Go
Martin County Airport (Witham Field)

ESA

APPENDIX E-2

Radar Flight Tracks



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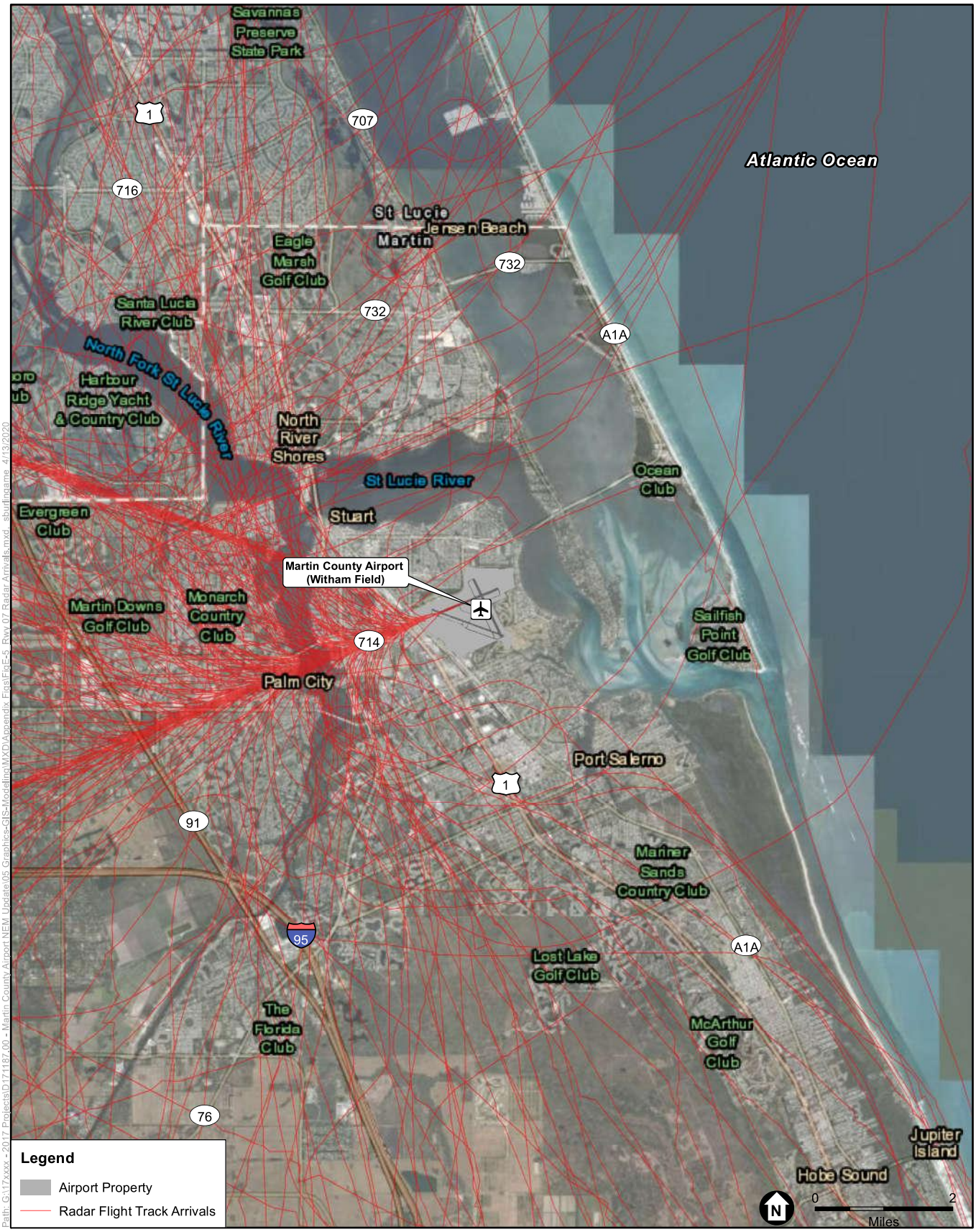
SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-4
Runway 07 Radar Track Departures
Martin County Airport (Witham Field)

ESA

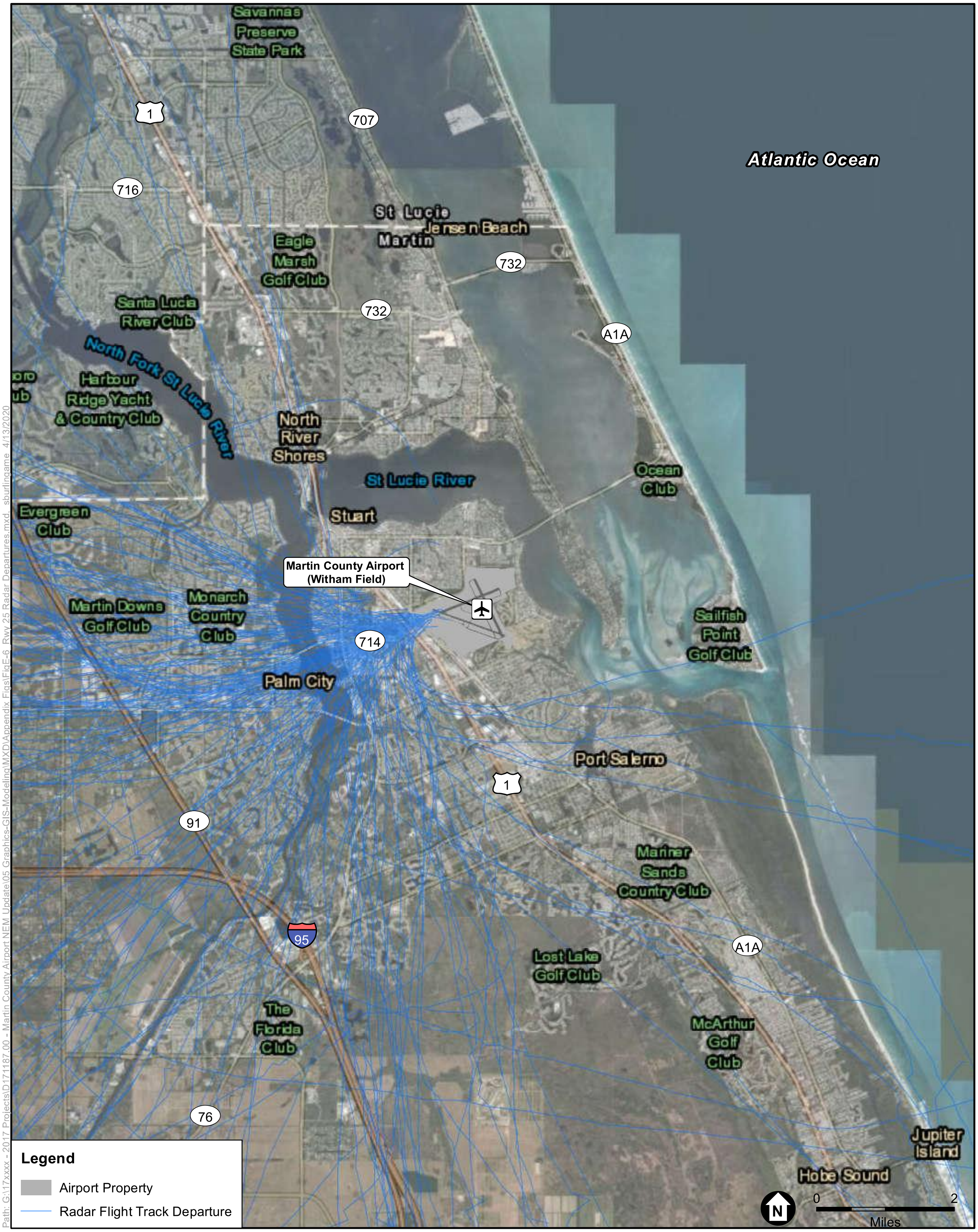


SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-5
Runway 07 Radar Track Arrivals
Martin County Airport (Witham Field)

ESA



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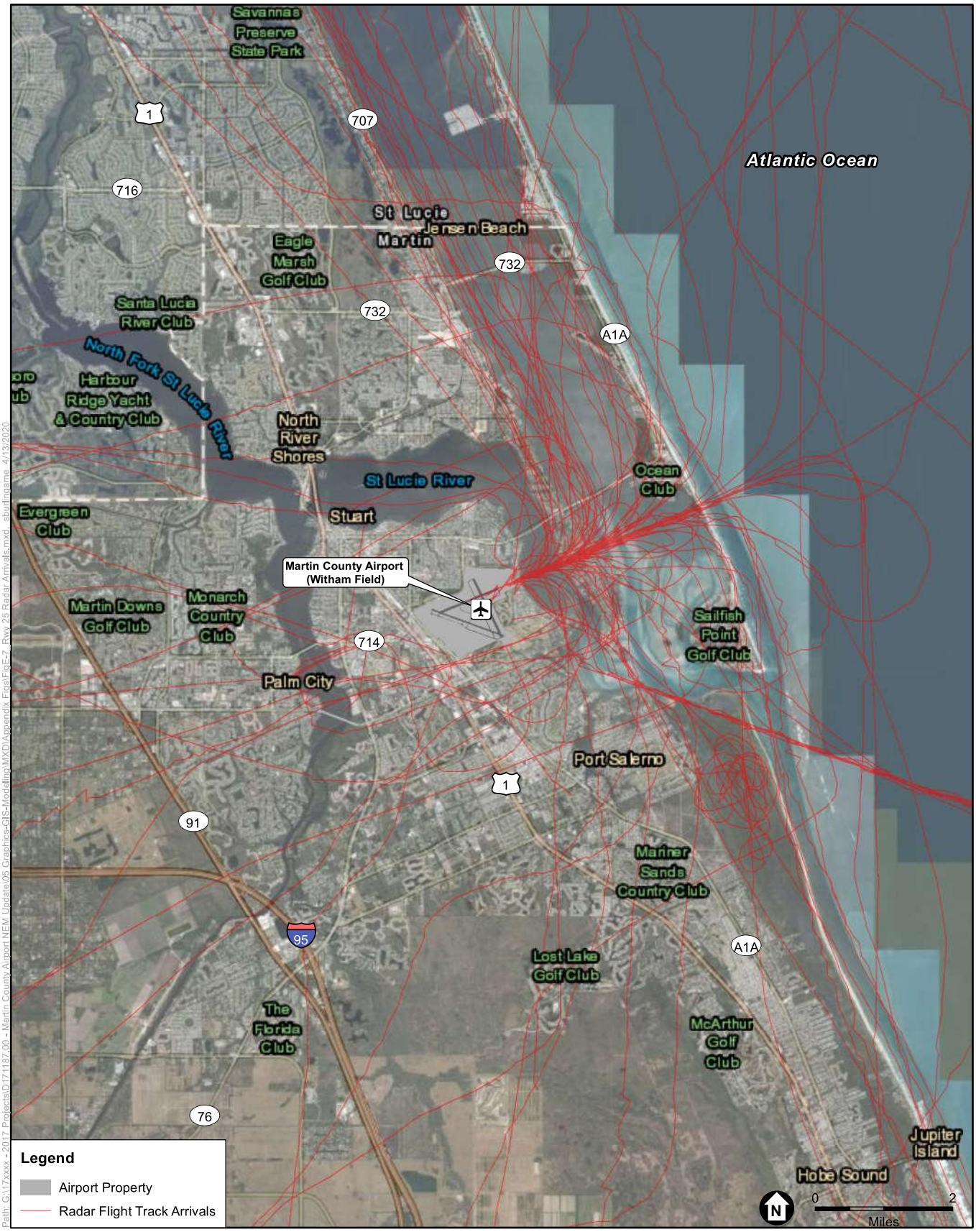
SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-6
Runway 25 Radar Track Departures
Martin County Airport (Witham Field)

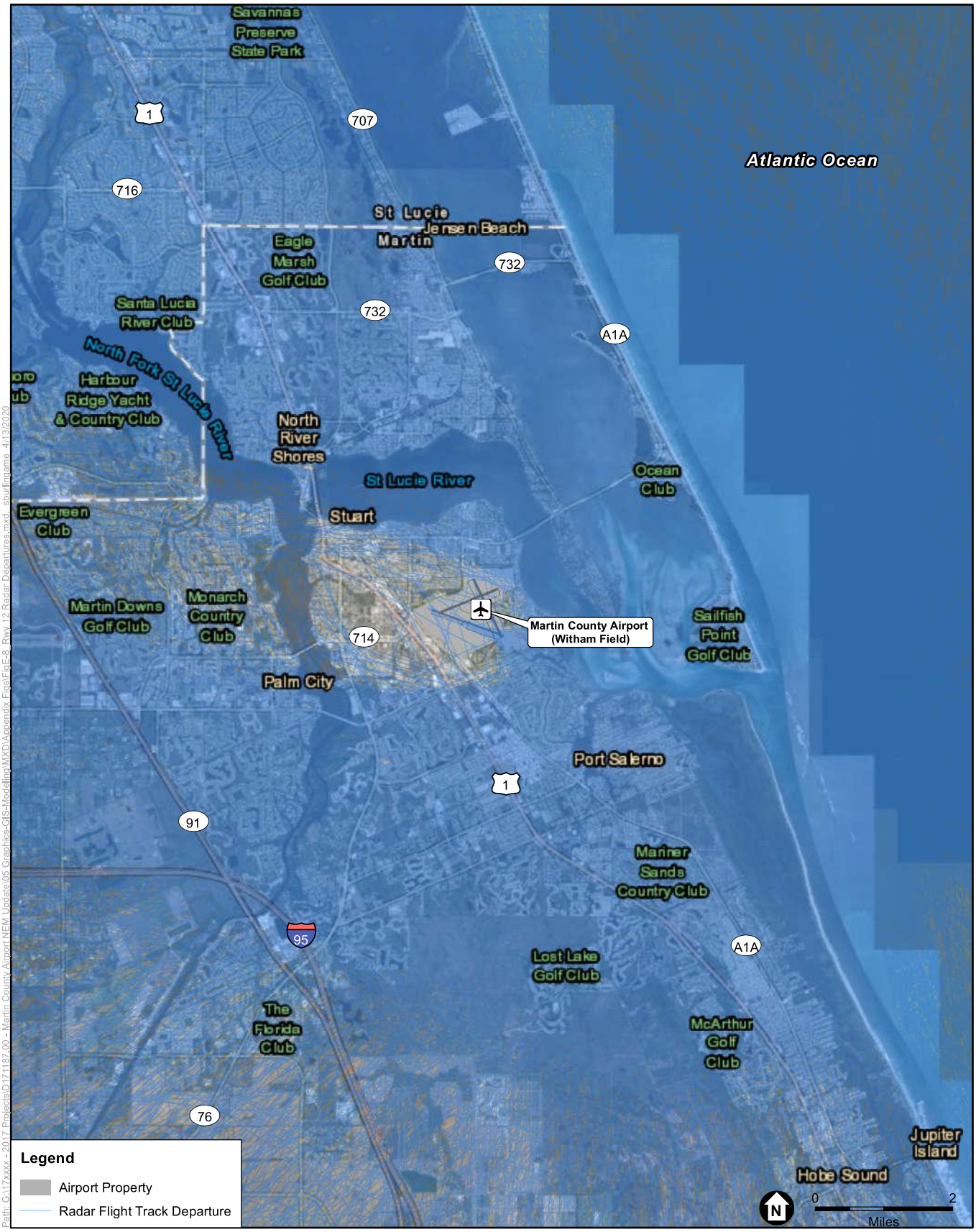
ESA



SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-7
Runway 25 Radar Track Arrivals
Martin County Airport (Witham Field)



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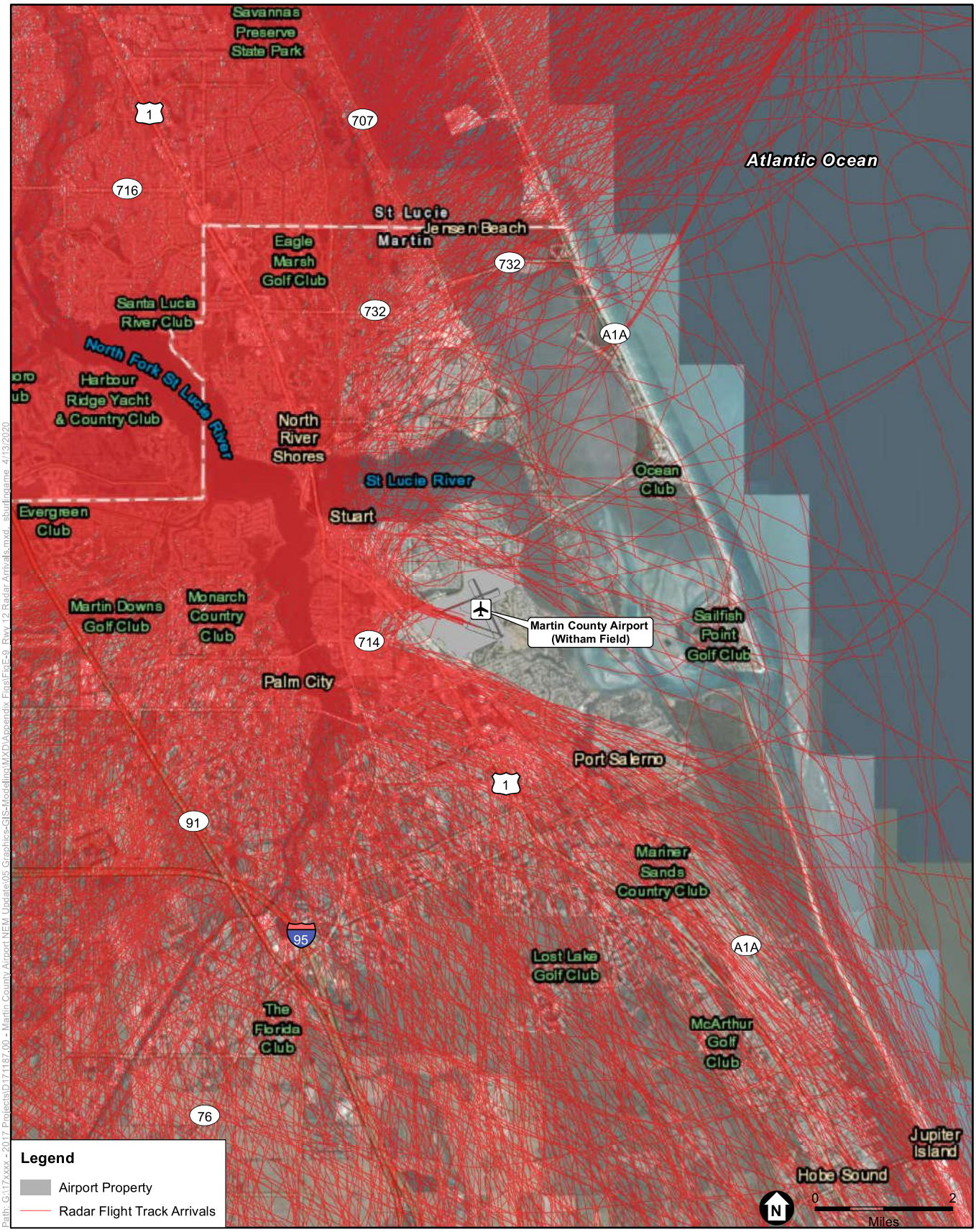
SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-8
Runway 12 Radar Track Departures
Martin County Airport (Witham Field)

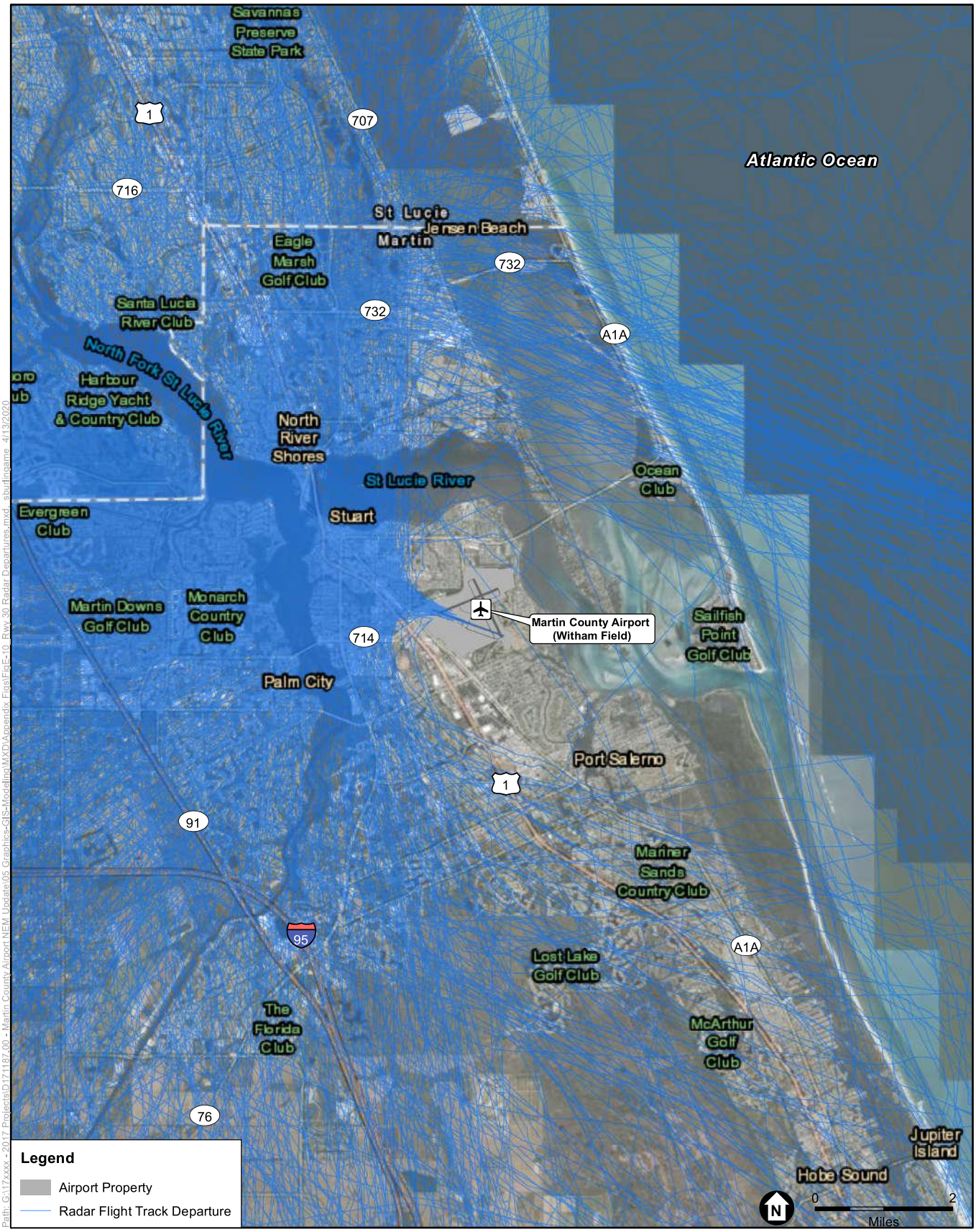
ESA



SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-9
Runway 12 Radar Track Arrivals
Martin County Airport (Witham Field)

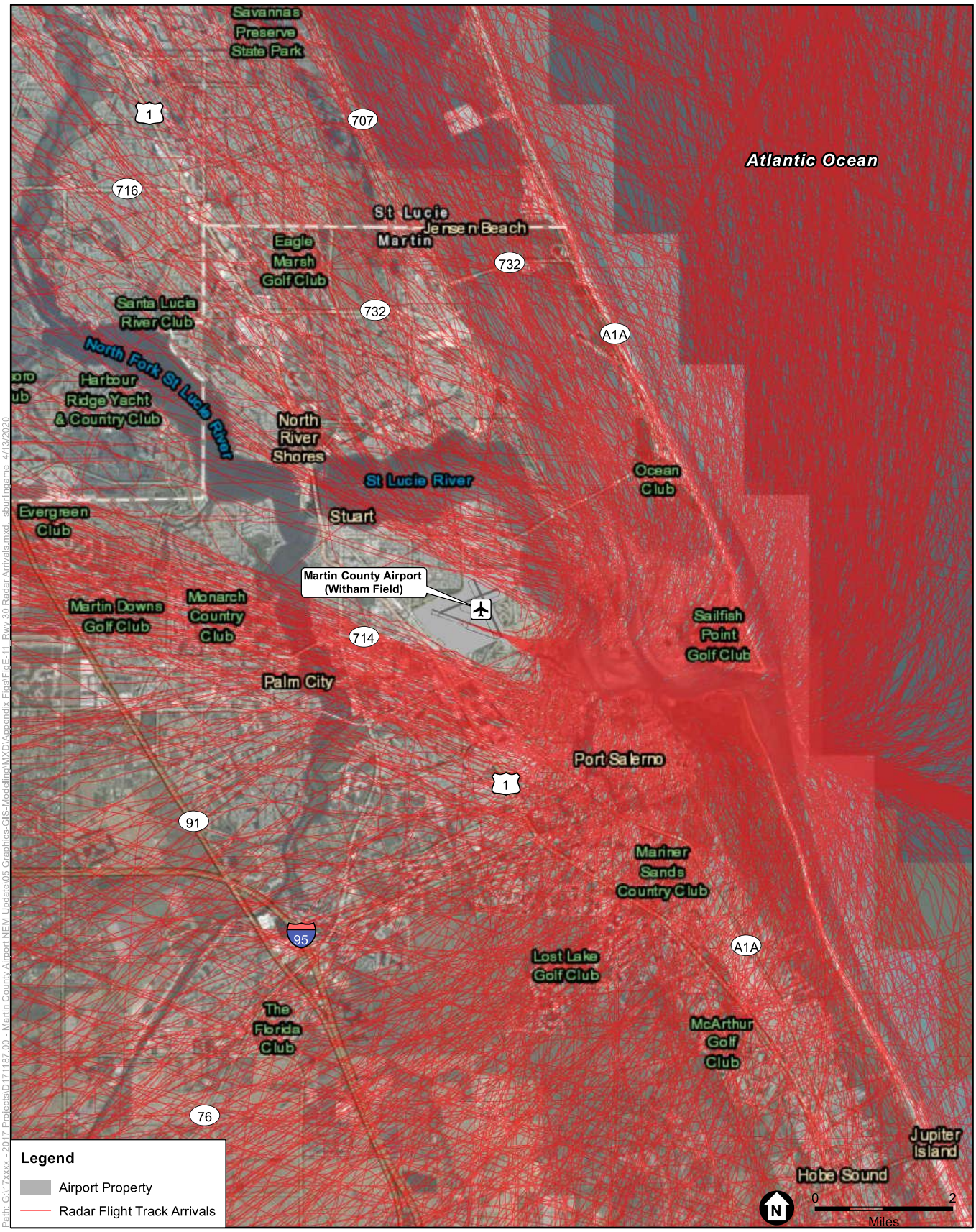


SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-10
Runway 30 Radar Track Departures
Martin County Airport (Witham Field)

ESA

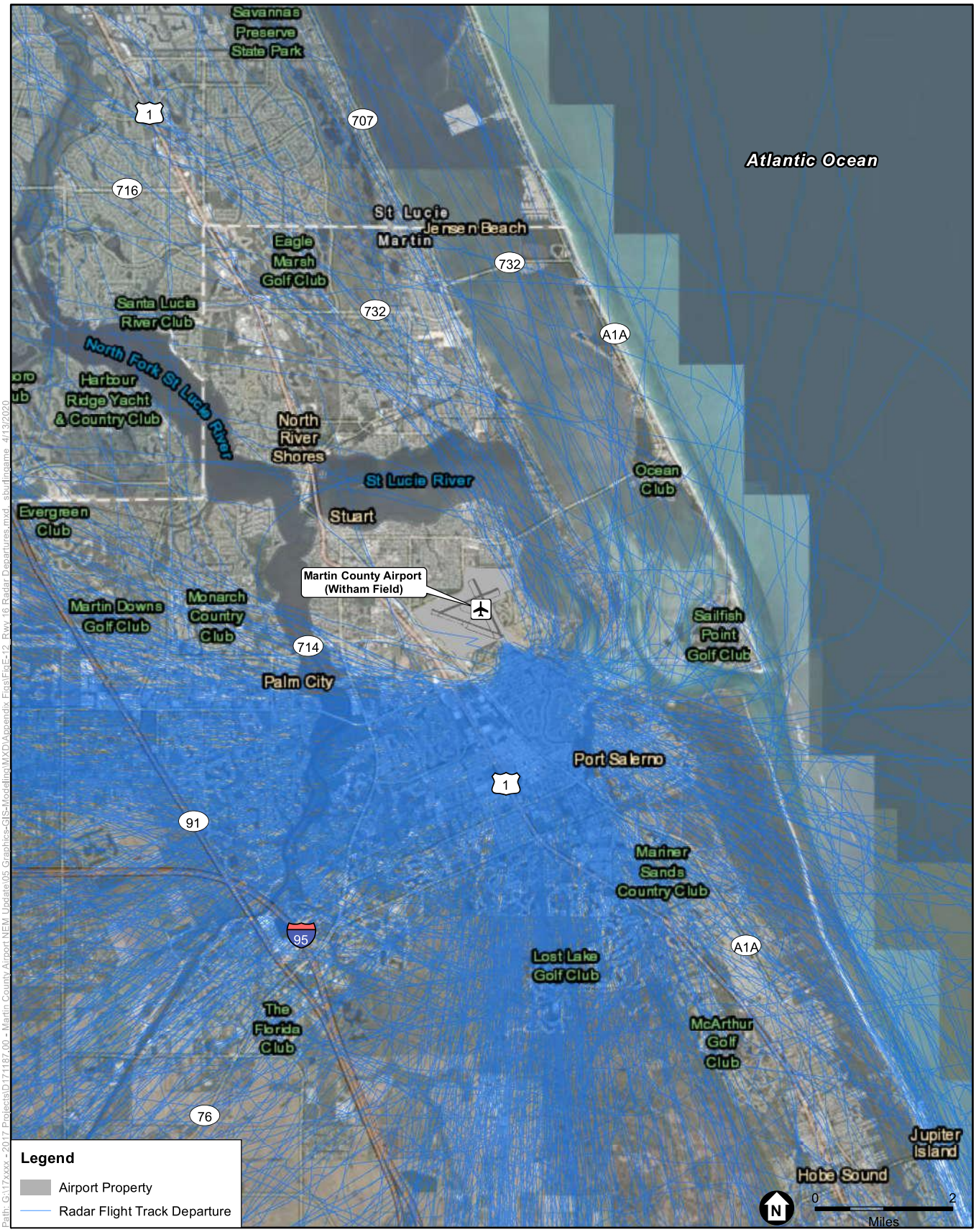


SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-11
Runway 30 Radar Track Arrivals
Martin County Airport (Witham Field)

ESA

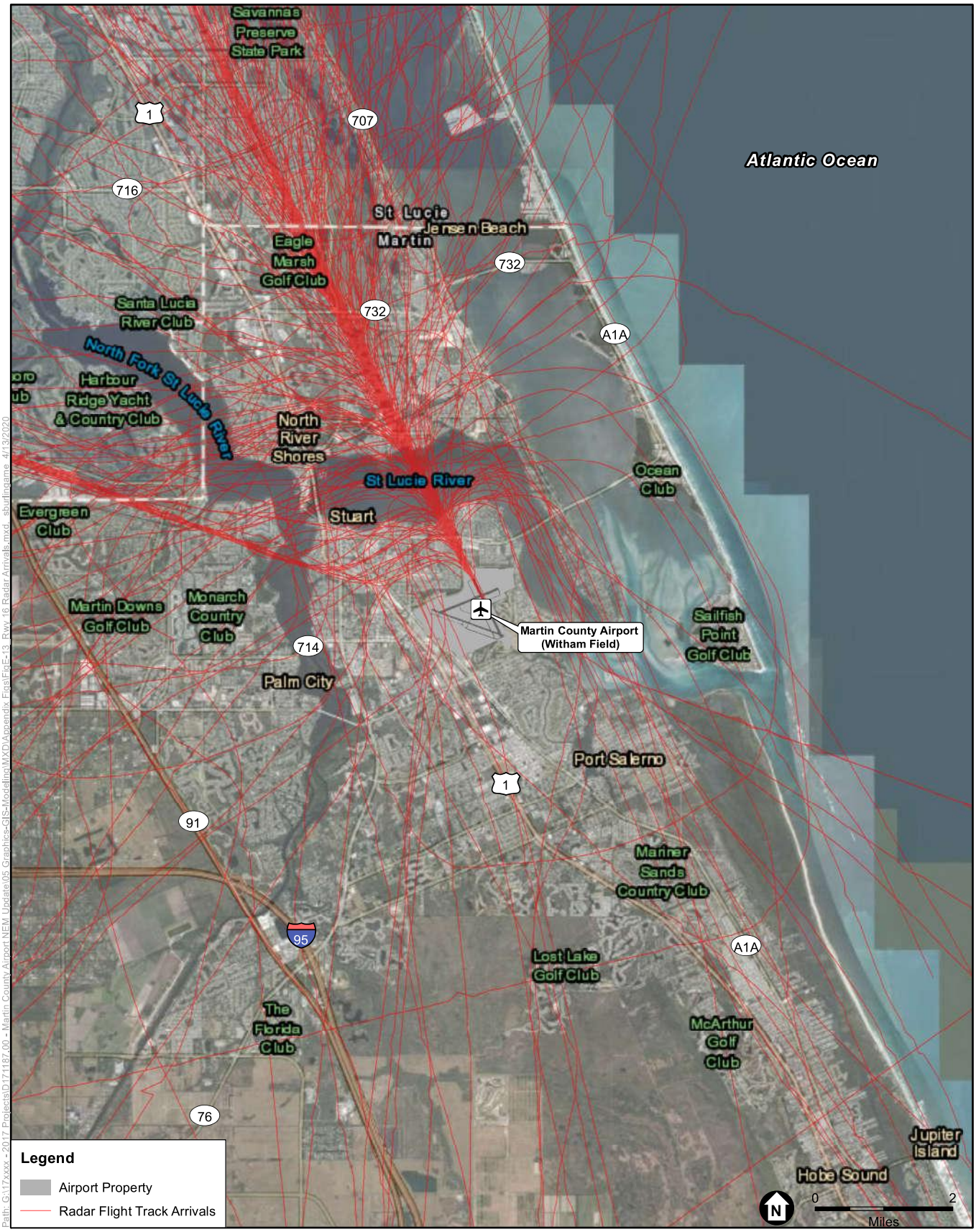


SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-12
Runway 16 Radar Track Departures
Martin County Airport (Witham Field)

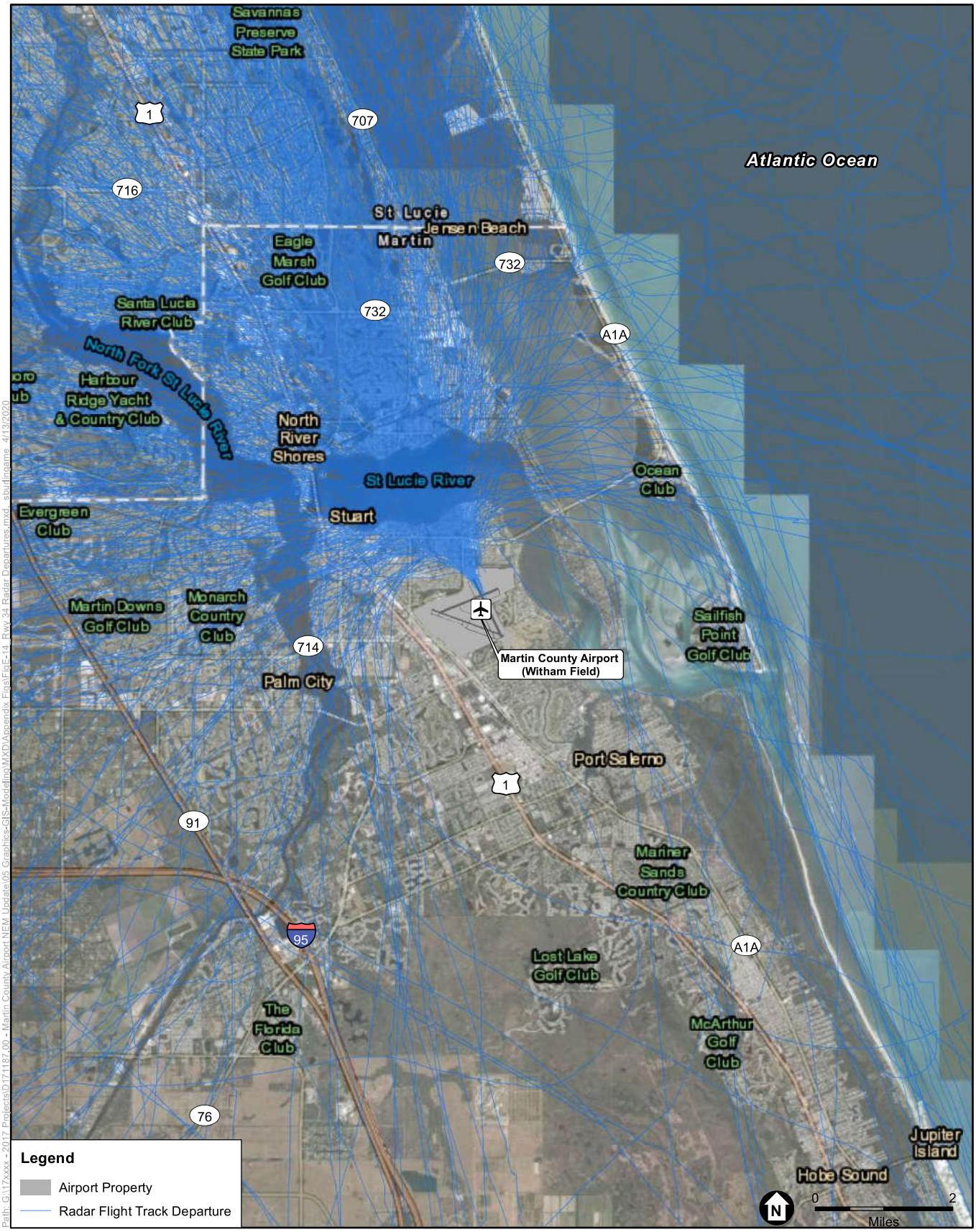
ESA



SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-13
Runway 16 Radar Track Arrivals
Martin County Airport (Witham Field)



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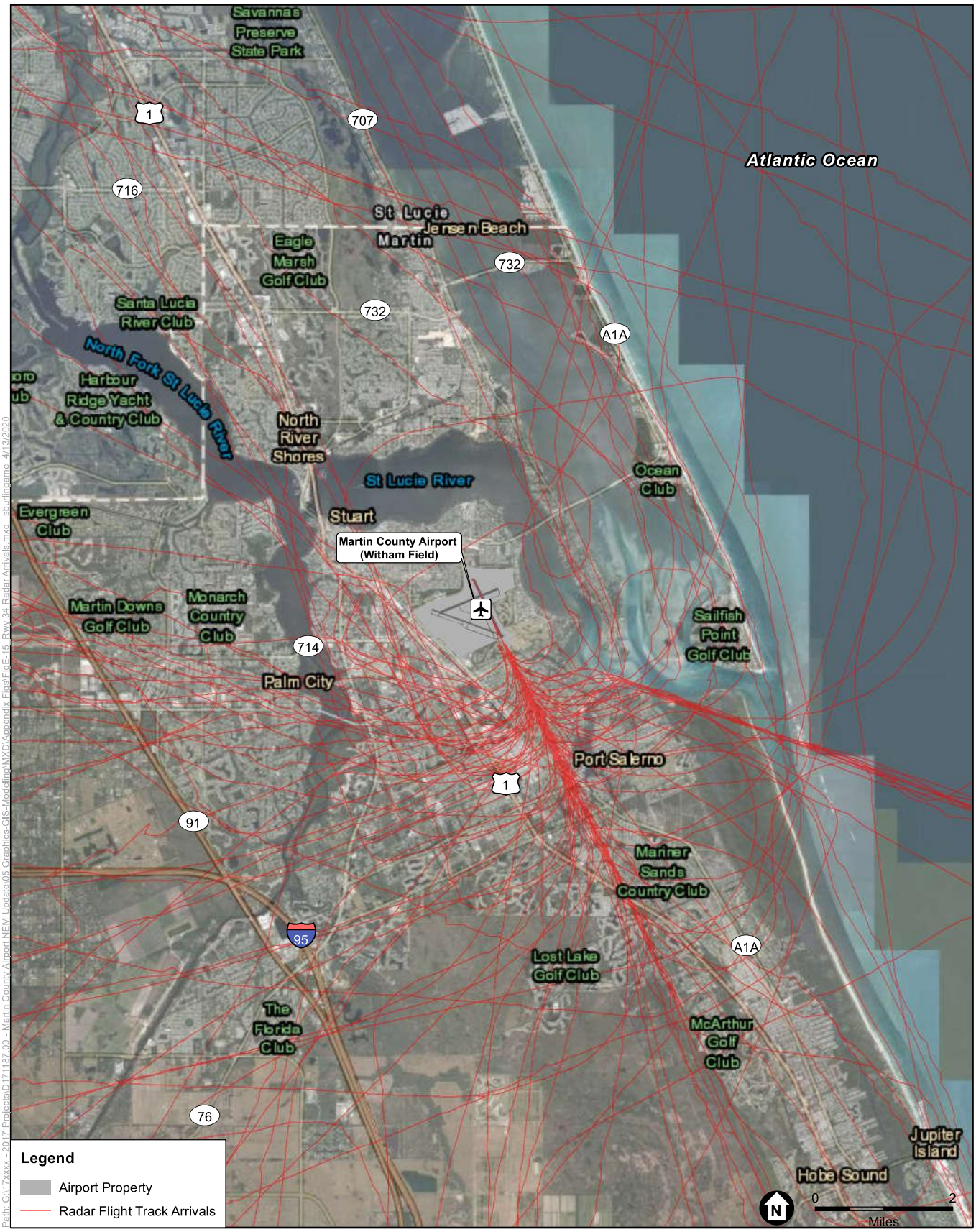
SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-14
Runway 34 Radar Track Departures
Martin County Airport (Witham Field)

ESA



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SOURCE: Vector Airport Systems, 2019; ESA, 2020

Martin County Airport NEM Update

Figure E-15
Runway 34 Radar Track Arrivals
Martin County Airport (Witham Field)

ESA

APPENDIX F

Correspondence and Consultation

This Appendix includes correspondence and consultation associated with the Martin County Airport Part 150 Study.

- ANAC Meeting #1 Materials (July 2018)
- Public Workshop Kickoff Materials (September 2018)
- ANAC Meeting #2 Materials (January 2019)
- ANAC Meeting #3 Materials (October 2019)
- ANAC Meeting #4 Materials (April 2021)
- Draft NEM Public Workshop Materials (June 2021)

APPENDIX F-1

ANAC Meeting #1 Materials

Martin County Airport / Witham Field
2011 SE Airport Rd, Stuart, FL, 34996 • 772-221-2374

Meeting Agenda
Commissioner Briefing
Part 150 Noise Exposure Map Update
Martin County Airport / Witham Field

July 25, 2018

1. Introductions
2. Airport Overview
3. Noise Exposure Map Update Regulation Overview
4. Noise and Land Use Overview
5. Noise Program History
6. Data Collection
7. Community Outreach/Meetings
8. Questions

→ Join Skype Meeting
Trouble Joining? Try Skype Web App
Join by phone
(412) 399-5555 (GAI) English (United States)
(844) 415-2030 (GAI) English (United States)
Conference ID: 419461

14 CFR Part 150
Noise Exposure Map Update

July 26, 2018

Martin County Airport / Witham Field

Agenda

- Introductions
- Airport Overview
- Noise Exposure Map Update Regulation Overview
- Noise and Land Use Overview
- Noise Program History
- Data Collection
- Community Outreach/Meetings
- Questions

Martin County Airport / Witham Field

Welcome and Introductions

Welcome and Introductions – Consultant Team

GAI Consultants

- 900+ person engineering, planning, and environmental consulting firm
- 60 years of airport experience
- Experience at more than 35 airports
- Previously Martin County Airport assignments include:
  - CIP support
  - ANAC participation
  - Conceptual Development Plans
  - Stormwater Analysis

Welcome and Introductions – Consultant Team

Environmental Science Associates

- 500+ person environmental consulting firm
- Experience at more than 150 airports nationally
- More than 100 airport noise-related studies in Florida
- Highly complex projects
  - Fort Lauderdale-Hollywood Part 150 Study
  - John F. Kennedy International Part 150 Study
  - Los Angeles International Part 150 Study

Airport Overview

SUA Overview

- Martin County Airport (Witham Field) began as a grass airfield in the 1930s and was used extensively by the Navy during World War II
- Leased to Northrop Grumman in 1950s1960s for flight testing purposes
- In 1994, Martin County began operating site as an airport for private and business aircraft

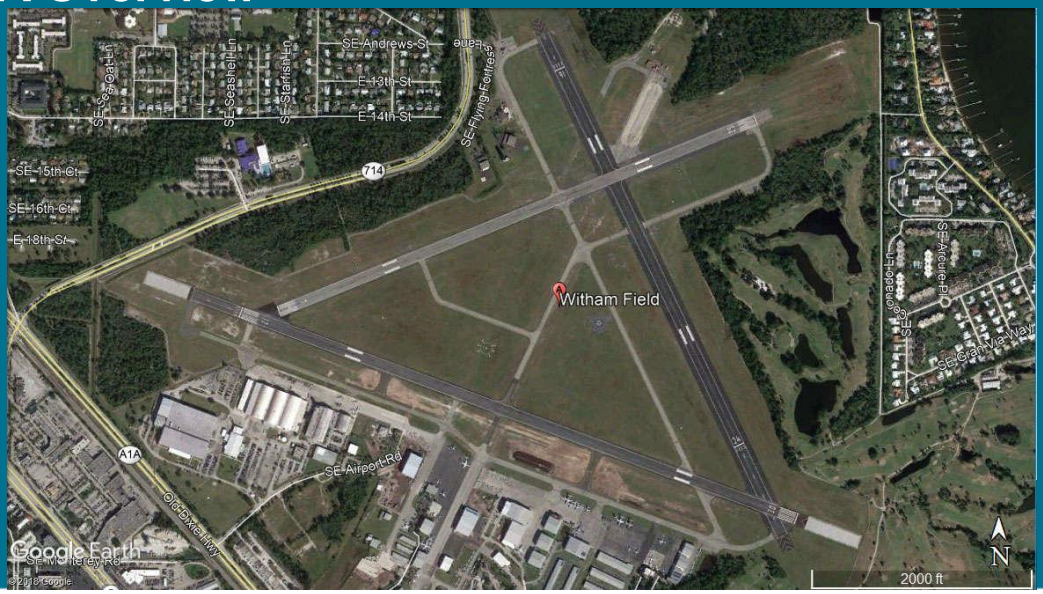
Images sourced from https://www.martin.fl.us/pilot-information

SUA Overview

- In 2015, SUA had 89,527 operations consisting of over 93% General Aviation operations with the reminder consisting of Air Taxi and Military operations.
- Was named Florida's General Aviation Airport of the Year by the Florida DOT in 2015

Images sourced from https://www.martin.fl.us/pilot-information

SUA Overview



Images sourced from Google Earth, 2018

SUA Overview - Roles & Responsibilities

Three core organizations are involved in aircraft operations at SUA:

- Federal Aviation Administration (FAA)
  - Directs the safe movement of aircraft in the air and on the ground
- Martin County Board of County Commissioners
  - Manages the airport(s), improves and maintains airport facilities
  - No control over where aircraft fly
- Pilots
  - The pilot in command has ultimate responsibility for the safe operation of his/her aircraft

Noise Exposure Map Update Overview

Noise Exposure Map Update Overview

- Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* issued in 1981 and finalized in 1985, later recodified as Title 14 Code of Federal Regulations (CFR) Part 150
- Issued in response to provisions contained in the *Aviation Safety and Noise Abatement Act of 1979*
- Establishes the methodology to be followed when preparing aircraft noise exposure maps
- Noise Exposure Map Updates are *voluntary, but…*
- Noise Exposure Map Updates as part of the Part 150 Process must adhere to 14 CFR Part 150 guidelines to be considered and accepted and approved by FAA

Noise Exposure Map Update Overview

Regulatory Framework

- **Federal law** sets aircraft noise standards, prescribes operating rules, establishes the compatibility planning process, and limits airport proprietor's ability to restrict aircraft operations.
- **State law** sets forth compatibility planning guidelines and noise standards but aircraft are exempt.
- **Local noise ordinances** set noise standards and provide for compatible land use planning but aircraft are exempt.

Noise Exposure Map Update Overview

Who Can Regulate Airport Noise?

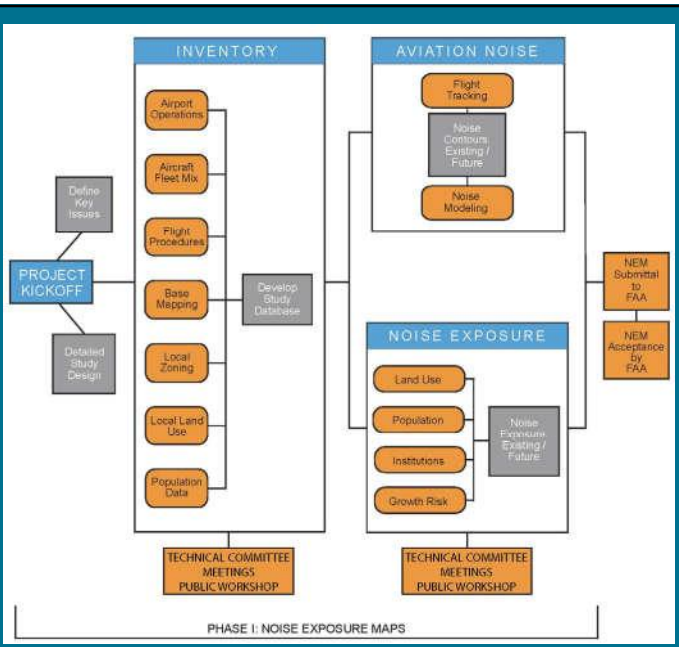
- **Federal Aviation Administration:** (1) Controls aircraft while in flight; (2) Responsible for controlling noise at its source (i.e., aircraft engines); (3) Certifies aircraft and pilots.
- **Airport Proprietors:** (1) Very limited authority to adopt local restrictions; (2) Responsible for capital improvement projects and infrastructure.
- **Local Governments and States:** (1) Promote compatible land use through zoning; (2) Require real estate disclosure: (3) Mandate sound-insulating building materials.

FEDERAL LAW PREEMPTS STATE AND LOCAL REGULATIONS

Noise Exposure Map Update Overview

Noise Exposure Map Report (NEM)

- Develop a comprehensive database of current conditions
- Noise contour development and impact analysis
- Prepare and submit Noise Exposure Map (NEM) Report



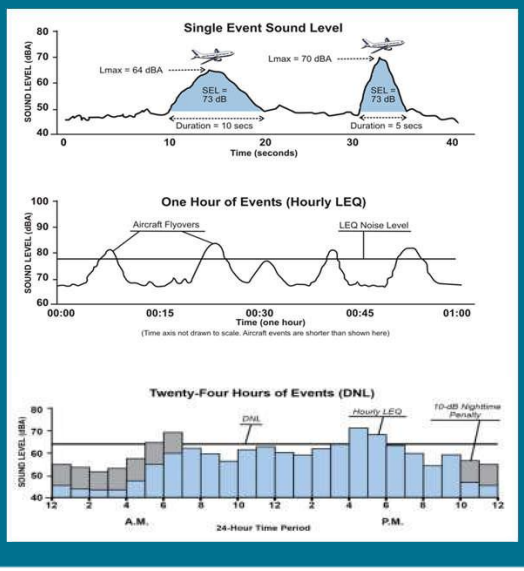
Noise and Land Use Overview

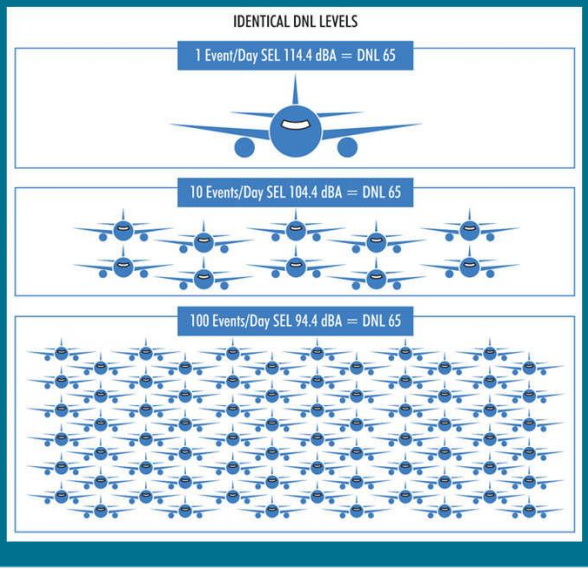
Noise and Land Use Overview

Day-Night Average Sound Level (DNL)

- 24-hour time weighted energy average noise level based on A-weighted decibels (dBA)
- Noise occurring between 10 p.m. to 7 a.m. is penalized by 10 dB to account for the higher sensitivity to noise during nighttime hours and for the expected further decrease in background levels that typically occur in the nighttime
- FAA requires the use of DNL for airport noise assessments
- Average Annual Day aircraft noise exposure is calculated over a broad area and then depicted using contour lines of equal noise levels

Noise and Land Use Overview





Noise and Land Use Overview

Noise Modeling

- Aircraft noise modeling allows:
  - Calculation of noise exposure at any point
  - Depicting annual average aircraft noise exposure
  - Predicting future aircraft noise exposure
  - Assessing changes in noise impacts resulting from runway configuration changes or new runways
  - Assessing changes in fleet mix and/or number of operations
  - Evaluating operational procedures
- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. The current version, AEDT 2D, will be used for the Martin County NEM Update.

Noise and Land Use Overview

Model Inputs

- The Amount of Noise Exposure is determined by:
  - Aircraft types
  - Stage length
  - Number of average annual day operations
  - Nighttime weighting (1 nighttime operation = 10 daytime operations)
- The Noise Exposure Distribution is determined by:
  - Runway configuration and use
  - Flight track locations
  - Flight track use
- Other Factors
  - Meteorological Conditions
  - Terrain

Aviation Environmental Design Tool (AEDT) Version 2D

Noise and Land Use Overview

Land Use Compatibility

- Table 1 in Appendix A of 14 CFR Part 150 provides noise and land use compatibility guidelines
- Levels below DNL 65 dB to be compatible with all land uses*
- Allows for the adoption of appropriate local land use standards for land use compatibility planning purposes

*Martin County has adopted DNL 60 dB as the threshold for compatibility

Noise and Land Use Overview

Land Uses

- Existing and Future Land Use
- Land parcel data
- Zoning
- Jurisdictional boundaries and neighborhoods
- Noise Sensitives Sites

Example land use (LaGuardia Airport)

Martin County Airport / Witham Field

Part 150 Studies Must Adhere to 14 CFR Part 150 Guidelines to be Accepted by FAA

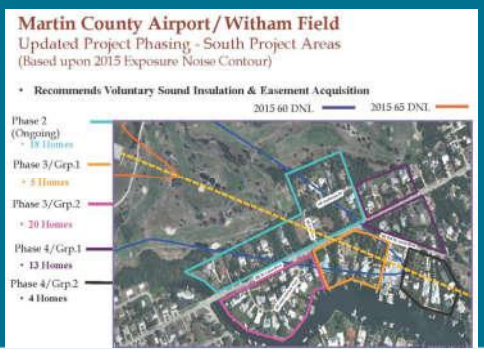
Noise Program History

Noise Program History

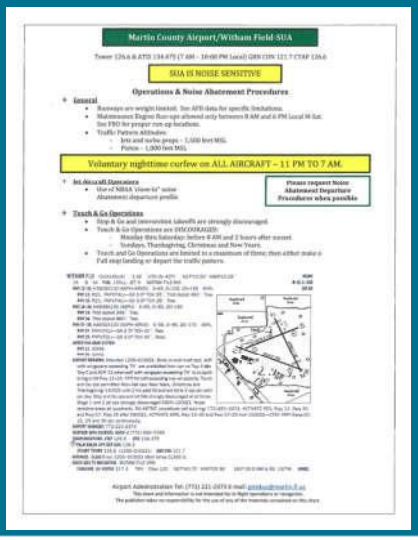
- First Part 150 Study completed in 2004 (2002 and 2007 contours)
- Martin County started the process to adopt the 60 DNL contour in 2002
  - City of Stuart has not adopted the 60 DNL contour for significance
- Airport Noise Advisory Committee formed in 2003
- Updated NEMs submitted in September 2010 (2010 and 2015 contours)
  - Between 60,000 and 70,000 operations
  - 3% nighttime
  - 17% jets (10-12,000 annually)
- Updated NCP submitted August 16, 2013 (2010 and 2015 contours certified to represent 2012 and 2017 conditions)
  - Record of Approval issued by the FAA on June 16, 2014

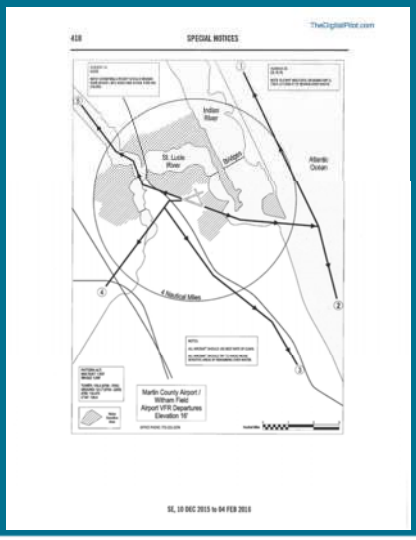
Noise Program History

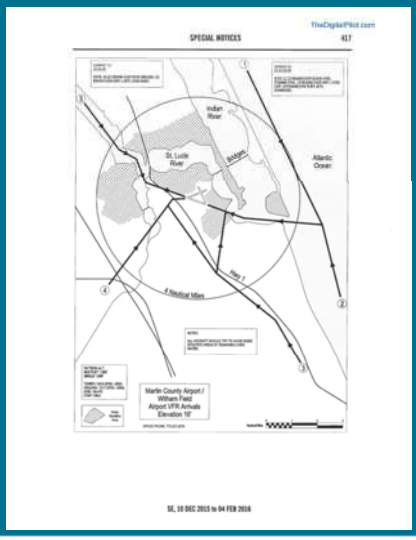
- Residential Sound Insulation Program Status
  - Phases 1 and 2 complete
  - Eligibility of Phase 3 depends on NEM Update
    - Phase 3, Group 1 – 5 homes
    - Phase 3, Group 2 – 20 homes



Voluntary Noise Program







Goals and Objectives

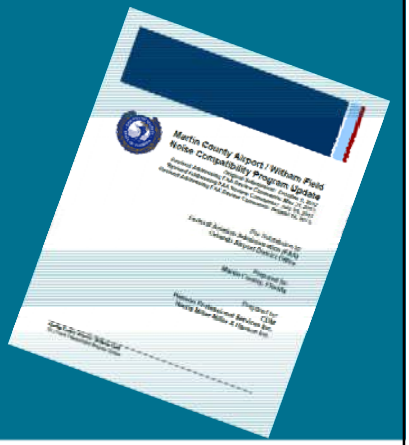
Key Issues

- Prior Residential Sound Insulation Program
- Community Education
- Expectation Management

Part 150 Studies Must Adhere to 14 CFR Part 150 Guidelines to be Accepted by FAA

Study Elements

- Develop a Comprehensive Database of Current Conditions
- Public Workshop
- Noise Contour Development and Impact Analysis
- Noise Exposure Map (NEM) Update Report
- NEM Public Workshop



Years of Analysis

Official Noise Exposure Maps

- Year of submittal must be consistent with base year
  - Existing Condition: 2019
  - Future Condition: 2024

- Existing Condition based on recent 12 months of operational data

Data Collection: Terminal Area Forecast

	Itinerant Operations					Local Operations			Total Operations
Year	Air Carrier	Air Taxi	General Aviation	Military	*Total Itinerant Operations*	General Aviation	Military	*Total Local Operations*	Total Operations
2015	4	4,380	45,517	241	*50,142*	33,523	92	*33,615*	**83,757**
2016	0	5,700	48,470	272	*54,442*	34,949	136	*35,085*	**89,527**
2017*	0	7,066	58,219	157	*65,442*	38,607	58	*38,665*	**104,107**
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2023*	0	7,066	58,996	157	*66,219*	39,180	58	*39,238*	**105,457**
2024*	0	7,066	58,925	157	*66,148*	39,376	58	*39,434*	**105,582**
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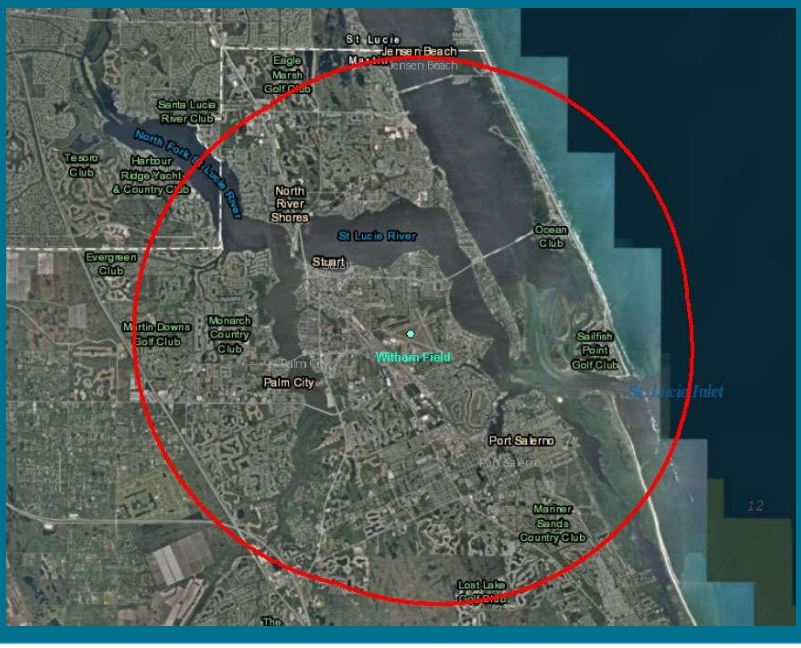
*Forecasted values

Data Collection: Minimum NEM Area



Community Outreach

- Initial Kickoff Public Workshop
  - Tentatively August/September 2018
- NEM Public Workshop
  - Tentatively February 2019
- Coordination with Airport Noise Advisory Committee
  - Meeting #1 July 2018
  - Meeting #2 October 2018
  - Meeting #3 January 2019

Martin County Airport / Witham Field

Preliminary Schedule

- Data Collection: Summer 2018
- Noise Modeling: Fall 2018
- Draft NEM Report: November 2018
- NEM Report – Public Notice and Review: January 2019
- Final NEM Report: May 2019
- FAA Review and Acceptance: Summer 2019
- NEM Update Notice of Availability: Summer 2019

Questions

Martin County Airport / Witham Field

APPENDIX F-2

Public Workshop Kickoff Materials

Entertainment

PEOPLE IN THE NEWS

Aretha Franklin

Soul icon Aretha Franklin seriously ill, resting at Detroit home

Fans and friends, including Mariah Carey and Missy Elliott, offered prayers and well wishes to Queen of Soul Aretha Franklin, who is seriously ill.

A person close to Franklin, who spoke on the condition of anonymity because the person was not allowed to publicly talk about the topic, told The Associated Press on Monday that the singer is seriously ill. No more details were provided.

"It's in God's hands," one longtime friend, who requested anonymity, told the Detroit Free Press. Franklin is receiving hospice care at her Detroit home, according to reports from CNN and CBS News.

Sam Smith

Sam Smith remark about Michael Jackson sparks online furor

Fans of the late King of Pop are telling Sam Smith to "Beat It" after the British singer voiced his dislike for Michael Jackson.

Fellow musician Adam Lambert posted a video over the weekend of the two listening to Jackson's "Human Nature" on a boat with friends. Smith can be heard saying: "I don't like Michael Jackson, but this is a good song."

Lambert quickly deleted the Instagram post, but Sam's words continue to live on, thanks to the internet. The Twitter account @musicnewsfacts captured and reposted the footage.

TODAY IN HISTORY

Today is Wednesday, Aug. 15, the 227th day of 2018. There are 138 days left in the year.

On this date:

1483: The Sistine Chapel was consecrated by Pope Sixtus IV.

1812: The Battle of Fort Dearborn took place as Potawatomi warriors attacked a U.S. military garrison of about 100 people. (Most of the garrison was killed, while those who remained were taken prisoner.)

1914: The Panama Canal officially opened as the SS Ancon crossed the just-completed waterway between the Pacific and Atlantic oceans.

1935: Humorist Will Rogers and aviator Wiley Post were killed when their airplane crashed near Point Barrow in the Alaska Territory.

1944: During World War II, Allied forces landed in southern France in Operation Dragoon.

TODAY'S BIRTHDAYS

Actress **Abby Dalton** ("Falcon Crest") is 86. Actress **Lori Nelson** is 85. Actress **Pat Priest** ("The Munsters") is 82. Drummer **Pete York** of The Spencer Davis Group is 76. Author-journalist **Linda Ellerbee** is 74. Songwriter **Jimmy Webb** is 72. Singer-guitarist **Tom Johnston** of The Doobie Brothers is 70. Actress **Phyllis Smith** ("The Office") is 69. Singer **Joe Jonas** of The Jonas Brothers is 29.

Jonas

Florida Lottery

Results are for tickets sold only in Florida

FLORIDA LOTTO

SATURDAY, AUG. 11 .....5-9-31-39-42-51 X4

6 of 6: $3.5 million (0). **5 of 6:** $9,171 (10).
4 of 6: $77 (870). **3 of 6:** $5 (18,681).
2 (with XTRA): Free ticket (48,912).

POWERBALL

SATURDAY, AUG. 11 ..... 5-43-56-62-68 PB: 24 X2

5+PB: $247 million (0). **5 of 5:** $50,000 (1).
4+PB: $50,000 (1). **4 of 5:** $100 (41).
3+PB: $100 (84). **3 of 5:** $7 (2,096).
2+PB: $7 (1,751). **1+PB:** $4 (14,335). **PB:** $4 (36,537).

MEGA MILLIONS

TUESDAY, AUG. 14..... 11-26-44-45-46 MB: 11 X2

LUCKY MONEY

TUESDAY, AUG. 14..... 7-12-15-43 LB: 3

4+LB: $600,000 (0).
4 of 4: $1,172.50 (4). **3+LB:** $354.50 (29).
3 of 4: $57.50 (524). **2+LB:** $20 (1,058). **2 of 4:** $2 (17,927).
1+LB: $2.50 (9,902). **LB:** Free ticket (23,364).

FANTASY 5

TUESDAY, AUG. 14 15-24-28-35-36

5 of 5: $188,095.91 (1). **4 of 5:** $135 (224).
3 of 5: $11 (7,438). **2 of 5:** Free ticket (73,893).

PICK 2, 3, 4, 5

TUESDAY, AUG. 14 MIDDAY

6-2.....2-7-6 .....1-6-2-4 7-6-0-5-7

TUESDAY, AUG. 14 EVENING

6-1.....1-5-1.....0-1-0-2 1-7-4-6

CASH4LIFE

MONDAY, AUG. 13 .....7-9-17-39-58 CB: 4

Florida Lottery results: Visit flalottery.com or call 850-487-7777.

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adam.neal@tcpalm.com

Noise Exposure Map Update
PUBLIC INFORMATION WORKSHOP
Martin County Airport/Witham Field

The Martin County Board of County Commissioners (BOCC) invites you to attend a public workshop to provide information on the Noise Exposure Map (NEM) Update for Martin County Airport/Witham Field (SUA). Topics include the Noise Exposure Map Update process, project schedule, and information about modeling aircraft noise exposure.

The workshops will be an "open house" format, which means there will be no formal presentation. This will provide attendees with the maximum opportunity for one-on-one interaction and sharing of information and concerns. You may attend at any time during the open house. Feedback received will be considered throughout the development of the Study.

The Martin County BOCC recently began the study to evaluate the aircraft noise exposure levels in the vicinity of the airport. This study will follow the NEM update process outlined in Title 14 of the Code of Federal Regulations (CFR) Part 150, Airport Noise Compatibility Planning. An additional public workshop will be held in order to provide an opportunity for input following the publication of the NEM report. The Martin County BOCC encourages all interested parties to monitor the airport website for the latest announcements at ***www.martin.fl.us/Airport.***

Anyone needing special accommodations under the Americans with Disabilities Act of 1990, or anyone with questions, should contact Patricia Spaulding at 772-221-1458.

WEDNESDAY SEPTEMBER 19, 2018
5:30-7:00 pm
Martin County Airport Maintenance Building Conference Room
1895 Flying Fortress Way
Stuart, FL 34996

TR-2081260

NOTICE OF LOCAL PUBLIC HEARING ON PETITION TO ESTABLISH THE HARMONY RANCH COMMUNITY DEVELOPMENT DISTRICT

A local public hearing, conducted pursuant to Chapters 120 and 190, Florida Statutes, by Administrative Law Judge Francine M. Ffolkes from the State of Florida Division of Administrative Hearings, will be held at the Hobe Sound Civic Center, 8980 Southeast Olympus Street, Hobe Sound, Florida 33455 on September 5, 2018 at 10:00 a.m.

The purpose of the hearing is to inform the public about the elements of the Petition to Establish the Harmony Ranch Community Development District (the "District") located in Martin County, Florida. The Petition was filed by Hobe Sound Ranch, LTD, as Petitioner. The information presented at this hearing will be used by the Florida Land and Water Adjudicatory Commission ("FLWAC") in granting or denying the Petition as set forth in section 190.005, Florida Statutes, and also to afford Petitioner, affected units of local government and the general public a fair and adequate opportunity to present oral and written comments relative to the proposed establishment of the District.

The District is generally located southwest of the Florida Turnpike, southeast of State Road 76 and north of West Indiantown Road, and consists of approximately 2,717.20 acres. A map showing the general location of the District is included within this notice.

A copy of the Petition, including the Statement of Estimated Regulatory Costs, is available for public inspection during normal business hours at the Florida Land and Water Adjudicatory Commission, The Capitol, Room 1801, Tallahassee, Florida 32399-0001. Specific legal authorities include Chapter 190, Florida Statutes, generally and section 190.005, Florida Statutes, particularly.

NOTICE TO PERSONS NEEDING SPECIAL ACCOMMODATIONS: Any person requiring a special accommodation to participate in the hearing because of disability shall contact the District's representative, Jonathan T. Johnson at (850) 222-7500, at least five (5) business days in advance of the hearing to make appropriate arrangements. If you are hearing or speech impaired, please contact the Florida Relay Service at 1(800) 955-8770, who can aid you in contacting the District.

Run Dates: August 8,15, 22, and August 29, 2018 TR-2081033

Welcome!

Martin County Airport / Witham Field

14 CFR Part 150
Noise Exposure Map Update

Public Information Workshop

1

Noise Exposure Map (NEM) Update Overview

- The FAA's Airport Noise Compatibility Planning Regulation (14 CFR Part 150) establishes the methodology to be followed when preparing aircraft noise exposure maps
- Why conduct a Noise Exposure Map Update (NEM)?
  - *Determine existing and future noise conditions in the vicinity of an airport*
  - *Identify and collect information from the local community about noise conditions in the vicinity of the airport*
  - *Educate communities on the Federal process and what can and cannot be done to address aircraft noise concerns*
- Noise Exposure Map Updates are voluntary
- Noise Exposure Map Updates as part of the Part 150 Process must adhere to 14 CFR Part 150 guidelines to be considered and accepted by FAA

2

Regulatory Overview

Regulatory Framework

- **Federal law** sets aircraft noise standards, prescribes operating rules, establishes the compatibility planning process, and limits airport proprietor's ability to restrict aircraft operations.
- **State law** sets forth compatibility planning guidelines and noise standards but aircraft are exempt.
- **Local noise ordinances** set noise standards and provide for compatible land use planning but aircraft are exempt.

Who Can Regulate Airport Noise?

- **Federal Aviation Administration:** (1) Controls aircraft while in flight; (2) Responsible for controlling noise at its source (i.e., aircraft engines); (3) Certifies aircraft and pilots.
- **Airport Proprietors:** (1) Very limited authority to adopt local restrictions; (2) Responsible for capital improvement projects and infrastructure.
- **Local Governments and States:** (1) Promote compatible land use through zoning; (2) Require real estate disclosure: (3) Mandate sound-insulating building materials.

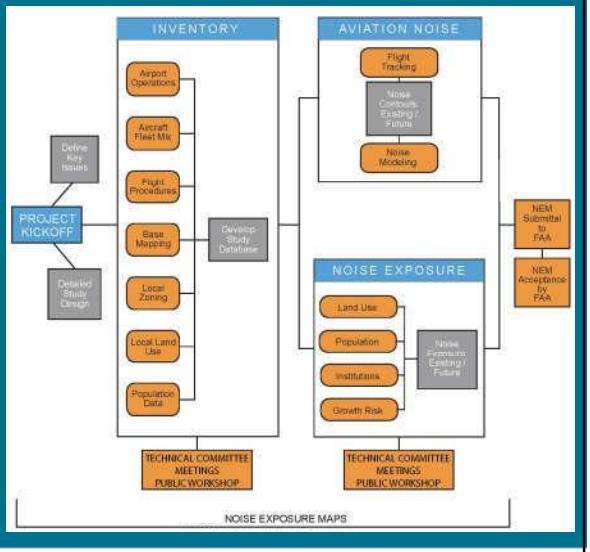
FEDERAL LAW PREEMPTS STATE AND LOCAL REGULATIONS

3

Noise Exposure Map Update Process

Noise Exposure Map Overview

- Develop a comprehensive database of current conditions
- Noise contour development and impact analysis
- Community Outreach and Engagement
- Prepare and submit Noise Exposure Map Report

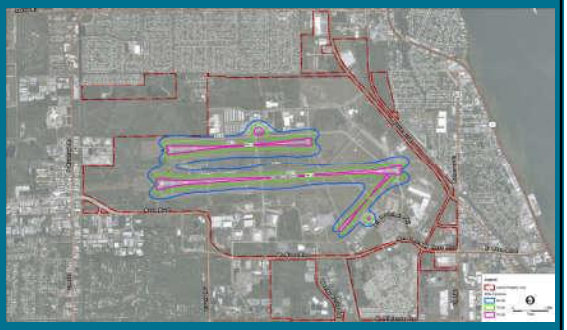


4

Noise Metrics and Contours

Day-Night Average Sound Level (DNL)

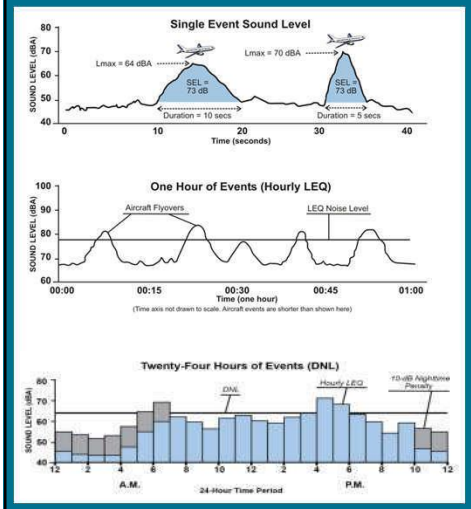
- 24-hour time weighted energy average noise level based on A-weighted decibels (dBA)
- Noise occurring between 10 p.m. to 7 a.m. is penalized by 10 dB to account for the higher sensitivity to noise during nighttime hours and for the expected further decrease in background levels that typically occur in the nighttime
- FAA requires the use of DNL for airport noise assessments
- Average Annual Day aircraft noise exposure is calculated over a broad area and then depicted using contour lines of equal noise levels

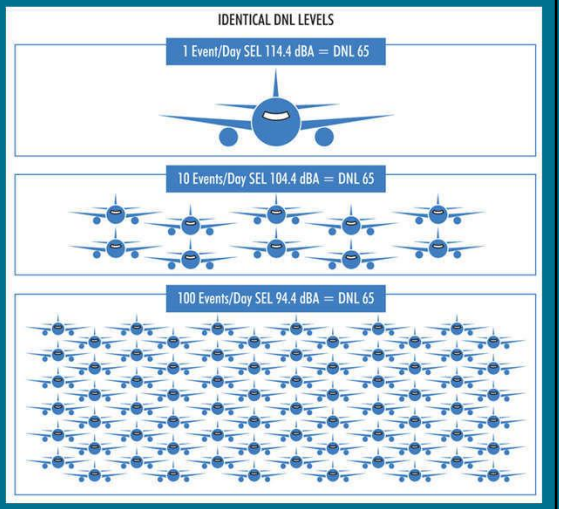


Noise Contour Example

5

Understanding Noise Metrics





6

Land Use and Noise Sensitive Areas

Land Uses

- Existing and Future Land Use
- Land parcel data
- Zoning
- Jurisdictional boundaries and neighborhoods

Noise Sensitive Uses

- Residential
- Places of worship
- Schools, colleges, and universities
- Libraries/cultural institutions
- Hospitals and residential healthcare facilities
- Daycare and assisted living facilities
- Historic properties

7

Martin County Airport Layout

8

Responsible Parties at Martin County Airport

Three core organizations are involved in aircraft operations at SUA:

- Federal Aviation Administration (FAA)
  - *Directs the safe movement of aircraft in the air and on the ground*
- Martin County Board of County Commissioners
  - *Manages the airport, improves and maintains airport facilities*
  - *No control over where aircraft fly*
- Pilots
  - *The pilot in command has ultimate responsibility for the safe operation of his/her aircraft*

9

Martin County Airport Part 150 History

- First Part 150 Study completed in 2004 (2002 and 2007 contours)
- Martin County Airport started the process to adopt the 60 DNL contour in 2002
  - *City of Stuart has not adopted the 60 DNL contour for significance*
- Airport Noise Advisory Committee formed in 2003
- Updated NEMs submitted in September 2010 (2010 and 2015 contours)
  - *Between 60,000 and 70,000 operations*
  - *3% nighttime*
  - *17% jets (10-12,000 annually)*
- Updated Noise Compatibility Program submitted August 16, 2013 (2010 and 2015 contours certified to represent 2012 and 2017 conditions)
  - *Record of Approval issued by the FAA on June 16, 2014*

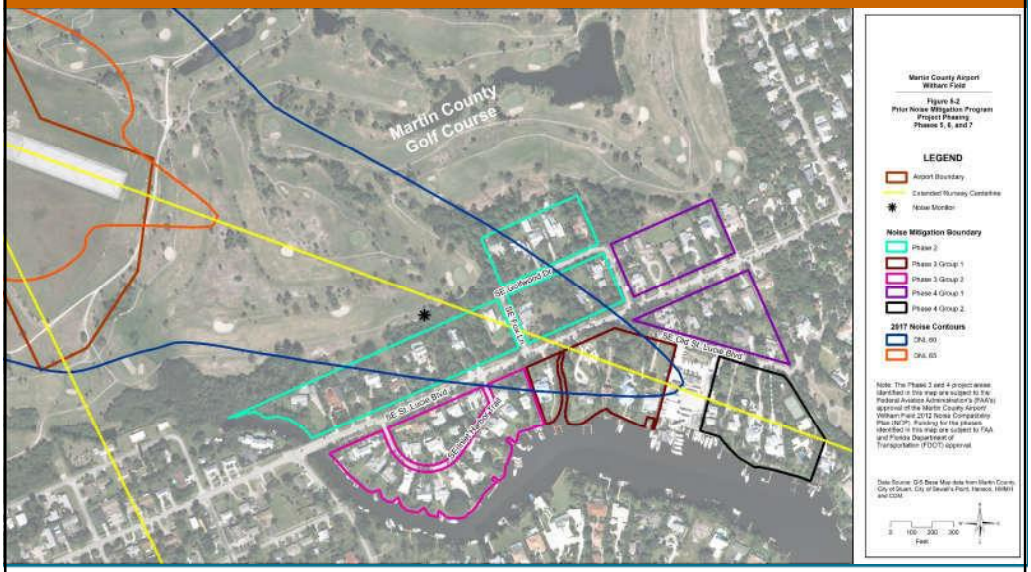
10

Previous Residential Sound Insulation Program Map

Martin County Airport / Witham Field

11

Previous Residential Sound Insulation Program Map



Martin County Airport / Witham Field

12

Study Elements & Analysis Years

- Develop a Comprehensive Database of Current Conditions
- Public Workshop
- Noise Contour Development and Impact Analysis
- Noise Exposure Map Update Report
- Noise Exposure Map Public Workshop
- Year of submittal must be consistent with base year
  - *Existing Condition: 2019*
  - *Future Condition: 2024*
- Existing Condition based on recent 12 months of operational data

13

Data Collection: Terminal Area Forecast

	Itinerant Operations					Local Operations			Total Operations
Year	Air Carrier	Air Taxi	General Aviation	Military	*Total Itinerant Operations*	General Aviation	Military	*Total Local Operations*	Total Operations
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14

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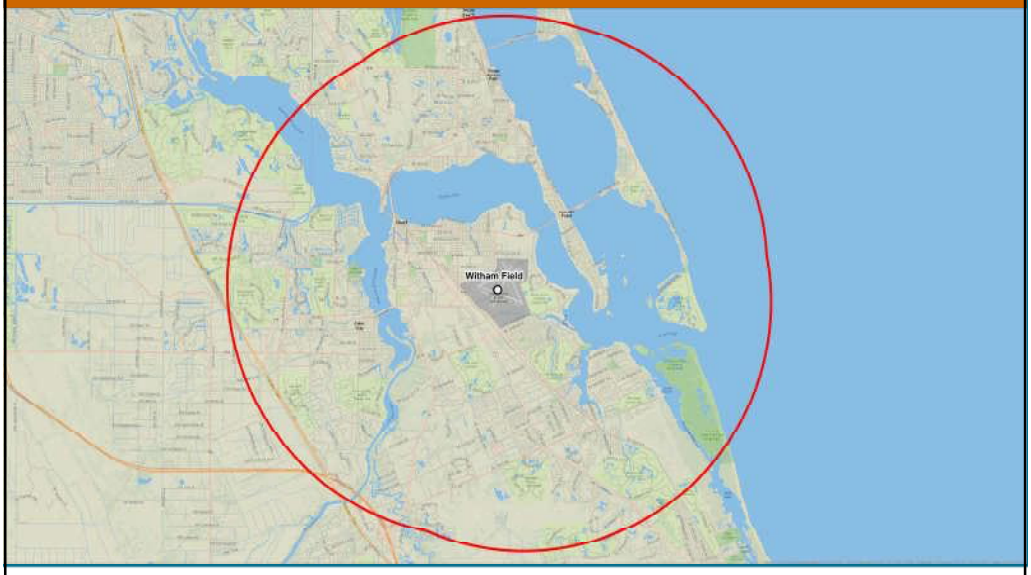

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Noise Modeling Details

Noise Modeling Basics

- Aircraft noise modeling allows:
  - *Calculation of noise exposure at any point*
  - *Depicting annual average aircraft noise exposure*
  - *Predicting future aircraft noise exposure*
  - *Assessing changes in noise impacts resulting from runway configuration changes or new runways*
  - *Assessing changes in fleet mix and/or number of operations*
  - *Evaluating operational procedures*
- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. The current version, AEDT 2d, will be used for the Martin County NEM Update.

16

Noise Modeling Details

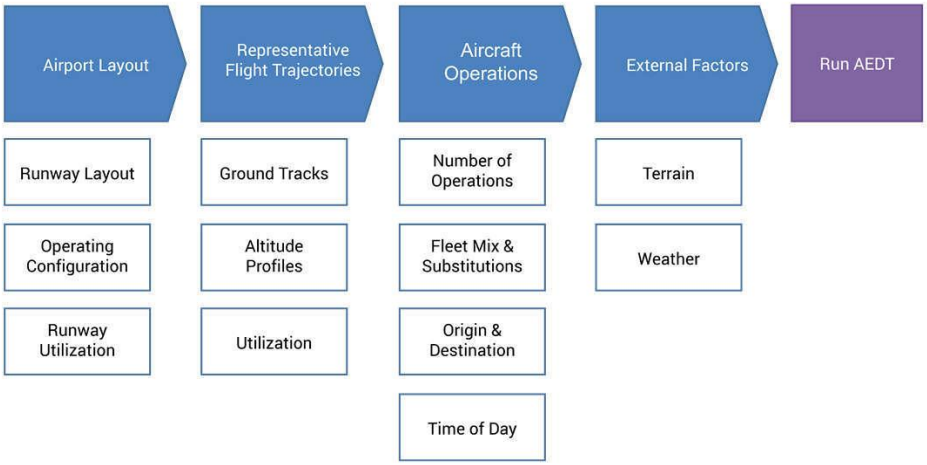
Model Inputs

- The Amount of Noise Exposure is determined by:
  - *Aircraft types*
  - *Stage length*
  - *Number of average annual day operations*
  - *Nighttime weighting (1 nighttime operation = 10 daytime operations)*
- The Noise Exposure Distribution is determined by:
  - *Runway configuration and use*
  - *Flight track locations*
  - *Flight track use*
- Other Factors
  - *Meteorological Conditions and Terrain*

Aviation Environmental Design Tool (AEDT) Version 2d

17

Noise Modeling Details- AEDT Inputs



18

Preliminary Schedule

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- Noise Modeling: Fall 2018
- Draft NEM Report: November 2018
- NEM Report – Public Notice and Review: January 2019
- Final NEM Report: May 2019
- FAA Review and Acceptance: Summer 2019
- NEM Update Notice of Availability: Summer 2019

19

Comment Submission

You may provide written comments during this public workshop. Comment forms are available at this meeting to submit here or by mail to:

ESA
4200 West Cypress St, #450
Tampa, FL 33607

Please submit your comments by **October 1, 2018**.

Thank You for Your Participation!

20

Martin County Board of County Commissioners

Martin County Airport / Witham Field

Noise Exposure Map Update Public Information Workshop

Public Sign-in Sheet

Date / Time: Wednesday, September 19, 2018

First & Last Name	Address	Email	Organization
SAM CARTER	25 SE SEMINOLE ST	SCARTER@MARTIN.FL	MARTIN COUNTY
STEPHEN M. SEIDEL	PO BOX 1727 JB	on file	ANAC
Helen McBride	921 SE Flamingo	helenbmcb@icloud.com	
George M. Stokes	2401 SE Monterey	ic	r
		☆	

Martin County Board of County Commissioners
Martin County Airport / Witham Field
Noise Exposure Map Update Public Information Workshop
Public Sign-in Sheet

Date / Time: Wednesday, September 19, 2018

First & Last Name	Address	Email	Organization
Mike Arnold			ESA
Autumn Ward			ESA
Sean Burlingame			ESA
Steve Goetzinger			ESA
Joe Halisky			ESA
Jack Thompson			GAI
Christina Lorenzo		☆	GAI

APPENDIX F-3

ANAC Meeting #2 Materials

NEM Status Update: Fleet Mix

- Operational Data collected from SUA over 12 months to assemble Fleet Mix for NEM Analysis
  - July 1, 2017- June 30, 2018
- Vector Airport Systems is contracted by SUA to track airport activity and collects data including:
  - Aircraft Type
  - FAA registry number
  - Operation type
  - Date and time of operation
- Records were compiled into a list of 126 unique aircraft/engine combinations with operational information for each aircraft group, which incorporated over 91% of the original data from Vector Airport Systems
  - Cessna 560 Citation XLS and Cessna 172 Skyhawk are the most common jet and non-jet aircraft respectively

1

NEM Status Update: Runway Use

- Vector Airport Systems data was used to generate Runway Usage Percentages for each Runway End
- Runway 12/30 is the most commonly used runway including 82.9% of arrivals and 79.4% of departures
- This information, as well as the detailed fleet information, will be loaded into the Aviation Environmental Design Tool (AEDT) in order to accurately assess the noise soundscape at Martin County Airport/Witham Field

SUA ARRIVALS RUNWAY PERCENTAGES

	07	12	16	25	30	34	All Runways
Helicopter	0.04%	0.07%	0.01%	0.01%	0.02%	0.01%	0.16%
Jet	0.89%	15.64%	0.23%	0.19%	8.42%	0.09%	25.46%
Single Engine Piston	9.11%	32.57%	1.06%	2.92%	16.67%	0.57%	62.88%
Twin Engine	1.00%	6.47%	0.30%	0.36%	3.09%	0.29%	11.50%
Grand Total	***11.03%***	***54.74%***	***1.60%***	***3.47%***	***28.21%***	***0.95%***	***100.00%***

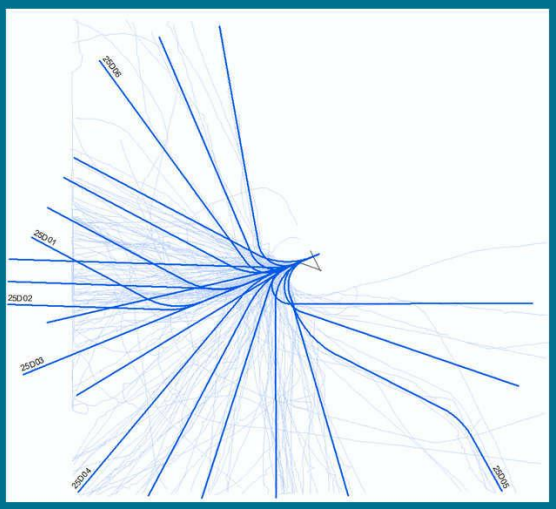
SUA DEPARTURES RUNWAY PERCENTAGES

	07	12	16	25	30	34	All Runways
Helicopter	0.03%	0.03%	0.02%	0.01%	0.03%	0.01%	0.13%
Jet	0.66%	12.08%	0.59%	0.11%	8.18%	0.56%	22.18%
Single Engine Piston	8.08%	32.48%	3.48%	2.11%	18.13%	2.73%	67.02%
Twin Engine	0.88%	5.60%	0.53%	0.25%	2.87%	0.55%	10.68%
Grand Total	***9.65%***	***50.20%***	***4.62%***	***2.48%***	***29.21%***	***3.84%***	***100.00%***

2

NEM Status Update: Flight Tracks

- An alternate report from Vector Airport Systems tracks the radar tracks as aircraft land and depart SUA
- These radar tracks were downloaded for the complete year (July 1, 2017-June 30, 2018), and then separated by aircraft type, and runway type in a GIS software
- AEDT Flight Tracks were then built using the radar tracks as a guide for each aircraft type and runway end combination; AEDT Flight Tracks will simulate the lateral distribution of aircraft actions and will be assigned the number of flight tracks proportional to the number of radar tracks used to built the flight tracks



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NEM Status Update: Recommended Activity Levels

	HISTORIC ANNUAL AIRCRAFT OPERATIONS (JULY 1, 2017-JUNE 30, 2018) MARTIN COUNTY AIRPORT/WITHAM FIELD				
Facility	ATADS Operations			Vector Airport Systems Operations	ATADS and Vector Airport Systems Operations
	Total Itinerant Operations	Total Local Operations	Total ATADS Operations	Vector Nighttime Operations	Total Annual Operations
SUA	69,430	34,581	104,011	2,324	106,335

- For the purposes of this analysis, actual operational data was collected for SUA of the recent 12-month period from July 1, 2017 to June 30, 2018. Historic annual aircraft operations were obtained from the FAA's Air Traffic Activity Data System (ATADS). ATADS is considered an official data source for operations counts by the Federal Aviation Administration (FAA). Since the tower is only active from 7 a.m.- 10 p.m., the ATADS operation counts do not include activity between 10 p.m. and 7 a.m.
- The historic nighttime activity (when the tower is closed) was pulled from the Vector Airport Systems database from July 1, 2017 to June 30, 2018. This activity was added to the ATADs activity to determine the total annual operations.

4

NEM Status Update: Existing Conditions/Forecasts

- The FAA's Terminal Area Forecast (TAF), the official forecast by the FAA, and the Florida Department of Transportation's (FDOT) aviation forecast were reviewed. The FDOT's forecast was ultimately selected since the flat growth of the TAF to appeared overly conservative relative to the recent activity at the airport.
- The annual aircraft operations for 2019 and 2024 for use in the Noise Exposure Map Update at SUA were estimated using the FDOT forecasted annual growth rates of 1.6%.

RECOMMENDED AIRPORT ACTIVITY FOR USE IN NOISE EXPOSURE MAP UPDATE MARTIN COUNTY AIRPORT/WITHAM FIELD	
Operational Year	Total Operation Counts for NEM Update
2017/2018	106,335
2019	108,869
2024	117,746

5

NEM Status Update: Next Steps

- Complete the operational analysis
- Incorporate information into AEDT
- Generate noise contours (2019 and 2024)
- Conduct impact analysis
- Generate Draft NEM Report
- ANAC Briefing and NEM Public Workshop

6

APPENDIX F-4

ANAC Meeting #3 Materials

14 CFR Part 150 Noise Exposure Map Update

Martin County Airport / Witham Field October 24, 2019

Presentation Outline

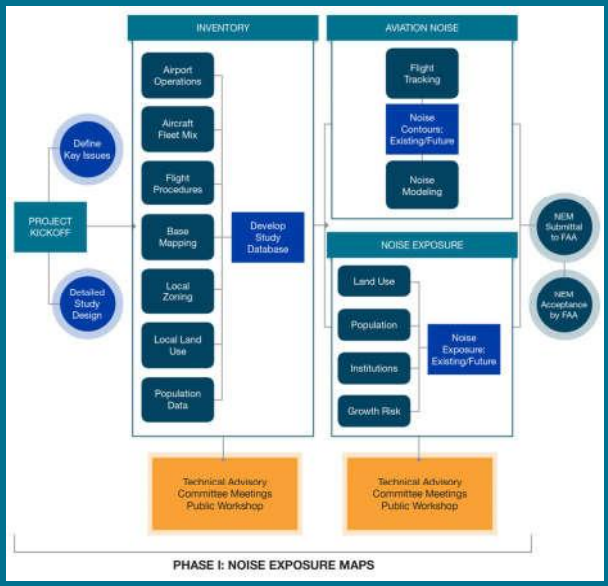
- NEM Overview
- Modeling Assumptions
- Previous Part 150 Contours and Noise Mitigation Program
- 2020/2025 Noise Contours
- Changes since Previous Contours
- Previous Contours vs New Contours
- Next Steps
- Questions

Martin County Airport / Witham Field October 24, 2019

NOISE EXPOSURE MAP UPDATE: OVERVIEW

Noise Exposure Map Report (NEM)

- Develop a comprehensive database of current conditions
- Noise contour development and impact analysis
- Prepare and submit Noise Exposure Map (NEM) Report



NOISE OVERVIEW

Day-Night Average Sound Level (DNL)

- 24-hour time weighted energy average noise level based on A-weighted decibels (dBA)
- Noise occurring between 10 p.m. to 7 a.m. is penalized by 10 dB to account for the higher sensitivity to noise during nighttime hours and for the expected further decrease in background levels that typically occur in the nighttime
- FAA requires the use of DNL for airport noise assessments
- Average Annual Day aircraft noise exposure is calculated over a broad area and then depicted using contour lines of equal noise levels

NOISE CONTOUR GENERATION

Noise Modeling

- Aircraft noise modeling allows:
  - Calculation of noise exposure at any point
  - Depicting annual average aircraft noise exposure
  - Predicting future aircraft noise exposure
  - Assessing changes in noise impacts resulting from runway configuration changes or new runways
  - Assessing changes in fleet mix and/or number of operations
  - Evaluating operational procedures
- Aviation Environmental Design Tool (AEDT) replaced the Integrated Noise Model (INM) when it was released in 2015. AEDT 2d was used to generate the contours seen in this analysis

NOISE CONTOUR GENERATION

Model Inputs

- The Amount of Noise Exposure is determined by:
  - Aircraft types
  - Stage length
  - Number of average annual day operations
  - Nighttime weighting (1 nighttime operation = 10 daytime operations)
- The Noise Exposure Distribution is determined by:
  - Runway configuration and use
  - Flight track locations
  - Flight track use
- Other Factors
  - Meteorological Conditions
  - Terrain

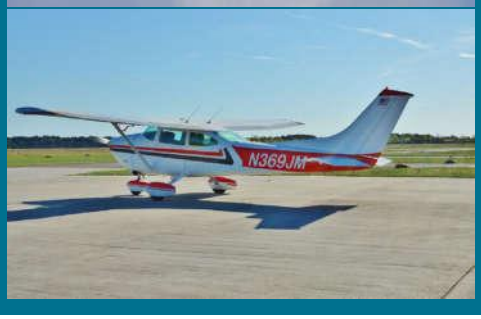
Aviation Environmental Design Tool (AEDT)

MODELING ASSUMPTIONS

Martin County Airport / Witham Field October 24, 2019

FLEET MIX

- Operational Data collected from SUA over 12 months to assemble Fleet Mix for NEM Analysis
  - July 1, 2017- June 30, 2018
- Vector Airport Systems is contracted by SUA to track airport activity and collects data including:
  - Aircraft Type
  - FAA registry number
  - Operation type
  - Date and time of operation
- Records were compiled into a list of 126 unique aircraft/engine combinations with operational information for each aircraft group, which incorporated over 91% of the original data from Vector Airport Systems
  - Cessna 560 Citation XLS and Cessna 172 Skyhawk are the most common jet and non-jet aircraft respectively



Martin County Airport / Witham Field October 24, 2019

RUNWAY USE

- Vector Airport Systems data was used to generate Runway Usage Percentages for each Runway End
- Runway 12/30 is the most commonly used runway including 84.6% of arrivals and 77.7% of departures
- This information, as well as the detailed fleet information, will be loaded into the Aviation Environmental Design Tool (AEDT) in order to accurately assess the noise soundscape at Martin County Airport/Witham Field

SUA ARRIVALS RUNWAY PERCENTAGES

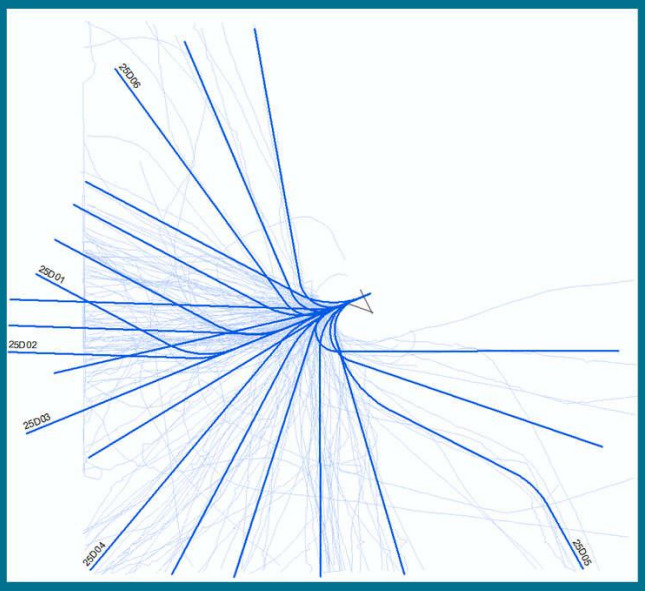
	12	30	16	34	7	25	All Runways
Single/Multi Eng. Piston	35.75%	31.88%	1.02%	0.75%	8.75%	1.66%	79.80%
Jet	9.33%	3.51%	0.25%	0.15%	1.74%	0.41%	15.39%
Turbo-Prop	2.01%	1.78%	0.06%	0.04%	0.48%	0.09%	4.46%
Helicopter	0.17%	0.14%	0.00%	0.00%	0.03%	0.01%	0.35%
Total	***47.26%***	***37.30%***	***1.33%***	***0.95%***	***11.00%***	***2.17%***	***100.00%***

SUA DEPARTURES RUNWAY PERCENTAGES

	12	30	16	34	7	25	All Runways
Single/Multi Eng. Piston	44.80%	18.79%	4.11%	2.92%	9.75%	1.90%	82.26%
Jet	6.69%	3.96%	0.31%	0.51%	1.26%	0.49%	13.21%
Turbo-Prop	2.29%	0.96%	0.21%	0.15%	0.50%	0.10%	4.21%
Helicopter	0.17%	0.08%	0.02%	0.01%	0.03%	0.01%	0.32%
Total	***53.94%***	***23.80%***	***4.64%***	***3.59%***	***11.54%***	***2.49%***	***100.00%***

RUNWAY USE

- An alternate report from Vector Airport Systems tracks the radar tracks as aircraft land and depart SUA
- These radar tracks were downloaded for the complete year (July 1, 2017- June 30, 2018), and then separated by aircraft type, and runway type in a GIS software
- AEDT Flight Tracks were then built using the radar tracks as a guide for each aircraft type and runway end combination; AEDT Flight Tracks will simulate the lateral distribution of aircraft actions and will be assigned the number of flight tracks proportional to the number of radar tracks used to built the flight tracks



FORECAST OVERVIEW

- Coordination with the FAA on the aviation forecast to be used in the Part 150 began in January 2019
- The Part 150 scope of work identified use of the FAA's most recent Terminal Area Forecast (2018 TAF, issued January of 2019).
- Review of the TAF indicated that the growth projections were extremely conservative (.5%) and did not reflect recent trends at the airport.
  - Project Team considered multiple sources in recommending a proposed approach:
    - FAA's Air Traffic Activity Data System (ATADS)
    - FAA's Terminal Area Forecast (TAF)
    - FDOT's Aviation and Spaceports Aviation Forecast
    - SUA's Vector Airport System Operations

FORECAST OVERVIEW

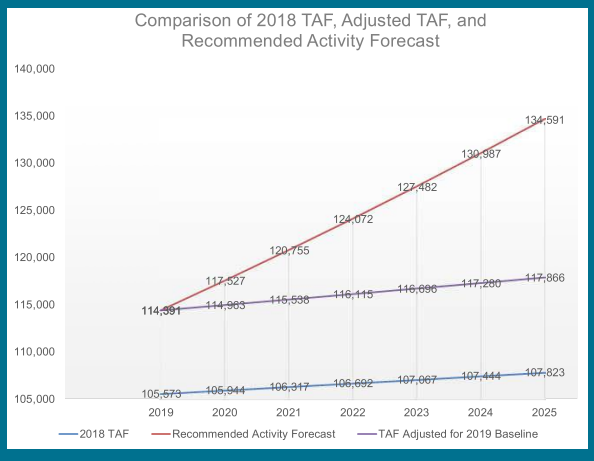
- Alternate forecast approaches were proposed to the FAA that better reflected recent trends:
  - FDOT's Aviation and Spaceports Aviation Forecast (1.6% growth projection)
    - FAA rejected application of the FDOT growth rates to recent activity levels – indicating that the forecast was developed in 2016 and outdated and potentially overstated activity
  - 10 year historic growth trend line projection (4.7% projection)
    - FAA rejected projection of the historic growth trends forward indicating that they did not believe that the airport activity would continue to grow at the same rate of growth moving forward
  - Adjusted activity projection based on actual capacity of recent improvements (2.75% growth)
    - FAA ultimately accepted this approach

FORECAST OVERVIEW

- Forecast approval was received from the FAA on August 26, 2019.
- Because of the delays related to the approval of the forecast, approval was requested for 2 sets of study years – 2019/2024 and 2020/2025
  - Based on the anticipated submission date, the project team has selected 2020/2025 as the study years for use in the NEM Update

FORECAST OVERVIEW

Fiscal Year	*2018 TAF*	*Recommended Activity Forecast*	*Difference*	*TAF Adjusted for 2019 Baseline*	*Adjusted Difference*
2019	105,573	114,391	8.4%	114,391	0.0%
2020	105,944	117,527	10.9%	114,963	2.2%
2021	106,317	120,755	13.6%	115,538	4.5%
2022	106,692	124,072	16.3%	116,115	6.9%
2023	107,067	127,482	19.1%	116,696	9.2%
2024	107,444	130,987	21.9%	117,280	11.7%
2025	107,823	134,591	24.8%	117,866	14.2%



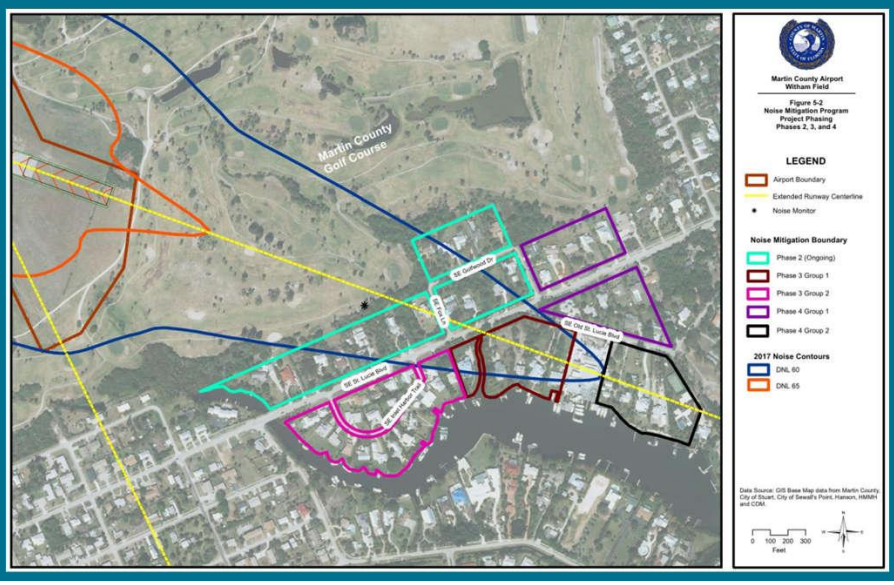
Martin County Airport / Witham Field October 24, 2019

PREVIOUS PART 150 CONTOURS AND NOISE MITIGATION PROGRAM

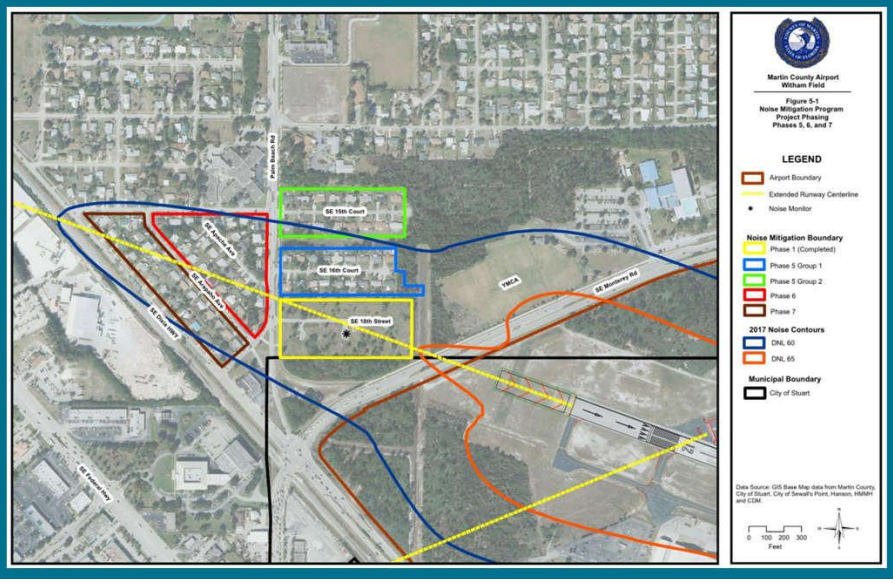
NOISE HISTORY

- First Part 150 Study completed in 2004 (2002 and 2007 contours)
- Martin County Airport started the process to adopt the 60 DNL contour in 2002
  - City of Stuart has not adopted the 60 DNL contour for significance
- Airport Noise Advisory Committee formed in 2003
- Updated NEMs submitted in September 2010 (2010 and 2015 contours)
  - Between 60,000 and 70,000 operations
  - 3% nighttime
  - 17% jets (10-12,000 annually)
- Updated Noise Compatibility Program submitted August 16, 2013 (2010 and 2015 contours certified to represent 2012 and 2017 conditions)
  - Record of Approval issued by the FAA on June 16, 2014

NOISE CONTOURS AND NOISE MITIGATION: RUNWAY 30



NOISE CONTOURS AND NOISE MITIGATION: RUNWAY 12

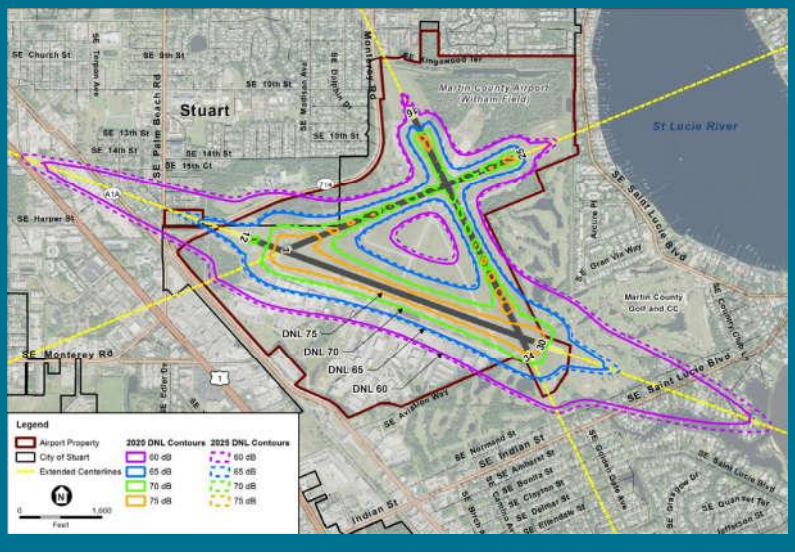


2020/2025 NOISE CONTOURS

Martin County Airport / Witham Field

October 24, 2019

2020/2025 CONTOURS



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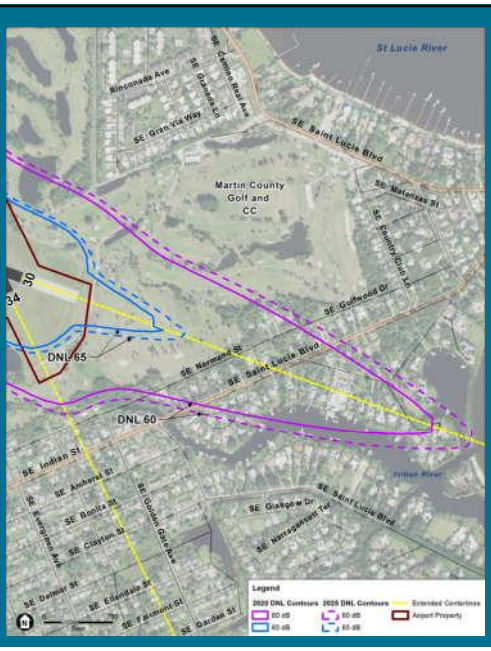
October 24, 2019

2020/2025 CONTOURS RUNWAY 30 END



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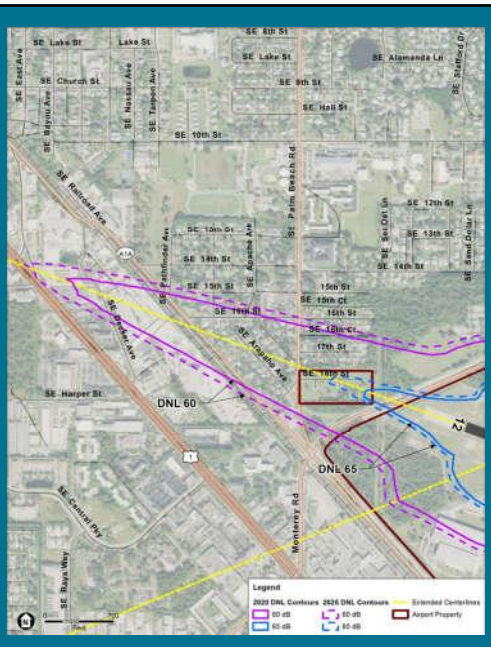
2020/2025 CONTOURS RUNWAY 12 END



Martin County Airport / Witham Field

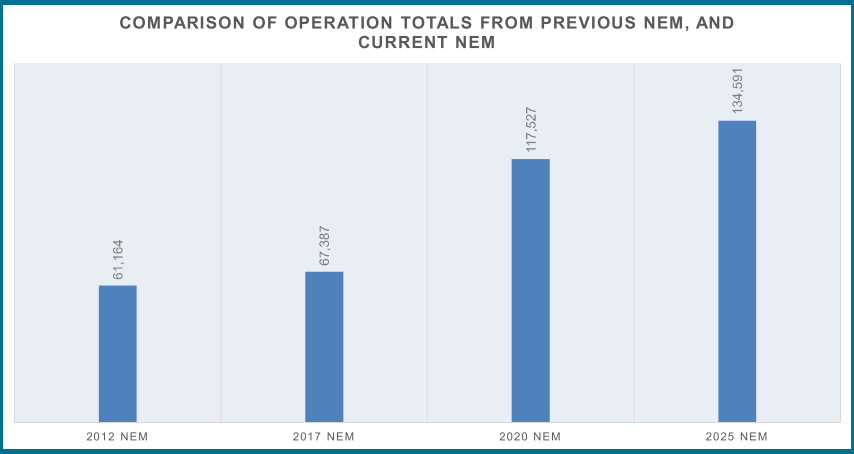
October 24, 2019

Changes Since Previous NEM Contours

Martin County Airport / Witham Field

October 24, 2019

CHANGES SINCE PREVIOUS NEMs



Martin County Airport / Witham Field

October 24, 2019

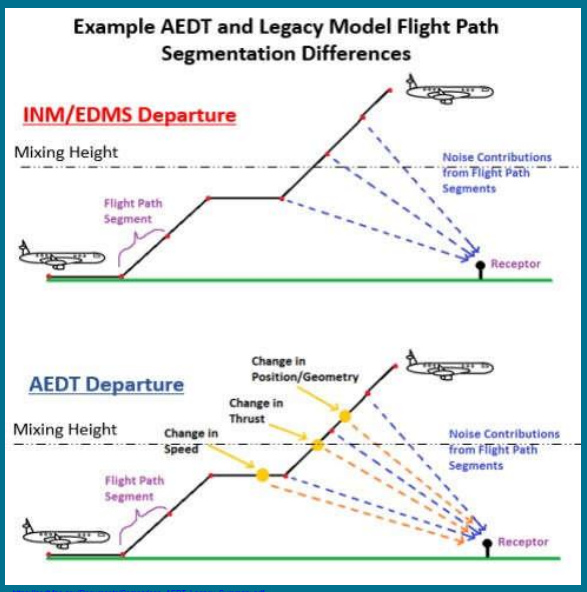
CHANGES SINCE PREVIOUS NEMs

- Operation Totals for the Current Noise Exposure Map illustrate the growth at Martin County Airport since the last NEM
- The growth is predicated in Single/Multi Engine Piston and Jet Aircraft while Turboprop operations remain relatively flat and helicopter operations decrease.

	2012 NEM			2017 NEM			Existing Conditions 2020			Forecasted Future Conditions 2025		
	Total	%	Avg. Day	Total	%	Avg. Day	Total	%	Avg. Day	Total	%	Avg. Day
Single/Multi Eng. Piston	44,650	73%	122	49,382	73%	135	89,206	76%	244	102,033	76%	280
Jet	10,398	17%	29	11,700	17%	32	23,178	20%	64	26,675	20%	73
Turbo-Prop	4,893	8%	13	5,274	8%	14	4,772	4%	13	5,458	4%	15
Helicopter	1,223	2%	3	1,031	2%	3	371	0%	1	425	0%	1
Total	**61,164**	**100%**	**167**	**67,387**	**100%**	**184**	**117,527**	**100%**	**322**	**134,591**	**100%**	**369**

CONTOUR UPDATES

- Previous NEMs generated using the Integrated Noise Model, which was the FAA's standard model from 1978-2015
- The Aviation Environmental Design Tool (AEDT) replaced INM and included multiple improvements including:
  - Flight Path Segments Increased
  - Improved Aircraft Performance Modeling
  - Improved Computation of Weather Impacts
  - Inclusion of Updated Aircraft Information and improved sound modeling of individual aircraft engines



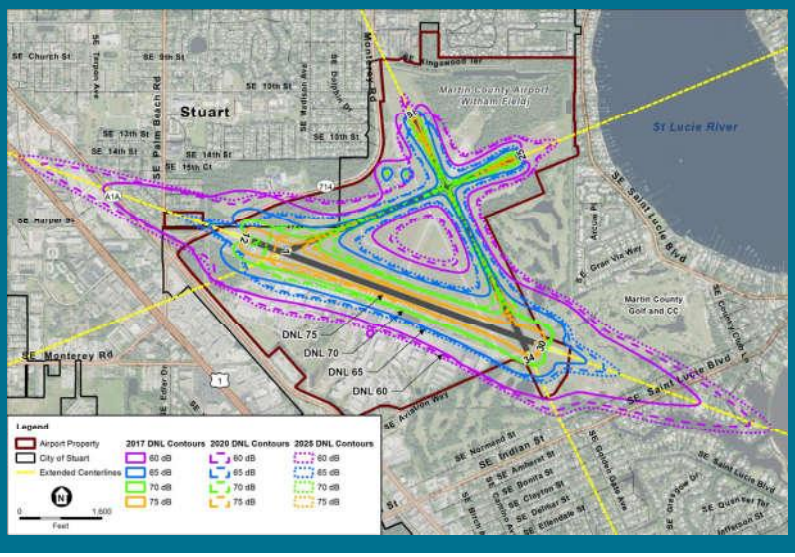
CONTOUR UPDATES

- The Previous NEM aircraft fleet and operations were compiled from analog counts of operations and observations at the airport.
- The airport now uses Vector Airport Systems, a service that digitally tracks airport activity and provides aircraft data about each operation at the airport
- This more detailed Vector data allows for more precise fleet modeling and includes the following data:
  - Aircraft Type
  - FAA registry number
  - Operation Type
  - Date of Operation
  - Time of Operation

PREVIOUS CONTOURS VS. NEW CONTOURS

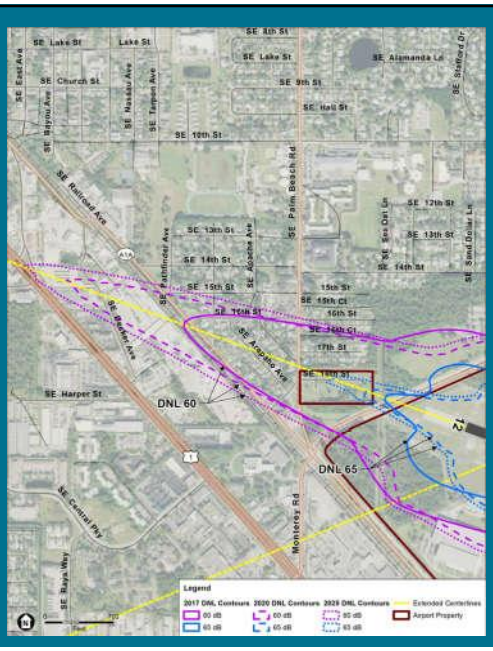
Martin County Airport / Witham Field October 24, 2019

2017/2020/2025 CONTOURS



2017/2020/2025 CONTOURS RUNWAY 30 END

2017/2020/2025 CONTOURS RUNWAY 12 END



UPCOMING SCHEDULE

- Draft Report for Public Review: February 2020
- NEM Public Workshop: March 2020
- Address Comment and Submit to FAA: May 2020
- FAA Compliance Determination: September 2020
- Noise Compatibility Program Amendment : December 2020
- NCP Design: Catalogue of Properties: March 2021

QUESTIONS

Martin County Airport / Witham Field

October 24, 2019

APPENDIX F-5

ANAC Meeting #4 Materials

Martin County Airport / Witham Field

ANAC Briefing for the 14 CFR Part 150 Noise Exposure Map Update

April 22, 2021

1

Part 150 Overview

2

Overview of 14 CFR Part 150

What is a Part 150 Noise Study?

- Establishes the methodology to be followed when preparing aircraft noise exposure maps and developing airport/airport environs land use compatibility programs.
- Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* issued in 1981 and finalized in 1985, later recodified as Title 14 Code of Federal Regulations (CFR) Part 150.
- Issued in response to provisions contained in the *Aviation Safety and Noise Abatement Act of 1979.*
- Part 150 studies must adhere to 14 CFR Part 150 guidelines to be considered, accepted, and approved by FAA.

Main Components of a Part 150 Study

Noise Exposure Maps (NEMS)

- NEMs identify compatible and non-compatible land uses around an airport.
- These maps help communities understand areas affected by different levels of noise.
- Enables better land-use planning and noise mitigation efforts in the NCP.

Noise Compatibility Program (NCP)

- NCP identifies specific measures to reduce incompatible land uses.
- Identifies and evaluates noise abatement alternatives, compatible land use alternatives, and administrative measure to reduce noise.

Public Outreach

* SUA is performing an NEM Update as a part of this Part 150 Study

3

3

Overview of 14 CFR Part 150

Why perform a Part 150 NEM Update?

- Report information on existing and future aircraft operations and the associated noise conditions in the vicinity of an airport
- Evaluate land use compatibility within the updated NEM
- Bring stakeholders together to improve understanding of the current and future noise impacts in the vicinity of the airport
- Educate communities on the Federal process and what can and cannot be done to address aircraft noise concern.
- Report updated existing and future noise exposure to FAA for their review and comment

SUA's Part 150 Efforts:

2004 *First Part 150 Study*

2010 *Updated NEMs submitted to FAA*

2014 *Updated NCP Accepted by FAA*

4

4

Overview – Regulation of Airport Noise

Framework

Federal law sets aircraft noise standards, prescribes operating rules, establishes the compatibility planning process, and limits an airport's ability to restrict aircraft operations

State law sets forth compatibility planning guidelines and noise standards, but aircraft are exempt

Local noise ordinances set noise standards and provide for compatible land use planning, but aircraft are exempt

Federal Aviation Administration

Local Governments and States

Airport Operators

Stakeholders

The FAA: (1) Controls aircraft while in flight; (2) Responsible for controlling noise at its source (i.e., aircraft engines); (3) Certifies aircraft and pilots

Local Governments and States:
(1) Promote compatible land use through zoning; (2) Require real estate disclosure; (3) Mandate sound-insulating building materials

Airport Operators: (1) Very limited authority to adopt local restrictions; (2) Responsible for capital improvement projects and infrastructure

FEDERAL LAW PREEMPTS STATE AND LOCAL REGULATIONS

5

5

Part 150 Terminology

Noise Exposure Contours

A noise exposure contour identifies areas of equal noise exposure around an airport. Noise exposure contours are similar to contours on topographic maps which show areas of equal elevation.

Noise Exposure Maps

A noise exposure map is a map showing noise exposure contour lines (or footprints) which identify areas of specific noise levels around an airport. NEMs also include a graphic depiction of geographical features and land uses that surround an airport.

Noise Compatibility Program

A noise compatibility program report includes descriptions and a detailed evaluation of noise abatement and noise mitigation options applicable to an airport.

6

6

Understanding Noise and Sound Level Metrics

7

Compatible Land Use Guidelines

Land Use Compatibility

- Table 1 in Appendix A of 14 CFR Part 150 provides noise and land use compatibility guidelines to airport sponsors.
- The FAA considers a DNL of 65 dB as the noise exposure level above which is considered noncompatible for noise sensitive land uses because this noise exposure level "create[s] a significant annoyance for most residents."
- The City of Stuart uses the DNL 65 dB contour while unincorporated Martin County has adopted the DNL 60 dB contour as the threshold for compatibility.

Yearly Day-Night Noise Level (DNL) in decibels

Land Use	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(9)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key to Table 1

SLUCM — Standard Land Use Coding Manual.
Y (Yes) — Land Use and related structures compatible without restrictions.
N(No) — Land Use and related structures are not compatible and should be prohibited.
NLR — Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35 — Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

Notes

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB (to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a 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 and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

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

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

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

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

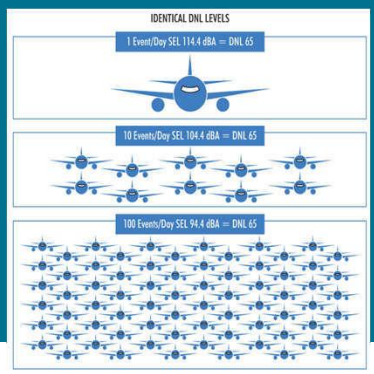
* The 14 CFR Part 150 process is the Airport Sponsor's mechanism to improve the compatibility between the Airport and surrounding communities

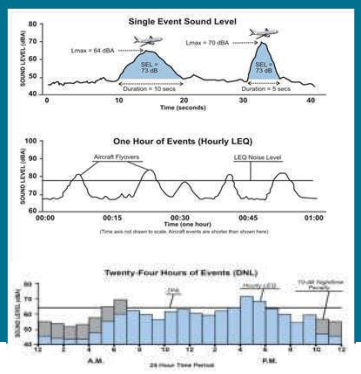
8

8

Day-Night Average Sound Level

- 24-hour time weighted energy average noise level based on A-weighted decibels (dBA)
- Noise occurring between 10 p.m. to 7 a.m. is adjusted by 10 dB to account for the higher sensitivity to noise during nighttime hours
- Average Annual Day aircraft noise exposure is calculated over a broad area and then depicted using contour lines of equal noise levels
- FAA requires the use of DNL for all airport noise assessments and environmental studies conducted nationally





9

9

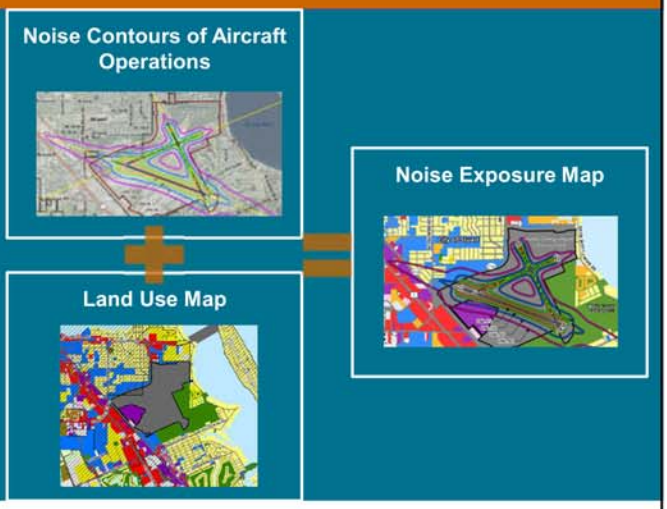
Noise Modeling Inputs

10

Noise Modeling

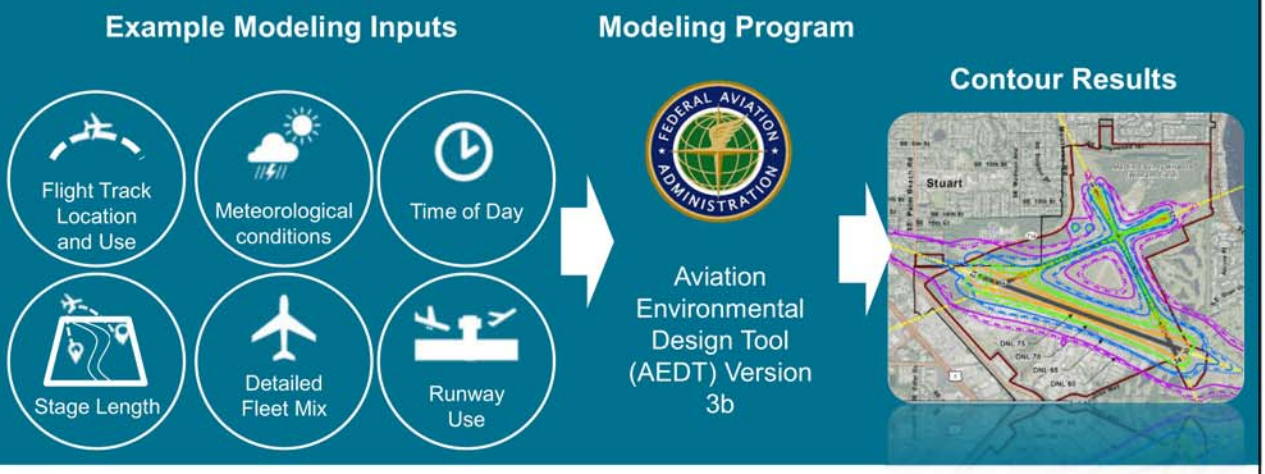
Aircraft noise modeling allows:

- Calculation of noise exposure at any point
- Depicting annual average day aircraft noise exposure
- Predicting future aircraft noise exposure
- Assessing changes in noise impacts resulting from runway configuration changes or new runways
- Assessing changes in fleet mix and/or number of operations
- Evaluating operational procedures



11

Noise Modeling Methodology



12

Annual Operations by Aircraft Type

- Operational Data was collected from SUA over 12 months to assemble Fleet Mix for NEM Analysis
  - July 1, 2017- June 30, 2018
- Technical memorandum sent to FAA December 17, 2020 in light of the effects of COVID-19.
  - Memo concluded that the forecast approved on August 26th, 2019 remains reasonable for use in the development of the SUA NEMs.

Annual Aircraft Operations by AEDT-Specific Aircraft Type

Aircraft Category	2020 Operations	2025 Operations
Helicopter	389	446
Jet	24,142	27,648
Piston	88,604	101,469
Turboprop	4,391	5,029
Grand Total	**117,527**	**134,591**

NOTE: An aircraft operation is equivalent to one arrival/landing or one departure/takeoff. Operations may not sum exactly due to rounding.
SOURCE: Environmental Science Associates, 2020.

* The NEM update went into a holding pattern for much of 2020 due to COVID-19 to gain insight into the effect on aircraft activity.

13

13

Annual Operations by Time of Day

- Aircraft operations are modeled in the AEDT as either occurring during daytime or nighttime
- The 2018/2019 VNOMS data served as the primary source for the operational splits and time of day information because it captures actual arrival and departure times.

Annual Aircraft Operations (All Aircraft) by Time of Day

Study Year	Arrivals		Departures		Touch & Go	
	Day	Night	Day	Night	Day	Night
2020	96.96%	3.04%	97.83%	2.17%	98.03%	1.97%
2025	96.96%	3.04%	97.66%	2.34%	98.03%	1.97%

14

Runway Use - Arrivals

SUA Arrival Runway Percentages

Arrivals (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%
2025						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

15

Runway Use - Departure

SUA Departure Runway Percentages

Departures (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%
2025						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

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Aircraft Operations

SUA Touch-and Go Runway Percentages

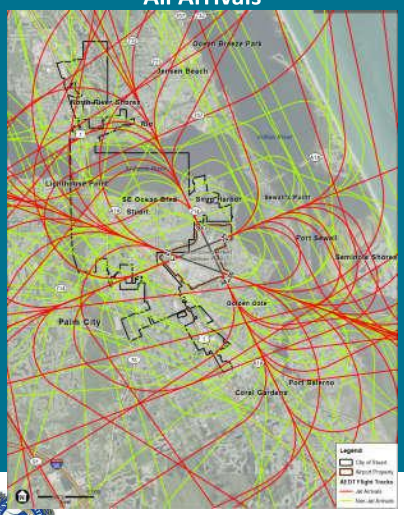
Arrivals (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%
2025						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

17

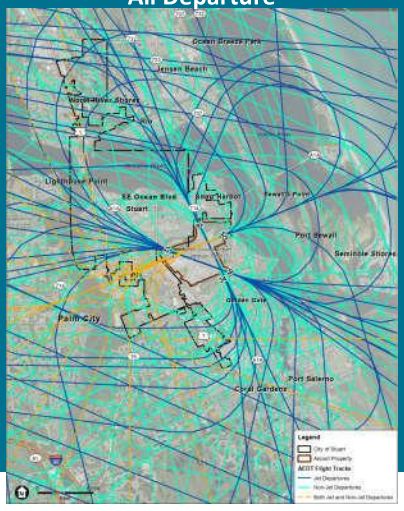
Flight Tracks – All Arrivals

All Arrivals



Touch-and-Go

All Departure



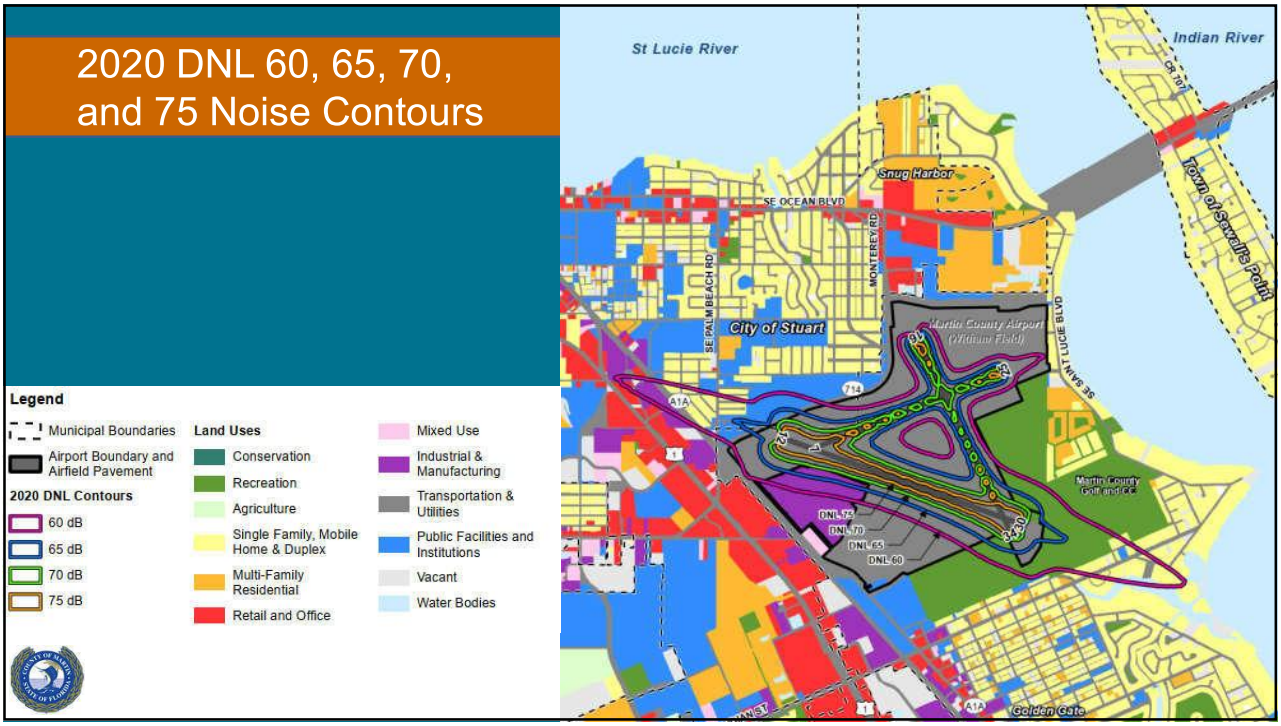
18

18

Noise Modeling Results

19

2020 DNL 60, 65, 70, and 75 Noise Contours



20

Noise Sensitive Sites Exposed to DNL 60 and Higher - 2020

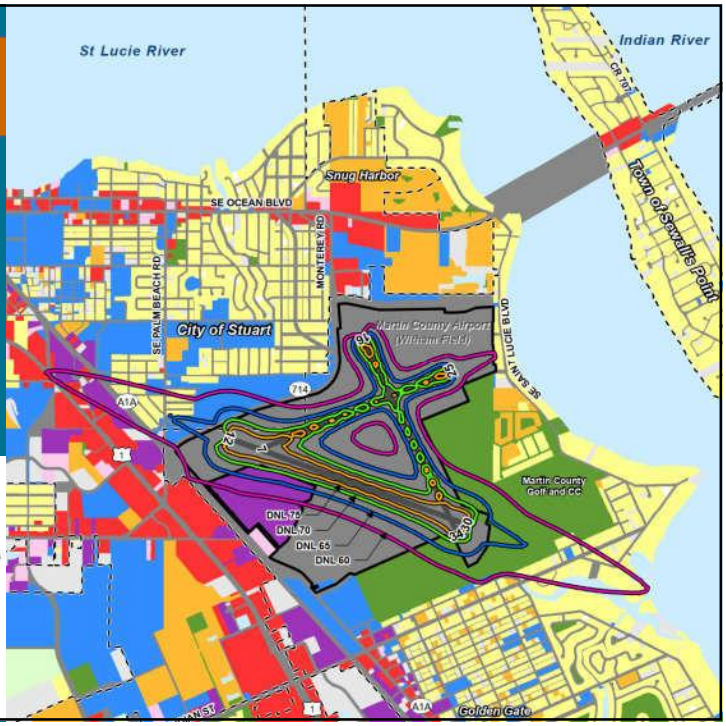
Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	341.03	139	316	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	267.93	*43*	*107*	0	0	0	0	0	0	0	0
DNL 65-70	143.34	0	0	0	0	0	0	0	0	0	0
DNL 70-75	75.43	0	0	0	0	0	0	0	0	0	0
DNL 75+	54.76	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**267.93**	**43**	**107**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:
[1] Noise contours from Environmental Science Associates (ESA)
[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)
[4] School locations obtained from Martin County School Board and St. Lucie County School Board

21

21

2025 DNL 60, 65, 70, and 75 Noise Contours



Legend

- City of Stuart
- Airport Property
- **2025 DNL Contours**
  - 60 dB
  - 65 dB
  - 70 dB
  - 75 dB
- **Land Uses**
  - Conservation
  - Recreation
  - Agriculture
  - Single Family, Mobile Home & Duplex
  - Multi-Family Residential
  - Retail and Office
  - Mixed Use
  - Industrial & Manufacturing
  - Transportation & Utilities
  - Public Facilities and Institutions
  - Vacant
  - Water Bodies

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Noise Sensitive Sites Exposed to DNL 60 and Higher - 2025

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	387.84	167	384	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	295.53	*63*	*157*	0	0	0	0	0	0	0	0
DNL 65-70	155.59	0	0	0	0	0	0	0	0	0	0
DNL 70-75	82.40	0	0	0	0	0	0	0	0	0	0
DNL 75+	60.85	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**295.53**	**63**	**157**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:
[1] Noise contours from Environmental Science Associates (ESA)
[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)
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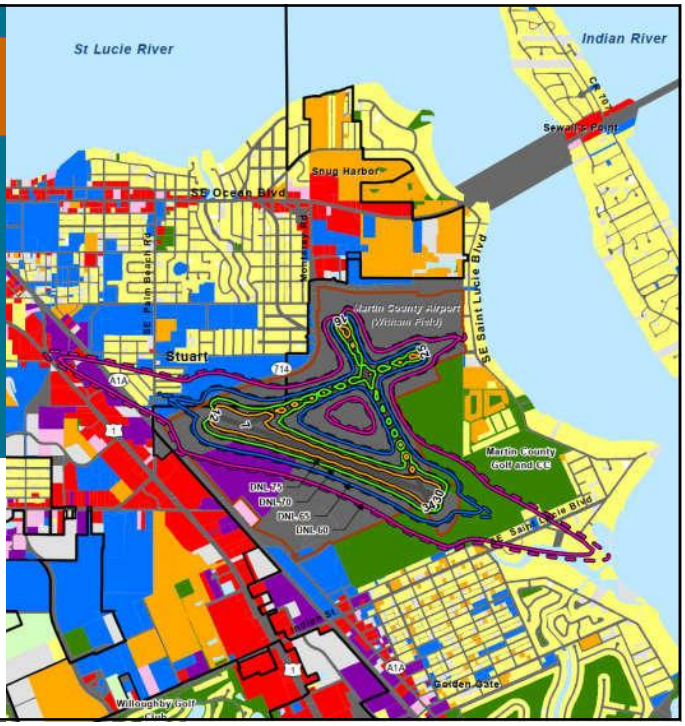
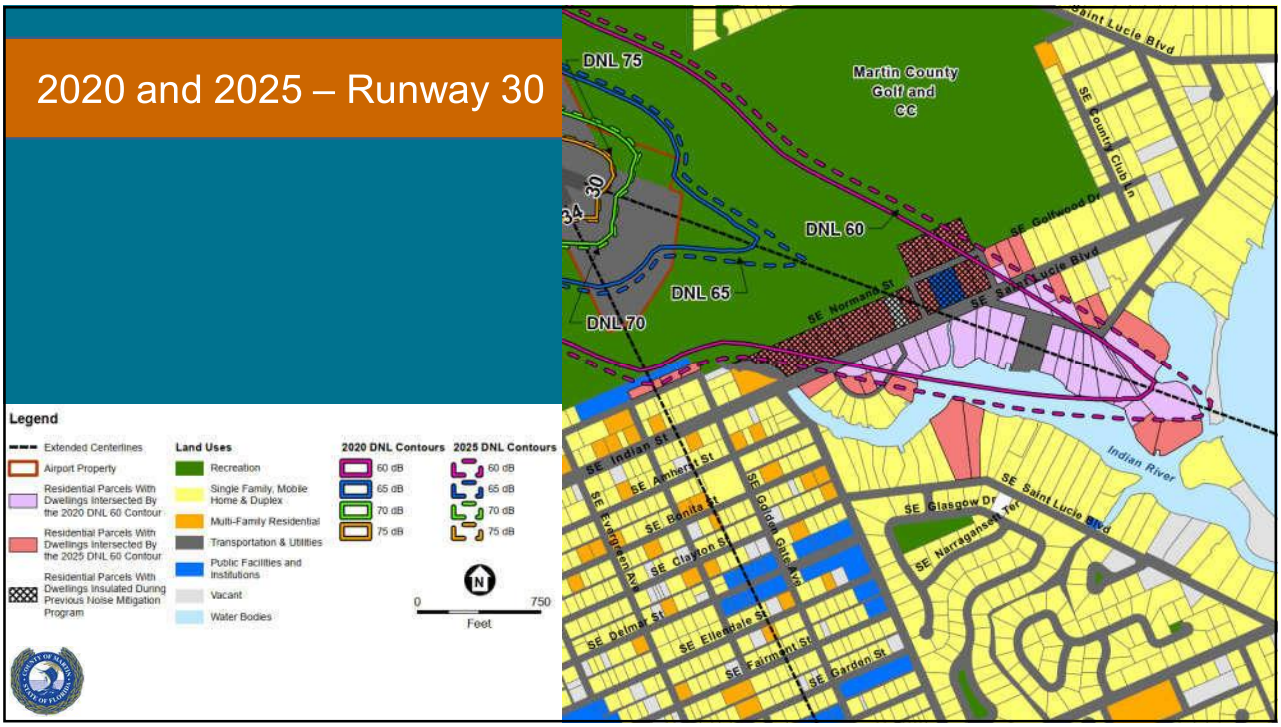
23

2020 and 2025 DNL 60, 65, 70, and 75 Noise Contours



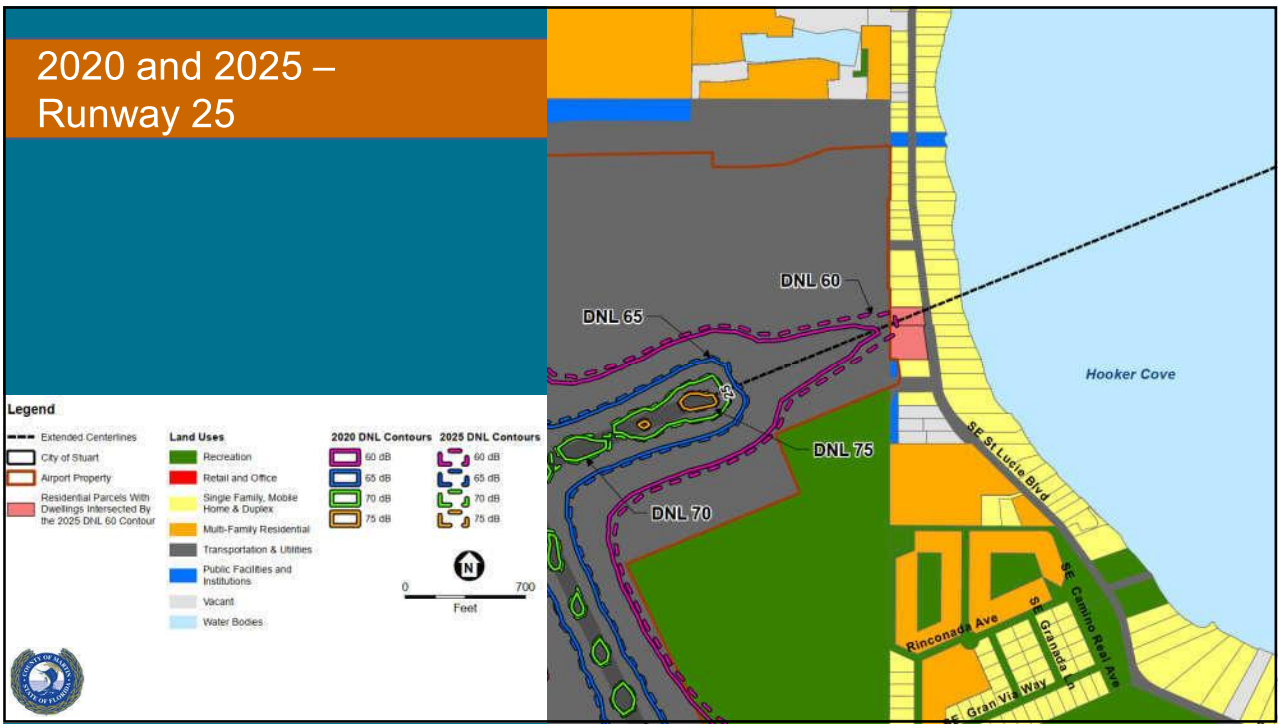
24

2020 and 2025 – Runway 30



25

2020 and 2025 – Runway 25



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Comparison of 2020 and 2025 NEMs

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	46.81	28	67	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	*27.61*	*20*	*50*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
DNL 65-70	12.25	0	0	0	0	0	0	0	0	0	0
DNL 70-75	6.98	0	0	0	0	0	0	0	0	0	0
DNL 75+	6.08	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**27.61**	**20**	**50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:
[1] Noise contours from Environmental Science Associates (ESA)
[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)
[4] School locations obtained from Martin County School Board and St. Lucie County School Board

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Project Schedule

Anticipated Schedule

- Due to COVID-19, the Project Schedule has been updated to reflect delays in public outreach and comment.
- Public workshop materials will be provided on the Part 150 Project webpage located at: **www.martin.fl.us/Airport**.

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APPENDIX F-6

Draft NEM Public Workshop Materials

Treasure Coast Newspapers

PART OF THE USA TODAY NETWORK

MARTIN COUNTY - AIRP
2401 SE MONTEREY RD
STUART FL 34996--332

Account	AD#	Net Amount	Tax Amount	Total Amount	Payment Method	Payment Amount	Amount Due
1605977	0004731128	$475.38	$0.00	$475.38	Invoice	$0.00	$475.38

Sales Rep: FAlexander **Order Taker:** FAlexander **Order Created** 05/10/2021

Product	# Ins	Column	Lines	Start Date	End Date
TCN-Stuart News	**2**	**1.00**	**139**	**05/15/2021**	**05/16/2021**

*** ALL TRANSACTIONS CONSIDERED PAID IN FULL UPON CLEARANCE OF FINANCIAL INSTITUTION**

Notice of Draft Noise Exposure Maps & Notice of Public Information Workshop

Title 14 Code of Federal Regulation Part 150 Airport Noise Compatibility Planning Study

Martin County Airport/Witham Field

Martin County is preparing a noise compatibility study for Martin County Airport/Witham Field in accordance with the provisions and methods prescribed in Title 14 Code of Federal Regulations Part 150, *Airport Noise Compatibility Planning*. As required by 14 CFR Part 150, Martin County has prepared Draft Noise Exposure Maps (NEMs) that depict the airport, its noise contours, and surrounding land uses. The County is making the Draft NEMs and supporting documentation available for public review and comment. After review and consideration of comments, the County will submit the NEMs to the Federal Aviation Administration for the agency's determination that the maps comply with applicable requirements.

A printed copy of the NEMs and NEM Report will be available for review during normal hours at the location listed below. In addition, the NEMs and NEM Report are available for download from the project website at: https://www.martin.fl.us/Airport.

- **Martin County Airport Maintenance Building** (by appointment - 772-221-2301): 1895 Flying Fortress Way, Stuart, FL 34996

The comment period begins May 15th and ends on June 22nd (5:00 PM Eastern). The Draft NEM Report will be available at the above location until the close of the comment period. Anyone wishing to submit comments may do so at any time during the comment period. Comments on the Draft NEMs should be mailed to: Martin County Airport Administration, Attn: Noise Office –Part 150 Study, 1895 Flying Fortress Way, Stuart, FL 34996. Comments may also be submitted online at SUAPart150@esassoc.com.

Please note that comments can only be accepted with the full name and address of the individual commenting. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you may ask to have your personal identifying information withheld from public review, it cannot be guaranteed.

Public Information Workshop

The Martin County Board of County Commissioners (BOCC) invites you to attend a virtual public workshop to provide information on the NEM Update for Martin County Airport/Witham Field (SUA). Topics include the NEM Update process and presenting the updated draft NEMs.

DATE: June 15, 2021
TIME: 5:30PM - 6:30PM
Registration link: http://bit.ly/martinnemupdate

The workshop will be conducted using a virtual format to maximize the opportunity to attend. The workshop will include a presentation and a live opportunity to submit questions and have them answered by the study team via the virtual platform.

The Martin County BOCC encourages all interested parties to monitor the airport website for the latest announcements at ***www.martin.fl.us/Airport***.

Anyone needing special accommodations under the Americans with Disabilities Act of 1990, or anyone with questions, should contact Patricia Spaulding at 772-221-1458 as soon as possible, but no later than three days prior to the scheduled meeting.

Text of Ad: **05/10/2021**

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Pub May 15th & 16th 2021
TCN4731128

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Martin County Airport / Witham Field

Public Workshop for the 14 CFR Part 150 Noise Exposure Map Update

JUNE 15, 2021

1

Part 150 Overview

2

Overview of 14 CFR Part 150

What is a Part 150 Noise Study?

- Establishes the methodology to be followed when preparing aircraft noise exposure maps and developing airport/airport environs land use compatibility programs.
- Interim Rule on Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning* issued in 1981 and finalized in 1985, later recodified as Title 14 Code of Federal Regulations (CFR) Part 150.
- Issued in response to provisions contained in the *Aviation Safety and Noise Abatement Act of 1979.*
- Part 150 studies must adhere to 14 CFR Part 150 guidelines to be considered, accepted, and approved by FAA.

Main Components of a Part 150 Study

Noise Exposure Maps (NEMS)

- NEMs identify compatible and non-compatible land uses around an airport.
- These maps help communities understand areas affected by different levels of noise.
- Enables better land-use planning and noise mitigation efforts in the NCP.

Noise Compatibility Program (NCP)

- NCP identifies specific measures to reduce incompatible land uses.
- Identifies and evaluates noise abatement alternatives, compatible land use alternatives, and administrative measure to reduce noise.

Public Outreach

* SUA is performing an NEM Update as a part of this Part 150 Study

3

3

Overview of 14 CFR Part 150

Why perform a Part 150 NEM Update?

- Report information on existing and future aircraft operations and the associated noise conditions in the vicinity of an airport
- Evaluate land use compatibility within the updated NEM
- Bring stakeholders together to improve understanding of the current and future noise impacts in the vicinity of the airport
- Educate communities on the Federal process and what can and cannot be done to address aircraft noise concern.
- Report updated existing and future noise exposure to FAA for their review and comment

SUA's Part 150 Efforts:

- **2004** *First Part 150 Study*
- **2010** *Updated NEMs submitted to FAA*
- **2014** *Updated NCP Accepted by FAA*

4

4

Overview – Regulation of Airport Noise

Framework		Stakeholders
Federal law sets aircraft noise standards, prescribes operating rules, establishes the compatibility planning process, and limits an airport's ability to restrict aircraft operations	Federal Aviation Administration	The FAA: (1) Controls aircraft while in flight; (2) Responsible for controlling noise at its source (i.e., aircraft engines); (3) Certifies aircraft and pilots
State law sets forth compatibility planning guidelines and noise standards, but aircraft are exempt	Local Governments and States	Local Governments and States: (1) Promote compatible land use through zoning; (2) Require real estate disclosure; (3) Mandate sound-insulating building materials
Local noise ordinances set noise standards and provide for compatible land use planning, but aircraft are exempt	Airport Operators	Airport Operators: (1) Very limited authority to adopt local restrictions; (2) Responsible for capital improvement projects and infrastructure

FEDERAL LAW PREEMPTS STATE AND LOCAL REGULATIONS

5

5

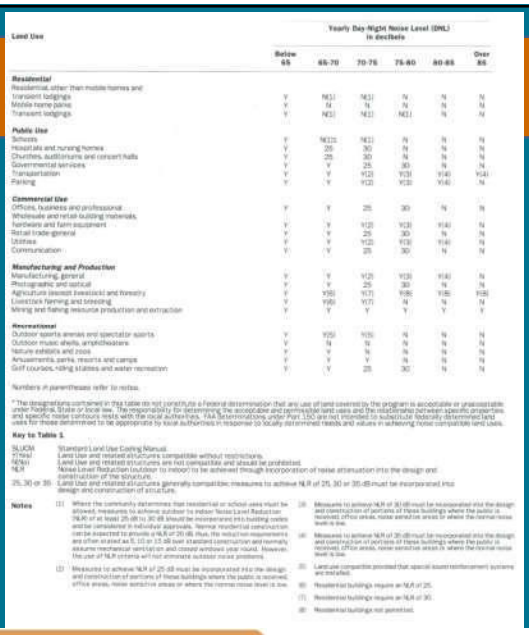
Understanding Noise and Sound Level Metrics

6

Compatible Land Use Guidelines

Land Use Compatibility

- Table 1 in Appendix A of 14 CFR Part 150 provides noise and land use compatibility guidelines to airport sponsors.
- The FAA considers a DNL of 65 dB as the noise exposure level below all land uses are considered compatible.
- The City of Stuart uses the DNL 65 dB contour while Martin County has adopted the DNL 60 dB contour as the threshold for compatibility.



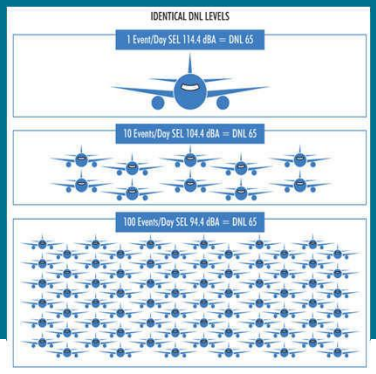
* The 14 CFR Part 150 process is the Airport Sponsor's mechanism to improve the compatibility between the Airport and surrounding communities

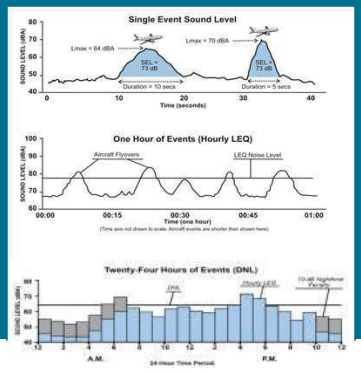
7

7

Day-Night Average Sound Level (DNL)

- 24-hour time weighted energy average noise level based on A-weighted decibels (dBA)
- Noise occurring between 10 p.m. to 7 a.m. is adjusted by 10 dB to account for the higher sensitivity to noise during nighttime hours
- Average Annual Day aircraft noise exposure is calculated over a broad area and then depicted using contour lines of equal noise levels
- FAA requires the use of DNL for all airport noise assessments and environmental studies conducted nationally





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Noise Modeling Inputs

9

Noise Modeling

Aircraft noise modeling allows:

- Calculation of noise exposure at any point
- Depicting annual average day aircraft noise exposure
- Predicting future aircraft noise exposure
- Assessing changes in noise impacts resulting from runway configuration changes or new runways
- Assessing changes in fleet mix and/or number of operations
- Evaluating operational procedures

Noise Contours of Aircraft Operations

Land Use Map

Noise Exposure Map

10

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Noise Modeling Inputs

Aircraft Operational Data Inputs

- The amount of noise exposure is determined by:
  - Detailed fleet mix
  - Stage length
  - Time of day (nighttime penalty; 1 nighttime operation = 10 daytime operations)
- The noise exposure distribution is determined by:
  - Runway configuration and use
  - Flight track locations and use
- Other Factors
  - Meteorological Conditions

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Noise Modeling Methodology

Example Modeling Inputs

Modeling Program

Aviation Environmental Design Tool (AEDT) Version 3b

Contour Results

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Annual Operations by Aircraft Type

- Operational Data was collected from SUA over 12 months to assemble Fleet Mix for NEM Analysis
  - July 1, 2017- June 30, 2018
- Technical memorandum sent to FAA December 17, 2020 in light of the effects of COVID-19.
  - Memo concluded that the forecast approved on August 26th, 2019 remains reasonable for use in the development of the SUA NEMs.

Annual Aircraft Operations by AEDT-Specific Aircraft Type

Aircraft Category	2020 Operations	2025 Operations
Helicopter	389	446
Jet	24,142	27,648
Piston	88,604	101,469
Turboprop	4,391	5,029
Grand Total	**117,527**	**134,591**

NOTE: An aircraft operation is equivalent to one arrival/landing or one departure/takeoff. Operations may not sum exactly due to rounding.
SOURCE: Environmental Science Associates, 2020.

* The NEM update went into a holding pattern for much of 2020 due to COVID-19 to gain insight into the effect on aircraft activity.

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Annual Operations by Time of Day

- Aircraft operations are modeled in the AEDT as either occurring during daytime or nighttime
- The 2018/2019 VNOMS data served as the primary source for the operational splits and time of day information because it captures actual arrival and departure times.

Annual Aircraft Operations (All Aircraft) by Time of Day

Study Year	Arrivals		Departures		Touch & Go	
	Day	Night	Day	Night	Day	Night
2020	96.96%	3.04%	97.83%	2.17%	98.03%	1.97%
2025	96.96%	3.04%	97.66%	2.34%	98.03%	1.97%

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Runway Use - Arrivals

SUA Arrival Runway Percentages

Arrivals (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%
2025						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

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Runway Use - Departure

SUA Departure Runway Percentages

Departures (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%
2025						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

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Aircraft Operations

SUA Touch-and Go Runway Percentages

Arrivals (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%
2025						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%

NOTE: Values may not add to 100 percent due to rounding.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018

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Aircraft Departure Stage Length

AEDT Departure Stage Length Categories

Stage Length Category	Departure Route/ Trip Length (nautical miles)
1	0 - 500
2	500 – 1,000
3	1,000 - 1,500
4	1,500 - 2,500
5	2,500 - 3,500
6	3,500 - 4,500
7	4,500 - 5,500
8	5,500 - 6,500
9	6,500 - 11,000

SOURCE: Federal Aviation Administration, 2019

Departure Stage Length (All Aircraft)

Study Year	Stage Length Category			
	1	2	3	4
2020	99.59%	0.35%	0.04%	0.01%
2025	99.59%	0.35%	0.04%	0.01%

NOTE: Values may not add to 100% due to rounding. No aircraft exceeded a departure stage length of 4.
SOURCE: Environmental Science Associates, 2018; Martin County Airport, Vector Noise and Operations Management System (VNOMS) data for July 2017-June 2018.

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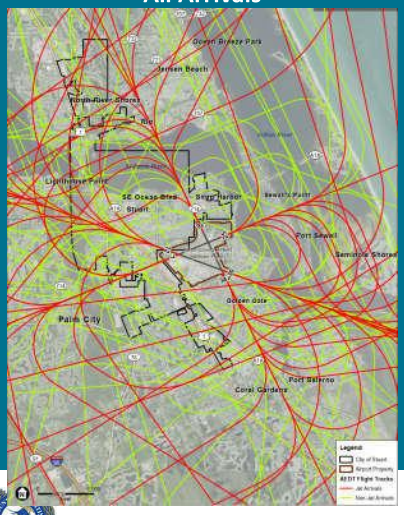
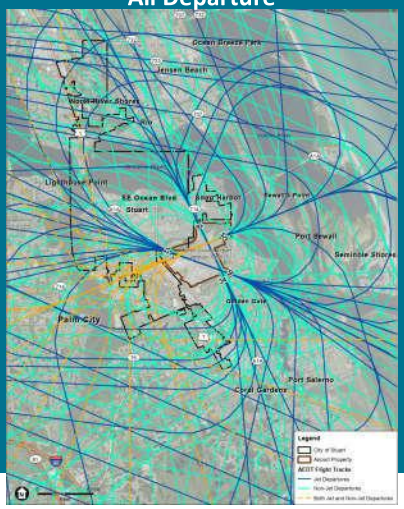
Flight Tracks – All Arrivals

All Arrivals



Touch-and-Go

All Departure



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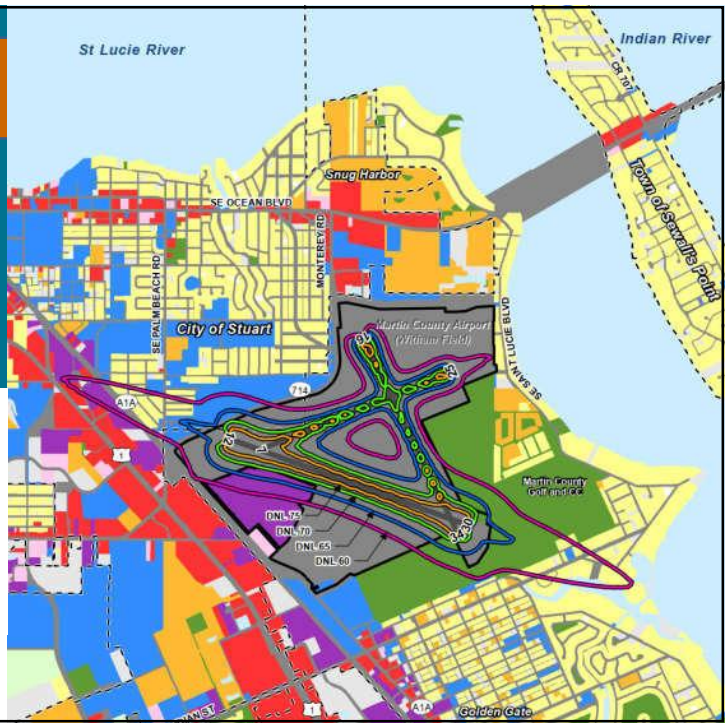
Noise Modeling Results

20

2020 DNL 60, 65, 70, and 75 Noise Contours



Legend

- Municipal Boundaries
- Airport Boundary and Airfield Pavement

2020 DNL Contours

- 60 dB
- 65 dB
- 70 dB
- 75 dB

Land Uses

- Conservation
- Recreation
- Agriculture
- Single Family, Mobile Home & Duplex
- Multi-Family Residential
- Retail and Office
- Mixed Use
- Industrial & Manufacturing
- Transportation & Utilities
- Public Facilities and Institutions
- Vacant
- Water Bodies

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Noise Sensitive Sites Exposed to DNL 60 and Higher - 2020

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	341.03	139	316	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	267.93	43	107	0	0	0	0	0	0	0	0
DNL 65-70	143.34	0	0	0	0	0	0	0	0	0	0
DNL 70-75	75.43	0	0	0	0	0	0	0	0	0	0
DNL 75+	54.76	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**267.93**	**43**	**107**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:

[1] Noise contours from Environmental Science Associates (ESA)

[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)

[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)

[4] School locations obtained from Martin County School Board and St. Lucie County School Board

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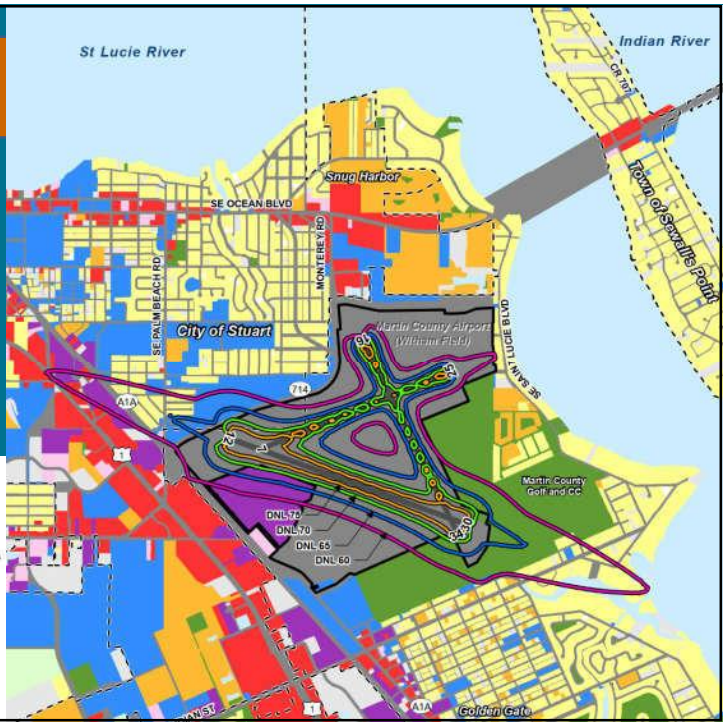
2025 DNL 60, 65, 70, and 75 Noise Contours



Legend

City of Stuart	**Land Uses**	Mixed Use
Airport Property	Conservation	Industrial & Manufacturing
2025 DNL Contours	Recreation	Transportation & Utilities
60 dB	Agriculture	Public Facilities and Institutions
65 dB	Single Family, Mobile Home & Duplex	Vacant
70 dB	Multi-Family Residential	Water Bodies
75 dB	Retail and Office	

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Noise Sensitive Sites Exposed to DNL 60 and Higher - 2025

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	387.84	167	384	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	295.53	63	157	0	0	0	0	0	0	0	0
DNL 65-70	155.59	0	0	0	0	0	0	0	0	0	0
DNL 70-75	82.40	0	0	0	0	0	0	0	0	0	0
DNL 75+	60.85	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**295.53**	**63**	**157**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:
[1] Noise contours from Environmental Science Associates (ESA)
[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)
[4] School locations obtained from Martin County School Board and St. Lucie County School Board

24

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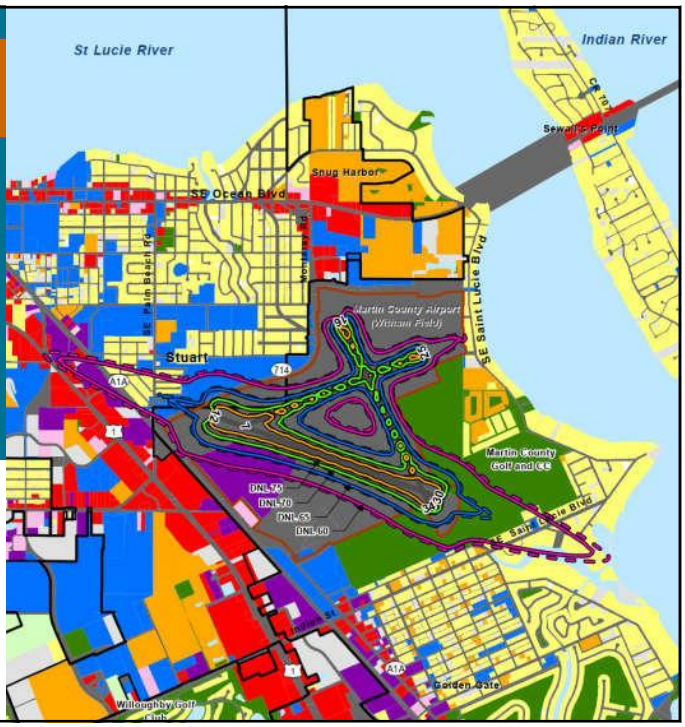
2020 and 2025 DNL 60, 65, 70, and 75 Noise Contours



Legend

Land Uses			2020 DNL Contours	2025 DNL Contours
Conservation	Mixed Use	Airport Property	60 dB	60 dB
Recreation	Industrial & Manufacturing	City of Stuart	65 dB	65 dB
Agriculture	Transportation & Utilities		70 dB	70 dB
Single Family, Mobile Home & Duplex	Public Facilities and Institutions		75 dB	75 dB
Multi-Family Residential	Vacant			
Retail and Office	Water Bodies			

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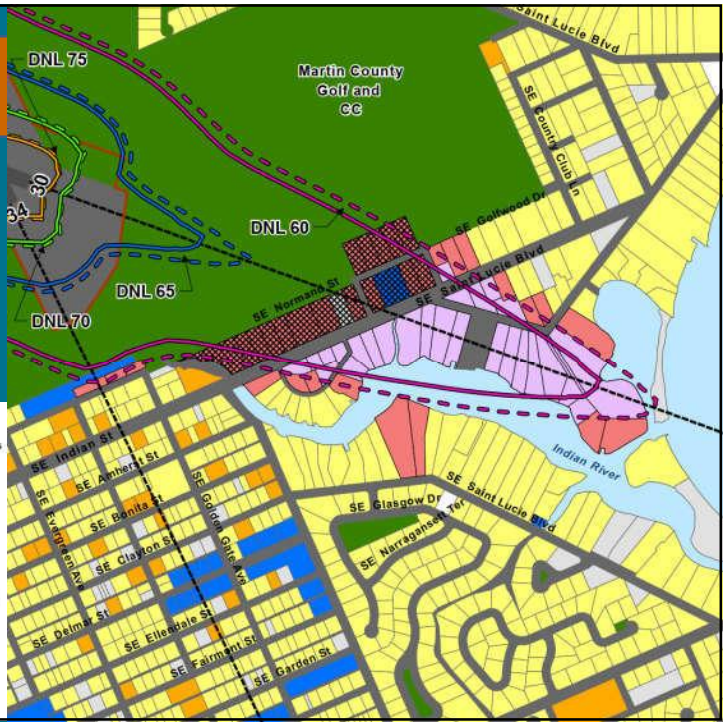
2020 and 2025 – Runway 30



Legend

	Land Uses	2020 DNL Contours	2025 DNL Contours
Extended Centerlines	Recreation	60 dB	60 dB
Airport Property	Single Family, Mobile Home & Duplex	65 dB	65 dB
Residential Parcels With Dwellings Intersected By the 2020 DNL 60 Contour	Multi-Family Residential	70 dB	70 dB
Residential Parcels With Dwellings Intersected By the 2025 DNL 60 Contour	Transportation & Utilities	75 dB	75 dB
Residential Parcels With Dwellings Insulated During Previous Noise Mitigation Program	Public Facilities and Institutions		
	Vacant		
	Water Bodies		

0 750 Feet

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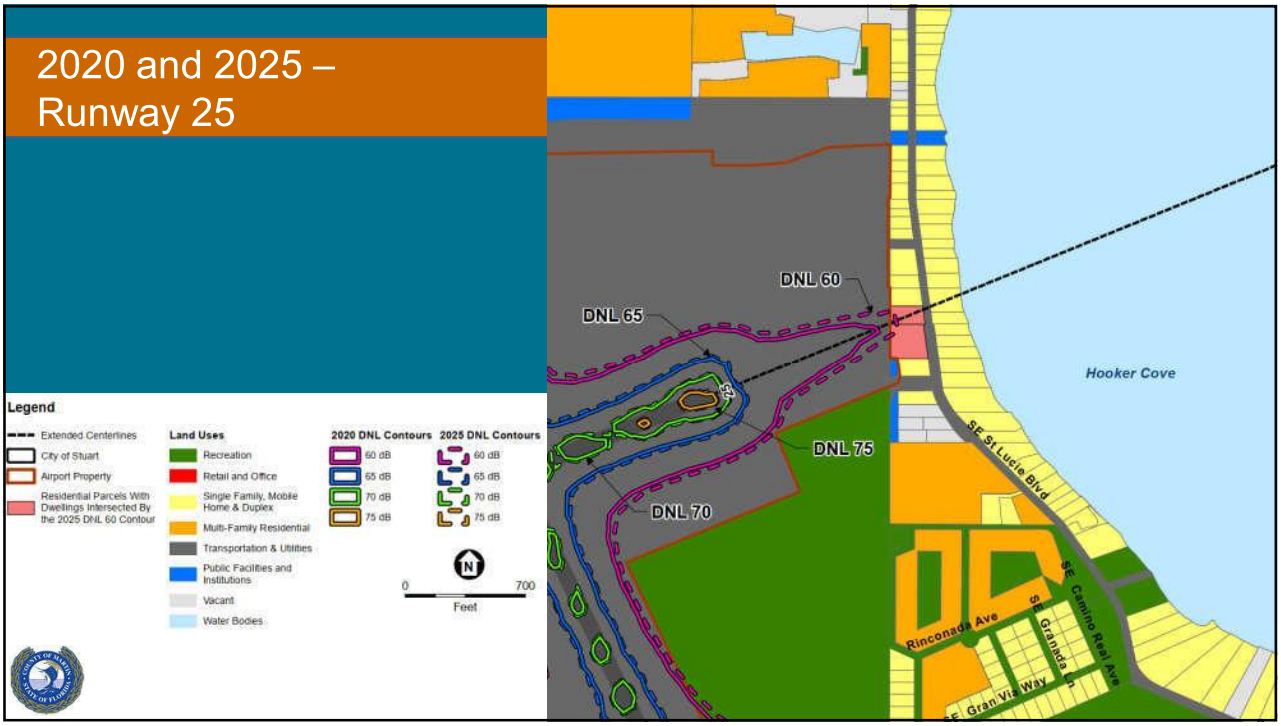
2020 and 2025 – Runway 25



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Comparison of 2020 and 2025 NEMs (difference)

Noise Level[1]	Total Area of Contours (Acres)	Housing Units[2]	Population[3]	Religious	Schools[4]	Hospitals	Historic Resources	Day Cares	Group Care	Libraries	Nursing Homes
DNL 60-65	46.81	28	67	0	0	0	0	0	0	0	0
DNL 60-65 (Unincorporated Martin County)	*27.61*	*20*	*50*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
DNL 65-70	12.25	0	0	0	0	0	0	0	0	0	0
DNL 70-75	6.98	0	0	0	0	0	0	0	0	0	0
DNL 75+	6.08	0	0	0	0	0	0	0	0	0	0
Total in Noncompatible Areas	**27.61**	**20**	**50**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SOURCES:
[1] Noise contours from Environmental Science Associates (ESA)
[2] Housing unit counts derived from Martin County Property Appraiser (Aug. 2018) and St. Lucie County Property Appraiser (Aug. 2018)
[3] Population estimates derived from 2013-2017 American Community Survey 5-Year Estimate (Population per Occupied Housing Units): 2.18 (City of Stuart); 2.49 (Unincorporated Martin County)
[4] School locations obtained from Martin County School Board and St. Lucie County School Board

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Project Schedule and Comments

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Anticipated Schedule

- Due to COVID-19, the Project Schedule has been updated to reflect delays in public outreach and comment.
- Public workshop materials will be provided on the Part 150 Project webpage located at: **www.martin.fl.us/Airport**.

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How To Submit a Comment on the Draft NEM Report

The Draft NEM Report is available for public review and comment. The comment period ends on June 22, 2021 (5:00 P.M. Eastern). You can submit a comment by using the methods below:

Regular Mail

Martin County Airport Administration
Attn: Noise Office- Part 150 Study
1895 Flying Fortress Way
Stuart, FL, 34996

E-Mail

SUAPart150@esassoc.com

The Draft NEM Report and NEMs are available for download at www.martin.fl.us/Airport.

A printed copy can is available for review by appointment at the Martin County Airport Maintenance Building by Appointment, call 772-221-2301 for more details. You can follow the status of the NEM Update at the website above.

Thank you for your participation!

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Martin County Airport NEM Update Public Information Workshop - Attendance Report			
Attended	**Name**	**Time in Session (minutes)**	**Country/Region Name**
Yes	Robert Langevin	45	The United States
Yes	Andrea DeSantis	45	The United States
Yes	Andrea DeSantis	43	The United States
Yes	Ellen Hamann	47	The United States

APPENDIX G

Public Comments and Responses

This Appendix contains a copy of the comments and the responses to the comments received on the SUA Part 150 Study.

COMMENT 1

From: Susan Schieren
To: SUAPart150
Subject: Noise Level in Conquistador Estates due to increase Air Traffic and re-routed Take-off and Landing regulations.
Date: Saturday, June 12, 2021 8:56:51 PM

I lived at 3140 SE Gran Via Way in 2012. I was a snow-bird at the time and have subsequently live at another location in Stuart since that time. I have just purchased a home at 3240 SE Gran Via Way since 12/04/2021. The huge amount of air traffic since 2012 till now has increased significantly and the noise level has significantly increased. I feel this is such a detriment to property values in this area. I have also sold at least 7 properties in Conquistador Estates which borders the Airport. My clients have continually complained at the increased air traffic and noise (during early morning hours) since they have moved in. This is becoming an issue in selling units in Conquistador and also in my enjoyment of living in this community. I wish that someone would put a control on the amount of planes and the noise immitted by the planes taking off from this airport throughout the d

RESPONSE 1

Thank you for your comment on the activity and noise levels at the airport. The Airport is preparing this Part 150 Study to ensure that the recent increase in air traffic is assessed through the preparation of current noise exposure maps, which will allow for potential noise mitigation strategies such as a continuation of the sound insulation program in eligible neighborhoods.

With respect to the impact of noise on real estate, there have been a few studies conducted to evaluate the relationship between airports and property values while these studies have focused primarily on the noise effects. The 2008 report by the Airport Cooperative Research Program (ACRP), *Synthesis 9: Effects of Aircraft Noise: Research Update on Selected Topics*, concluded the studies of the effects of aviation noise on property values are highly complex owing to the differences in methodologies, airport/community environments, market conditions, and demand variables involved. Most studies concluded that aviation noise effects on property value range from some negative impacts to significant negative impacts, some studies combined airport noise and proximity and concluded that the net effect on property value was positive. Prospective homebuyers were at times not well informed about the noise levels of aircraft operations near the property of interest. Lack of information often led to high bid prices and possible disappointment after purchase.

COMMENT 2

June 10, 2021

To Whom it may Concern

Our home is located in the southwest corner of the Conquistador subdivision in the eastern section of the noise polluted area, created by the Martin County airport. The airport has been our neighbor for many years and until lately it was an acceptable neighbor. Over the past year the increase of noise from large jets, (that have been recently added to the inventory at the airport) have greatly affected the peaceful enjoyment of our homes. The jets are the size of commuter airliners used by commercial airlines (like American's Eagle regional aircraft). Some take off at all hours daily, including 5am and earlier. They are flying so close to our home that it becomes impossible to use the back yard, especially during holiday times and winter months. I thought there was a restricted time for use of the airport. If there is, it is not being enforced.

I cannot think of noise that irritates me more than a noisy jet transport. Some planes cause people to stop conversing because it is so loud. The noise lasts 30 or more seconds and at times it is almost one minute that conversation is impossible. Then the planes come over in the middle night interrupting sleep. Last night we were awaken at 2:45am.

The planes are not following the path of the runway they are lifting off from. They are intentionally turning east, which puts them over the south wall of Conquistador and the golf course.

This airport was never intended to be a large commercial airport. It is located in to middle of beautiful homes. Their owners have worked hard to maintain their property and thus contribute to the beauty of Martin County. The airport is now causing an environmental hazard by polluting the area with increased noise and spewing jet fuel, that is the by-product of aircraft taking off and landing. Have you tested the air quality? We can smell the jet fuel when the wind blows toward us. There is a film on the outside furniture that is black.

I have not addressed the noise of the helicopters, that are increasingly annoying but don't reach the decibels created by a jet taking off and using their thrust reverse to land. Our yard is a perfect place to check out the noise level and traffic that is occurring over our home.

It seems possible for the jet aircraft to be restricted in size, operations during normal daytime hours and a flight path, in line with the runway direction.

Increased air traffic is not what we want. Larger aircraft is not what we want. If an airport is needed to support large commercial aircraft, why doesn't the county seek land west of the developed area of Martin County and leave the beautiful community we now know as Stuart?

Very Respectively,

Wilfred & Ellen Hamann

1898 SE Coronado Dr.

Stuart, FL 34996

(772)286-8923

Lnme95@gmail.com

RESPONSE 2

Thank you for your comment concerning increased aircraft noise, aircraft size at SUA, hours of airport operation, flight paths, and aircraft emissions.

The Airport is preparing this Part 150 Study to ensure that the recent increase in air traffic is assessed through the preparation of current noise exposure maps, which will allow for potential noise mitigation strategies such as a continuation of the sound insulation program. Generally, as the size of an aircraft increases, the noise increases and with the increase in larger aircraft operations, that makes the NEM update more important to ensure that these larger jets are incorporated into the noise exposure maps.

With respect to eliminating nighttime operations, the Airport maintains a voluntary nighttime curfew period from 11 p.m. to 7 a.m. daily. The voluntary nighttime curfew was initially approved as a measure at the Airport in 2004 following the 2002 Part 150Study. Using data from the Airport's flight tracking system, flights during the voluntary nighttime curfew are tracked and anotification of each flight occurring during the voluntary nighttime curfew period is mailed to the aircraft owner as well assummarized in the monthly voluntary curfew reports.

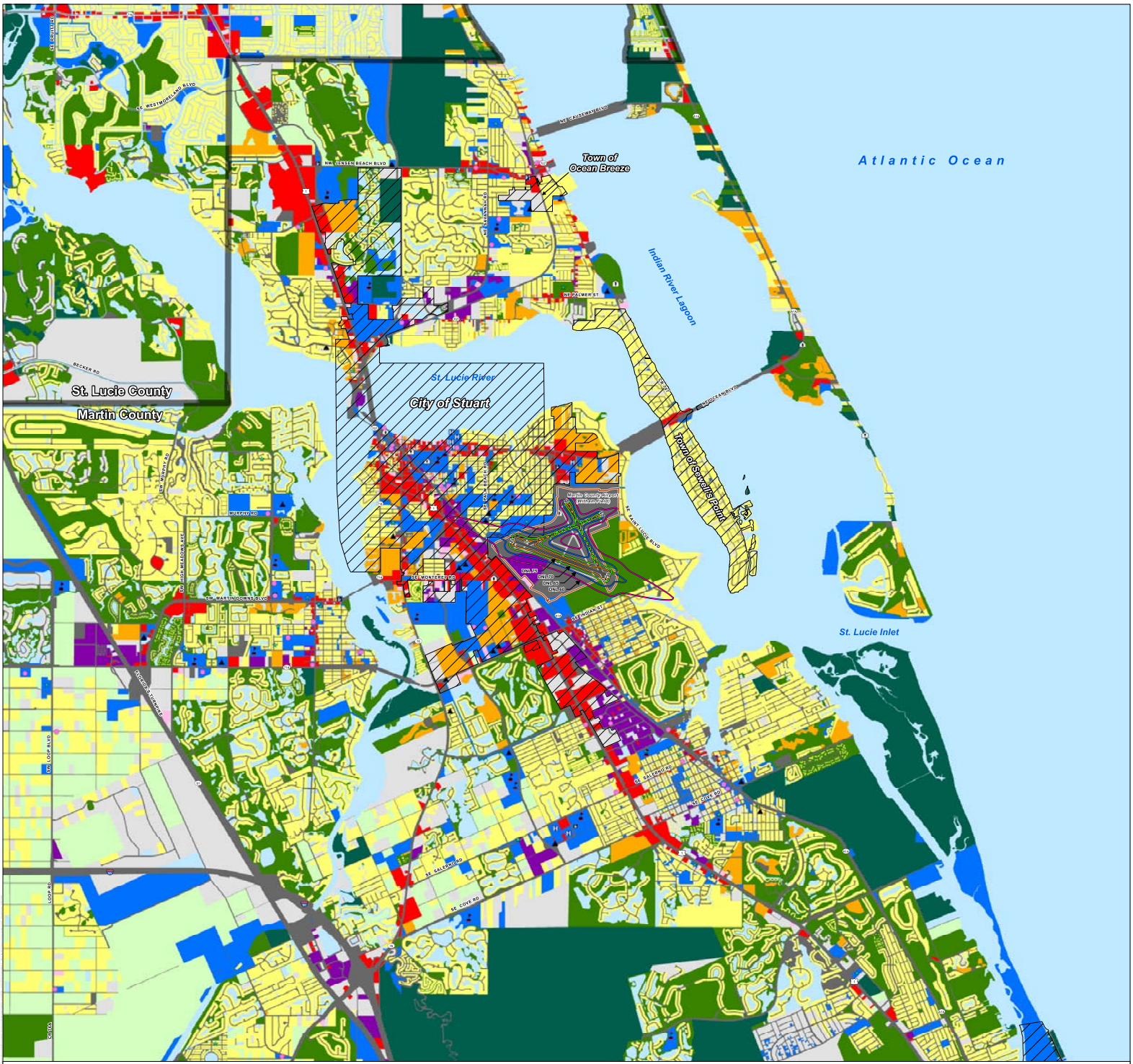
The flight path of an aircraft once the aircraft leaves the ground is determined by a number of factors including air traffic control restrictions, the aircraft's destination, and specific aircraft specifications, all of which are out of the Airport's control. Creating departure routes out of an airport is under the jurisdiction of the Federal Aviation Administration (FAA). However, airports can advocate for specific departure and arrival routes in and out of an airport to the FAA and we encourage you to bring this commentto the Airport through the Airport Noise Abatement Committee.

While air quality is outside of the Part 150 Study analyses, air quality in Martin County is below the ambient concentration standards set by the Environmental Protection Agency for the principal pollutants monitored by the agency to protect both public health and the environment.

APPENDIX H

NEM Maps

This Appendix includes the NEM Maps for the Martin County Airport Part 150 Study.



Legend

Municipalities
Airport Property
Major Highways
Major Roads
Local Traffic

Noise Sensitive Sites
Historic Structure
Childcare Facility
Place of Worship
Hospital
Library
Museum/Cultural
School
Senior Care

Land Use Type
Conservation
Recreation
Agriculture
Single Family, Mobile Home, and Duplex
Multi-Family Residential
Retail and Office
Mixed Use
Industrial and Manufacturing
Transportation and Utilities
Public Facilities and Institutions
Vacant
Water Bodies

2020 DNL Contours
60 dB
65 dB
70 dB
75 dB

SOURCE: Esri; Martin County Property Appraiser, 9/2018; St. Lucie County Property Appraiser, 9/2018; GAI, 2020; ESA, 2020

N

0 4,000
Feet
1" = 2,000'

Sponsor's Certification

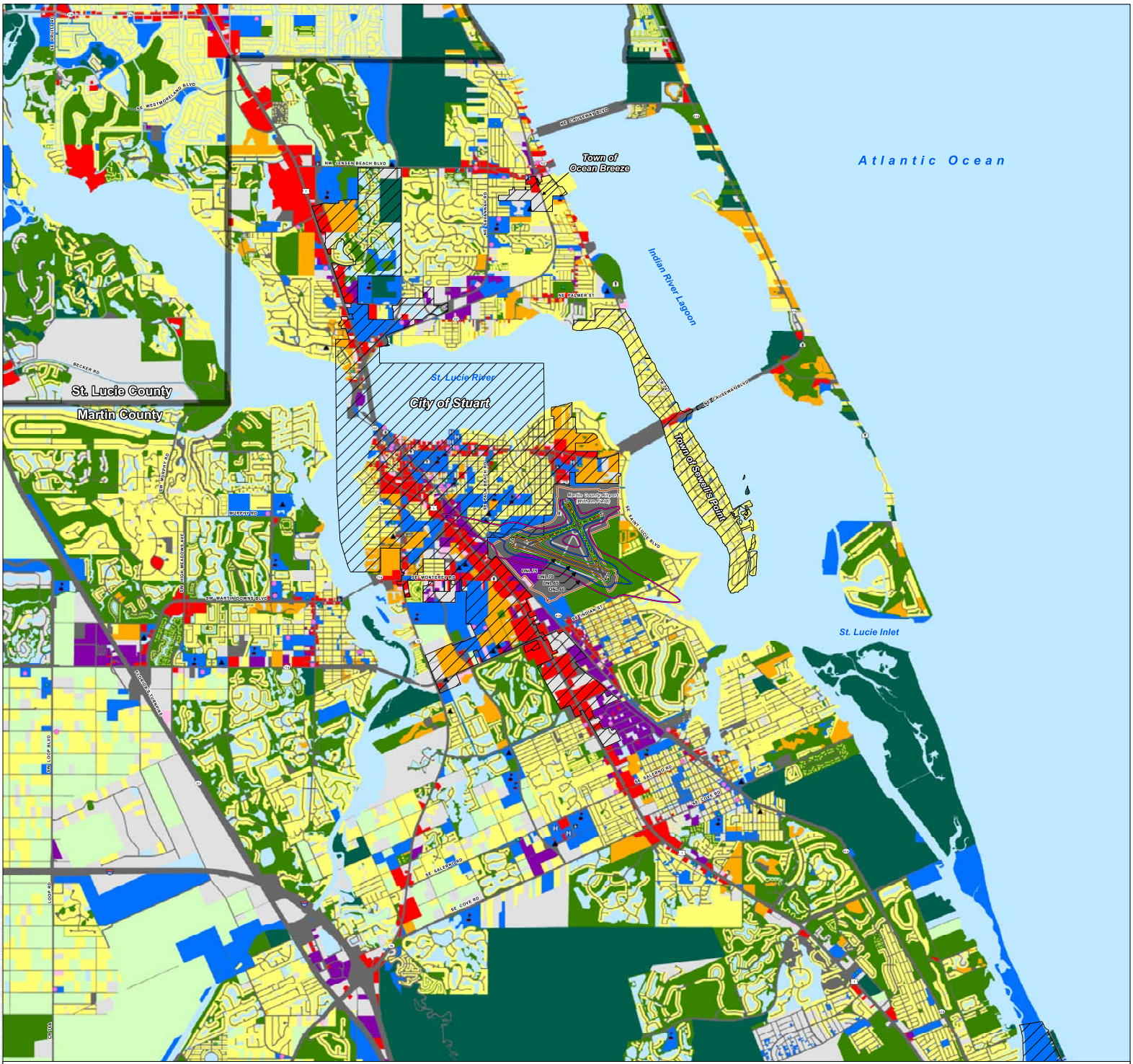
The Martin County Aviation Department certifies that it has afforded interested persons adequate opportunity to submit their views, data, and comments concerning the correctness and adequacy of the Martin County Airport (Witham Field) 2020 Noise Exposure Map and descriptions of forecast aircraft operations. The 2020 operations at Martin County Airport (Witham Field) are hereby certified to be consistent with fleet mix, forecast operational levels, and flight procedures depicted on this 2020 Noise Exposure Map.

By: _____
Title: _____
Address: _____
_____
Signature Date

2020 Noise Exposure Map

Map 1 of 5

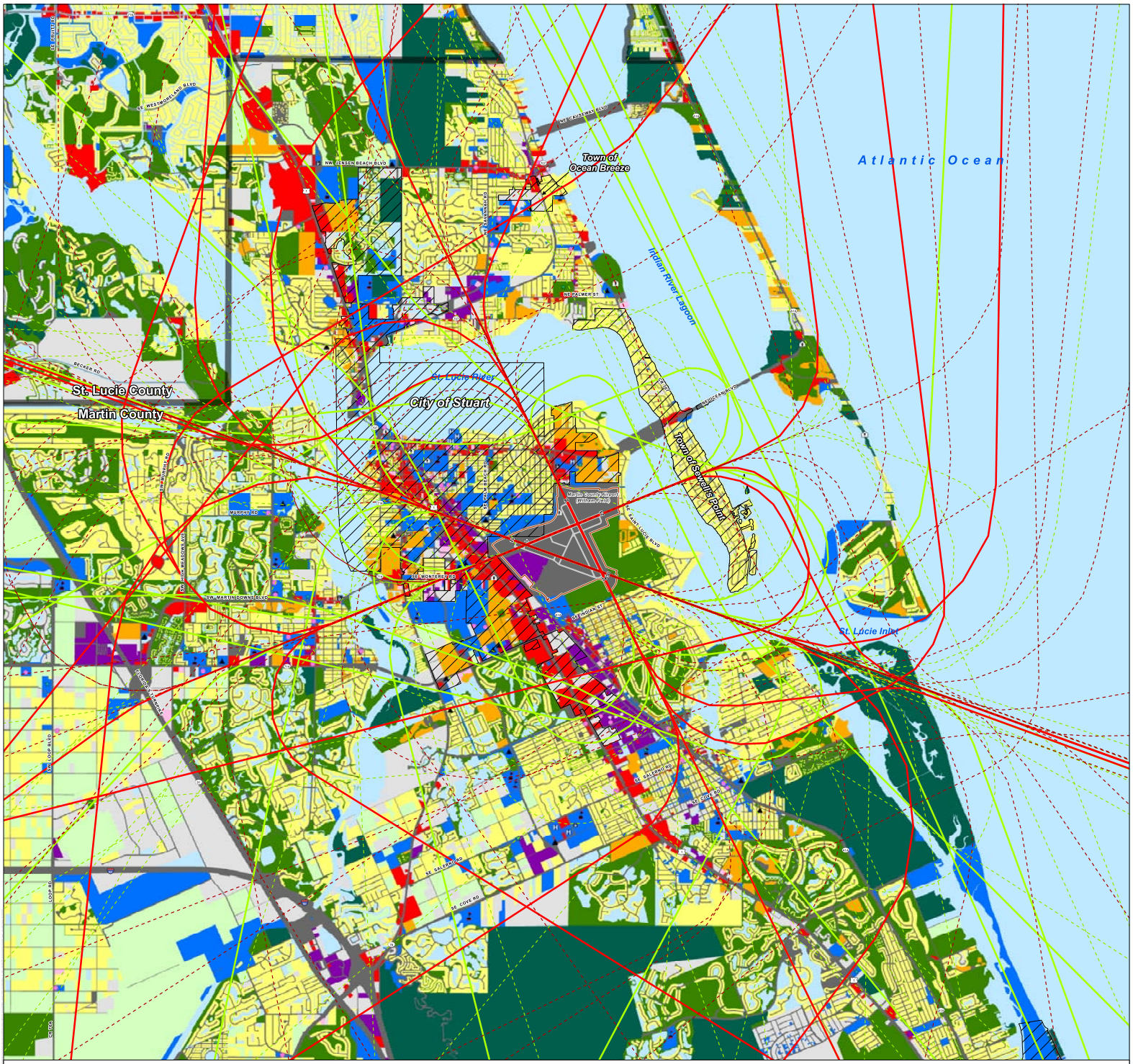
Martin County Airport (Witham Field)



2025 Noise Exposure Map

Map 2 of 5

Martin County Airport (Witham Field)

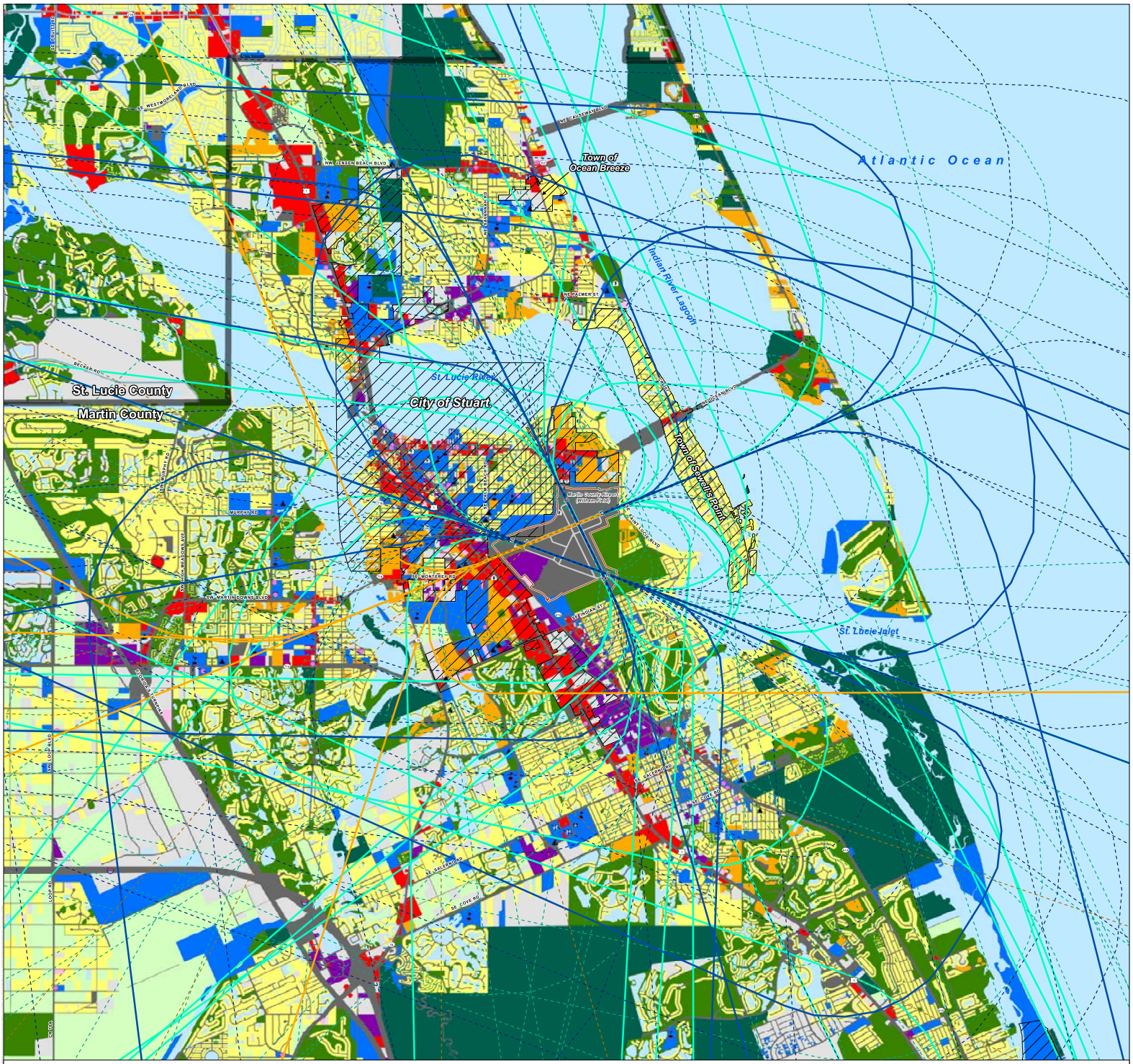


SOURCE: Esri; Martin County Property Appraiser, 8/2018; St. Lucie County Property Appraiser, 8/2018; GAI, 2020; ESA, 2020

AEDT Flight Tracks - All Arrivals

Map 3 of 5

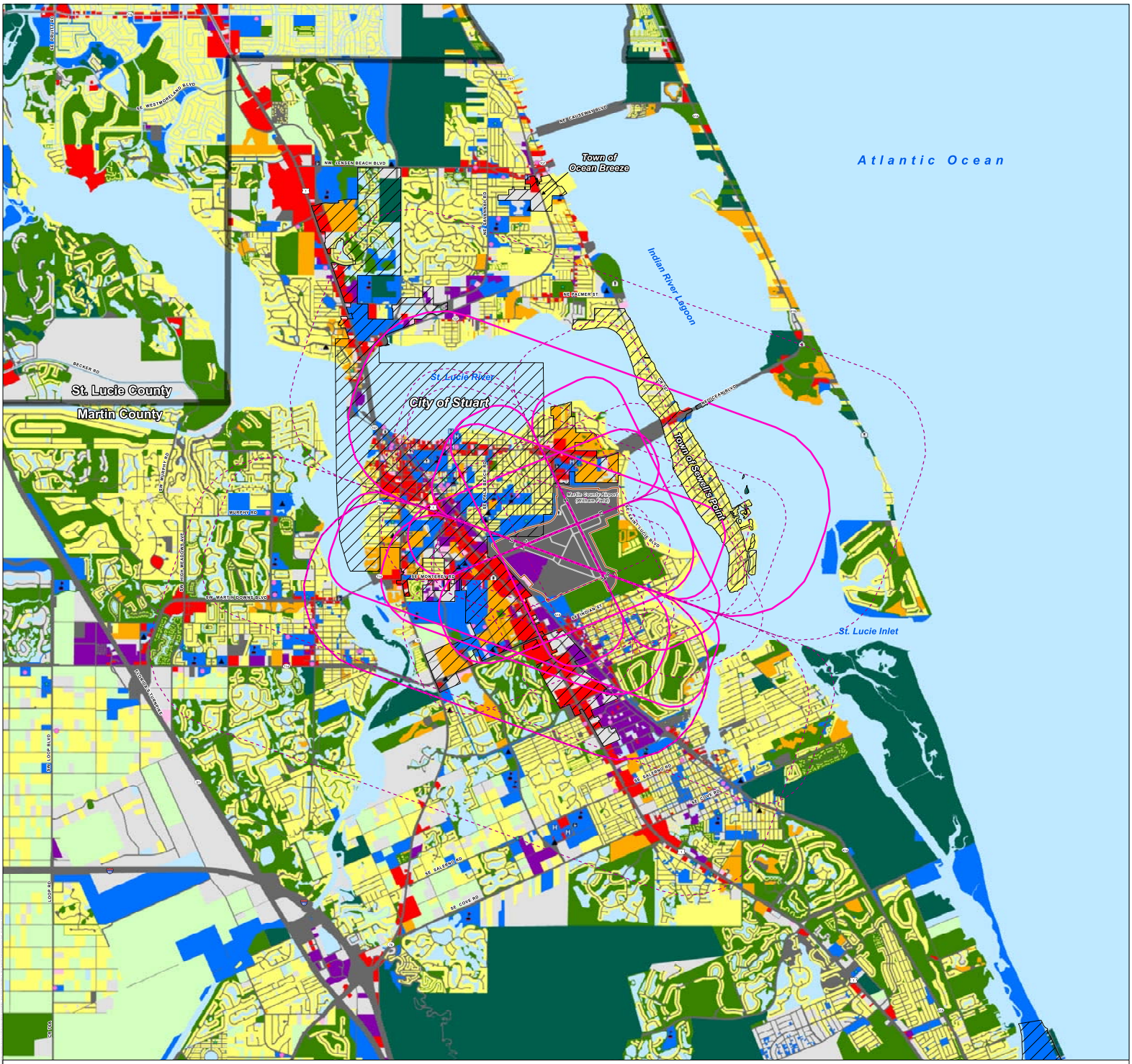
Martin County Airport (Witham Field)



AEDT Flight Tracks - All Departures

Map 4 of 5

Martin County Airport (Witham Field)



Legend

Municipalities
Airport Property
Major Highways
Major Roads
Local Traffic

Noise Sensitive Sites
Historic Structure
Childcare Facility
Place of Worship
Hospital
Library
Museum/Cultural
School
Senior Care

Land Use Type
Conservation
Recreation
Agriculture
Single Family, Mobile Home, and Duplex
Multi-Family Residential
Retail and Office
Mixed Use
Industrial and Manufacturing
Transportation and Utilities
Public Facilities and Institutions
Vacant
Water Bodies

AEDT Flight Tracks
Touch and Go Backbone Track
Touch and Go Sub-Track

0 4,000
Feet
1" = 2,000'

SOURCE: Esri; Martin County Property Appraiser; 8/2018; St. Lucie County Property Appraiser; 8/2018; GAI, 2020; ESA, 2020

AEDT Flight Tracks - All Touch and Go
Map 5 of 5
Martin County Airport (Witham Field)

APPENDIX I
Supplemental AEDT Modeling Information

The tables in this appendix provide the aircraft operations data for SUA used in the AEDT to model noise exposure in 2020 and 2025. Some of the data presented here is also presented in Chapter 4 of the Main Report but is presented here so the modeling information is presented entirely in one location. Average Annual Day (AAD) operations are required for use in 14 CFR Part 150, as modeled by the AEDT. This appendix includes the following summary tables:

- Table I-1: 2020 and 2025 Annual Average Day AEDT Aircraft Operations by Aircraft Type
- Table I-2: 2020 and 2025 Annual Aircraft Operations by AEDT Aircraft Type
- Table I-3: 2020 and 2025 Annual Aircraft Operations by Time of Day
- Table I-4: Departure Stage Length by Aircraft Type
- Table I-5: 2020 and 2025 Arrival Runway Use by Aircraft Category and Time of Day – 2020 Conditions
- Table I-6: 2020 and 2025 Departure Runway Use by Aircraft Category and Time of Day – 2020 Conditions
- Table I-7: 2020 and 2025 Touch-and-Go Runway Use by Aircraft Category and Time of Day – 2025 Conditions
- Table I-8: Arrival Flight Track Use
- Table I-9: Departure Flight Track Use
- Table I-10: Touch-and-Go Flight Track Use –

Table I-1

Annual Aircraft Operations by AEDT Aircraft Type

Aircraft Category	2020 Operations	2025 Operations
Helicopter	389	446
Jet	24,112	27,613
Piston	26,866	30,767
Prop	66,160	75,766
Grand Total	**117,527**	**134,591**

NOTE: An aircraft operation is equivalent to one arrival/landing or one departure/takeoff.

SOURCE: Environmental Science Associates, 2020.

Table I-1

Annual Aircraft Operations by AEDT Aircraft Type

Aircraft Category	AEDT Aircraft Type	AEDT Engine Code	AEDT Engine Modification Code	2020 Operations	2025 Operations
Helicopter	Agusta A-109	250B17	NONE	18	21
	Bell 206 JetRanger	250B17	NONE	42	48
	Bell 407 / Rolls-Royce 250-C47B	250B17	NONE	262	300
	Robinson R22	IO320	NONE	47	54
	Robinson R44 Raven / Lycoming O-540-F1B5	TIO540	NONE	13	15
	Sikorsky S-76 Spirit	T70070	NONE	6	7
Subtotal Helicopter				389	446
Jet	Bombardier Challenger 300	6AL006	NONE	1,026	1,175
	Bombardier Challenger 300	8HN001	NONE	69	79
	Bombardier Challenger 350	14HN009	NONE	455	521
	Bombardier Challenger 600	5GE084	NONE	696	797
	Bombardier Global Express	4BR008	NONE	35	41
	Bombardier Global Express	4BR009	NONE	191	219
	Bombardier Learjet 31	1AS002	NONE	291	333
	Bombardier Learjet 35	1AS001	NONE	341	390
	Bombardier Learjet 40	1AS001	NONE	68	77
	Bombardier Learjet 45	1AS001	NONE	789	904

Annual Aircraft Operations by AEDT Aircraft Type					
Aircraft Category	AEDT Aircraft Type	AEDT Engine Code	AEDT Engine Modification Code	2020 Operations	2025 Operations
	Bombardier Learjet 45	TFE731	NONE	47	53
	Bombardier Learjet 55	1AS002	NONE	55	63
	Bombardier Learjet 60	PW307B	NONE	736	843
	Bombardier Learjet 75	1AS002	NONE	167	191
	Cessna 500 Citation I	PW530	NONE	289	331
	Cessna 501 Citation ISP	1PW035	NONE	141	162
	Cessna 525 CitationJet	1PW035	NONE	1,296	1,484
	Cessna 525A CitationJet	PW610F	NONE	461	528
	Cessna 525B CitationJet	1PW036	NONE	555	635
	Cessna 525C CitationJet	PW615F	NONE	122	140
	Cessna 551 Citation IISP	1PW036	NONE	5	6
	Cessna 560 Citation Excel	1PW037	NONE	1,134	1,298
	Cessna 560 Citation XLS	7PW078	NONE	1,111	1,272
	Cessna 560 Citation XLS	PW307B	NONE	2,217	2,539
	Cessna 650 Citation III	TFE731	NONE	98	112
	Cessna 680 Citation Sovereign	7PW078	NONE	1,166	1,335
	Cessna 680-A Citation Latitude	7PW078	NONE	363	416
	Cessna 750 Citation X	6AL021	NONE	605	692
	Cessna 750 Citation X	8AL025	NONE	23	26
	CESSNA CITATION 510	PW615F	NONE	145	166
	Dassault Falcon 10	1AS001	NONE	37	42
	Dassault Falcon 2000	7PW080	NONE	185	212
	Dassault Falcon 2000-EX	7PW080	NONE	981	1,123
	Dassault Falcon 20-G	TFE731	NONE	601	689
	Eclipse 500 / PW610F	PW610F	NONE	206	236
	Embraer 500	PW610F	NONE	230	263
	Embraer 505	PW530	NONE	1,040	1,191
	Embraer ERJ135	6AL018	NONE	43	50
	Embraer ERJ190	XCF10E	NONE	13	15
	Embraer Legacy 450 (EMB-545)	14HN007	NONE	148	169
	Embraer Legacy 500 (EMB-550)	14HN008	NONE	410	470
	Falcon 7X	8PW091	NONE	42	48
	Gulfstream G150	1AS002	NONE	88	101
	Gulfstream G200	7PW077	NONE	167	191
	Gulfstream G280	11HN005	NONE	71	81
	Gulfstream G300	F1131	NONE	13	15
	Gulfstream G450	6RR042	NONE	1,117	1,280
	Gulfstream G550	3BR001	NONE	547	626
	Israel IAI-1124-A Westwind II	CJ6102	NONE	58	66
	Israel IAI-1125 Astra	1AS002	NONE	90	103

Annual Aircraft Operations by AEDT Aircraft Type					
Aircraft Category	AEDT Aircraft Type	AEDT Engine Code	AEDT Engine Modification Code	2020 Operations	2025 Operations
	Lockheed L-1329 Jetstar I	1AS002	NONE	106	122
	Raytheon Beechjet 400	1PW035	NONE	119	136
	Raytheon Beechjet 400	1PW038	NONE	1,114	1,276
	Raytheon Hawker 1000	TFE731	NONE	42	48
	Raytheon Hawker 800	TFE731	NONE	1,307	1,497
	Raytheon Premier I	1PW035	NONE	233	267
	Rockwell Sabreliner 65	1AS002	NONE	405	464
			Jet Subtotal	24,112	27,613
Piston	AeroStar PA-60	TIO540	NONE	106	122
	Aviat Husky A1B	IO360	NONE	13	15
	Cessna 310	TIO540	NONE	617	707
	Cessna 337 Skymaster	IO360	NONE	3,576	4,095
	Cessna 337 Skymaster	TSIO36	NONE	10	11
	Cessna 340	TIO540	NONE	18	20
	Cessna 402	TIO540	NONE	34	39
	Cessna 404 Titan II	TIO540	NONE	31	35
	Cessna 414	TIO540	NONE	175	201
	Cessna 425 Conquest I	PT6112	NONE	21	24
	Cessna 441 Conquest II	TPE10	NONE	40	46
	Maule MT-7-235	TIO540	NONE	13	15
	Mitsubishi MU-2	TPE1	NONE	6	7
	Piper PA-23 Apache/Aztec	TIO540	NONE	598	685
	Piper PA-24 Comanche	TIO540	NONE	178	204
	Piper PA-27 Aztec	TIO540	NONE	214	245
	Piper PA-28 Cherokee Series	IO320	NONE	386	442
	Piper PA-28 Cherokee Series	IO360	NONE	6,493	7,435
	Piper PA-28 Cherokee Series	O320	NONE	1,939	2,221
	Piper PA-30 Twin Comanche	IO320	NONE	309	354
	Piper PA-31 Navajo	TIO540	NONE	1,434	1,642
	Piper PA-32 Cherokee Six	TIO540	NONE	1,889	2,164
	Piper PA-34 Seneca	IO360	NONE	1,068	1,223
	Piper PA46-TP Meridian	PT6A42	NONE	510	584

Annual Aircraft Operations by AEDT Aircraft Type					
Aircraft Category	AEDT Aircraft Type	AEDT Engine Code	AEDT Engine Modification Code	2020 Operations	2025 Operations
	Raytheon Beech 60 Duke	TIO540	NONE	3	4
	Raytheon Beech Baron 58	TIO540	NONE	1,452	1,663
	Raytheon Beech Bonanza 36	TIO540	NONE	3,200	3,664
	Raytheon Super King Air 200	PT6A40	NONE	772	884
	Raytheon Super King Air 300	PT660A	NONE	900	1,031
	Robin DR 400	IO360	NONE	93	107
	Robin DR 400	O320	NONE	85	98
	Ryan ST3KR	TIO540	NONE	585	670
	Vulcanair P.68	IO360	NONE	98	112
			Piston Subtotal	26,866	30,767
Prop	Air Tractor AT-602	PT6A60	NONE	10	11
	Cessna 150 Series	O200	NONE	6,116	7,004
	Cessna 172 Skyhawk	IO360	NONE	47,360	54,237
	Cessna 172 Skyhawk	O320	NONE	2,394	2,742
	Cessna 182	IO360	NONE	1,592	1,823
	Cessna 206	TIO540	IO-540-AC	302	346
	Cessna 208 Caravan	TPE12	NONE	129	147
	Cessna 210 Centurion	TIO540	NONE	325	372
	Cessna T-37 Tweet	J6925A	AEIO-540-D4A5	31	35
	Cirrus SR20	IO360	NONE	519	595
	Cirrus SR22	TIO540	NONE	2,934	3,360
	DeHavilland DHC-2 Turbo Beaver	PT6A20	NONE	72	83
	EADS Socata TB-10 Tobago	IO360	NONE	3	4
	EADS Socata TB-20 Trinidad	TIO540	NONE	122	140
	EADS Socata TB-9 Tampico	O320	NONE	751	860
	EADS Socata TBM-700	PT6A60	NONE	624	714
	Mooney M20-K	TSIO36	NONE	986	1,129
	Piaggio P.180 Avanti	PT6A60	NONE	23	26
	Pilatus PC-12	PT6A67	NONE	910	1,042
	Pilatus Turbo Trainer PC-9	PT6A62	NONE	79	90
	Piper PA-31T Cheyenne	PT6A11	NONE	47	53
	Piper PA-42 Cheyenne Series	TPE10	NONE	29	33
	Raytheon Beech 99	P6135A	NONE	473	541
	Raytheon King Air 100	PT6A28	NONE	77	88
	Rockwell Commander 680	TIO540	NONE	72	83
	Rockwell Commander 690	TPE1	NONE	167	191
	Shorts 360-300 Series	PT6A6A	PT6A-65AR	11	13
	SOCATA TBM 850	PT6A66	NONE	2	2

Annual Aircraft Operations by AEDT Aircraft Type					
Aircraft Category	AEDT Aircraft Type	AEDT Engine Code	AEDT Engine Modification Code	2020 Operations	2025 Operations
			Prop Subtotal	66,160	75,766
				117,527	134,591

NOTE: An aircraft operation is equivalent to one arrival/landing or one departure/takeoff.

SOURCE: Environmental Science Associates, 2020.

Table I-3
Annual Aircraft Operations (All Aircraft) by Time of Day

Study Year	Arrivals			Departures			Touch & Go	
	Day	Night		Day	Night		Day	Night
2020	**96.96%**	**3.04%**		**97.83%**	**2.17%**		**98.03%**	**1.97%**
2025	**96.96%**	**3.04%**		**97.83%**	**2.17%**		**98.03%**	**1.97%**

SOURCE: Environmental Science Associates, 2020; Martin County Airport, Vector Noise and Operations Management System (VNOMS) data for July 2017-June 2018.

Table I-4
Departure Stage Length (All Aircraft)

Study Year	Stage Length Category			
	1	2	3	4
2020	**99.59%**	**0.35%**	**0.04%**	**0.01%**
2025	**99.59%**	**0.35%**	**0.04%**	**0.01%**

NOTE: Values may not add to 100 percent due to rounding. No aircraft exceeded a departure stage length of 4.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, Vector Noise and Operations Management System (VNOMS) data for July 2017-June 2018.

Table I-5
Arrival Runway Use

Arrivals (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%
2025						
Daytime Arrivals	12.11%	53.38%	1.72%	3.73%	28.19%	0.87%
Nighttime Arrivals	0.24%	75.12%	0.24%	0.54%	23.86%	0.00%

NOTE: . Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

Table I-6
Departure Runway Use

Departures (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%
2025						
Daytime Departures	10.44%	49.19%	4.86%	2.63%	29.05%	3.83%
Nighttime Departures	3.68%	46.59%	3.50%	1.10%	42.54%	2.58%

NOTE: . Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

Table I-7
Touch-and-Go Runway Use

Touch-and-Gos (Time of Day)	Runway					
	7	12	16	25	30	34
2020						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%
2025						
Daytime Touch-and-Gos	10.87%	39.38%	18.00%	3.87%	25.63%	2.26%
Nighttime Touch-and-Gos	4.00%	72.00%	5.33%	0.00%	18.67%	0.00%

NOTE: . Values may not add to 100 percent due to rounding.

SOURCE: Environmental Science Associates, 2018; Martin County Airport, VNOMS data for July 2017-June 2018.

Table I-8 Arrival Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
7	07A01	7.94%	15.80%
7	07A02	3.97%	7.90%
7	07A03	3.97%	7.90%
7	07A04	3.97%	7.90%
7	07A05	20.04%	15.12%
7	07A06	16.03%	12.10%
7	07A07	20.04%	15.12%
7	07A08	8.02%	6.05%
7	07A09	16.03%	12.10%
7 Total	-	*100.00%*	*100.00%*
7 (Helicopters)	07A05H	25.00%	25.00%
7 (Helicopters)	07A06H	20.00%	20.00%
7 (Helicopters)	07A07H	25.00%	25.00%
7 (Helicopters)	07A08H	10.00%	10.00%
7 (Helicopters)	07A09H	20.00%	20.00%
7 (Helicopters) Total	-	*100.00%*	*100.00%*
12	12A01	5.95%	11.85%
12	12A02	5.95%	11.85%
12	12A03	3.97%	7.90%
12	12A04	3.97%	7.90%
12	12A05	12.02%	9.07%
12	12A06	12.02%	9.07%
12	12A07	28.05%	21.17%
12	12A08	28.05%	21.17%
12 Total	-	*100.00%*	*100.00%*
12 (Helicopters)	12A05H	15.00%	15.00%
12 (Helicopters)	12A06H	15.00%	15.00%
12 (Helicopters)	12A07H	35.00%	35.00%
12 (Helicopters)	12A08H	35.00%	35.00%
12 (Helicopters) Total	-	*100.00%*	*100.00%*
16	16A01	5.95%	11.85%
16	16A02	9.92%	19.75%
16	16A03	1.98%	3.95%
16	16A04	1.98%	3.95%
16	16A05	8.02%	6.05%
16	16A06	56.11%	42.34%
16	16A07	8.02%	6.05%
16	16A08	8.02%	6.05%
16 Total	-	*100.00%*	*100.00%*

Arrival Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
16 (Helicopters)	16A05H	10.00%	10.00%
16 (Helicopters)	16A06H	70.00%	70.00%
16 (Helicopters)	16A07H	10.00%	10.00%
16 (Helicopters)	16A08H	10.00%	10.00%
16 (Helicopters) Total	-	***100.00%***	***100.00%***
25	25A01	13.89%	27.66%
25	25A02	2.98%	5.93%
25	25A03	2.98%	5.93%
25	25A04	16.03%	12.10%
25	25A05	40.08%	30.25%
25	25A06	24.05%	18.15%
25 Total	-	***100.00%***	***100.00%***
25 (Helicopters)	25A04H	20.00%	20.00%
25 (Helicopters)	25A05H	50.00%	50.00%
25 (Helicopters)	25A06H	30.00%	30.00%
25 (Helicopters) Total	-	***100.00%***	***100.00%***
30	30A01	11.91%	23.71%
30	30A02	5.95%	11.85%
30	30A03	1.98%	3.95%
30	30A04	8.02%	6.05%
30	30A05	16.03%	12.10%
30	30A06	8.02%	6.05%
30	30A07	24.05%	18.15%
30	30A08	8.02%	6.05%
30	30A09	8.02%	6.05%
30	30A10	8.02%	6.05%
30 Total	-	***100.00%***	***100.00%***
30 (Helicopters)	30A04H	10.00%	10.00%
30 (Helicopters)	30A05H	20.00%	20.00%
30 (Helicopters)	30A06H	10.00%	10.00%
30 (Helicopters)	30A07H	30.00%	30.00%
30 (Helicopters)	30A08H	10.00%	10.00%
30 (Helicopters)	30A09H	10.00%	10.00%
30 (Helicopters)	30A10H	10.00%	10.00%
30 (Helicopters) Total	-	***100.00%***	***100.00%***
34	34A01	4.96%	
34	34A02	4.96%	
34	34A03	4.96%	
34	34A04	4.96%	

Arrival Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
34	34A05	12.02%	
34	34A06	8.02%	
34	34A07	12.02%	
34	34A08	32.06%	
34	34A09	16.03%	
34 Total	-	***100.00%***	-
34 (Helicopters)	34A05H	15.00%	
34 (Helicopters)	34A06H	10.00%	
34 (Helicopters)	34A07H	15.00%	
34 (Helicopters)	34A08H	40.00%	
34 (Helicopters)	34A09H	20.00%	
34 (Helicopters) Total	-	***100.00%***	-

Table I-9 Departure Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
7	07D01	4.08%	7.23%
7	07D02	14.29%	25.32%
7	07D03	1.02%	1.81%
7	07D04	1.02%	1.81%
7	07D05	11.94%	9.58%
7	07D06	27.86%	22.34%
7	07D07	11.94%	9.58%
7	07D08	11.94%	9.58%
7	07D09	1.59%	1.28%
7	07D10	4.78%	3.83%
7	07D11	4.78%	3.83%
7	07D12	4.78%	3.83%
7 Total	-	***100.00%***	***100.00%***
7 (Helicopters)	07D05H	15.00%	15.00%
7 (Helicopters)	07D06H	35.00%	35.00%
7 (Helicopters)	07D07H	15.00%	15.00%
7 (Helicopters)	07D08H	15.00%	15.00%
7 (Helicopters)	07D09H	2.00%	2.00%
7 (Helicopters)	07D10H	6.00%	6.00%
7 (Helicopters)	07D11H	6.00%	6.00%
7 (Helicopters)	07D12H	6.00%	6.00%
7 (Helicopters) Total	-	***100.00%***	***100.00%***
12	12D01	8.16%	14.47%

Departure Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
12	12D02	1.02%	1.81%
12	12D03	8.16%	14.47%
12	12D04	3.06%	5.42%
12	12D05	15.92%	12.77%
12	12D06	31.84%	25.53%
12	12D07	11.94%	9.58%
12	12D08	3.98%	3.19%
12	12D09	3.98%	3.19%
12	12D10	7.96%	6.38%
12	12D11	3.98%	3.19%
12 Total	-	***100.00%***	***100.00%***
12 (Helicopters)	12D05H	20.00%	20.00%
12 (Helicopters)	12D06H	40.00%	40.00%
12 (Helicopters)	12D07H	15.00%	15.00%
12 (Helicopters)	12D08H	5.00%	5.00%
12 (Helicopters)	12D09H	5.00%	5.00%
12 (Helicopters)	12D10H	10.00%	10.00%
12 (Helicopters)	12D11H	5.00%	5.00%
12 (Helicopters) Total	-	***100.00%***	***100.00%***
16	16D01	14.29%	25.32%
16	16D02	6.12%	10.85%
16	16D03	3.98%	3.19%
16	16D04	3.98%	3.19%
16	16D05	23.88%	19.15%
16	16D06	11.94%	9.58%
16	16D07	7.96%	6.38%
16	16D08	23.88%	19.15%
16	16D09	3.98%	3.19%
16 Total	-	***100.00%***	***100.00%***
16 (Helicopters)	16D03H	5.00%	5.00%
16 (Helicopters)	16D04H	5.00%	5.00%
16 (Helicopters)	16D05H	30.00%	30.00%
16 (Helicopters)	16D06H	15.00%	15.00%
16 (Helicopters)	16D07H	10.00%	10.00%
16 (Helicopters)	16D08H	30.00%	30.00%
16 (Helicopters)	16D09H	5.00%	5.00%
16 (Helicopters) Total	-	***100.00%***	***100.00%***
25	25D01	17.13%	18.13%
25	25D02	27.62%	27.29%
25	25D03	11.05%	10.92%

Departure Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
25	25D04	33.15%	32.75%
25	25D05	5.52%	5.46%
25	25D06	5.52%	5.46%
25 Total	-	***100.00%***	***100.00%***
25 (Helicopters)	25D01H	25.00%	25.00%
25 (Helicopters)	25D02H	25.00%	25.00%
25 (Helicopters)	25D03H	10.00%	10.00%
25 (Helicopters)	25D04H	30.00%	30.00%
25 (Helicopters)	25D05H	5.00%	5.00%
25 (Helicopters)	25D06H	5.00%	5.00%
25 (Helicopters) Total	-	***100.00%***	***100.00%***
30	30D01	5.99%	10.53%
30	30D02	2.00%	3.51%
30	30D03	2.00%	3.51%
30	30D04	9.98%	17.55%
30	30D05	20.01%	16.23%
30	30D06	4.00%	3.25%
30	30D07	12.00%	9.74%
30	30D08	12.00%	9.74%
30	30D09	32.01%	25.96%
30 Total	-	***100.00%***	***100.00%***
30 (Helicopters)	30D05H	25.00%	25.00%
30 (Helicopters)	30D06H	5.00%	5.00%
30 (Helicopters)	30D07H	15.00%	15.00%
30 (Helicopters)	30D08H	15.00%	15.00%
30 (Helicopters)	30D09H	40.00%	40.00%
30 (Helicopters) Total	-	***100.00%***	***100.00%***
34	34D01	3.99%	7.02%
34	34D02	6.99%	12.29%
34	34D03	2.00%	3.51%
34	34D04	6.99%	12.29%
34	34D05	4.00%	3.24%
34	34D06	16.01%	12.98%
34	34D07	16.01%	12.98%
34	34D08	16.01%	12.98%
34	34D09	4.00%	3.24%
34	34D10	24.01%	19.46%
34 Total	-	***100.00%***	***100.00%***
34 (Helicopters)	34D05H	5.00%	5.00%
34 (Helicopters)	34D06H	20.00%	20.00%

Departure Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
34 (Helicopters)	34D07H	20.00%	20.00%
34 (Helicopters)	34D08H	20.00%	20.00%
34 (Helicopters)	34D09H	5.00%	5.00%
34 (Helicopters)	34D10H	30.00%	30.00%
34 (Helicopters) Total	-	*100.00%*	*100.00%*

Table I-10 Touch-and-Go Flight Track Use (2020 & 2025)			
Runway	Flight Track	Daytime Percentage	Nighttime Percentage
7	07T01	100.00%	100.00%
7 Total	-	*100.00%*	*100.00%*
7 (Helicopters)	07T01H	100.00%	
7 (Helicopters) Total	-	*100.00%*	-
12	12T01	3.46%	2.67%
12	12T02	96.54%	97.33%
12 Total	-	*100.00%*	*100.00%*
12 (Helicopters)	12T02H	100.00%	
12 (Helicopters) Total	-	*100.00%*	-
16	16T01	100.00%	100.00%
16 Total	-	*100.00%*	*100.00%*
16 (Helicopters)	16T01H	100.00%	
16 (Helicopters) Total	-	*100.00%*	-
25	25T01	100.00%	
25 Total	-	*100.00%*	-
25 (Helicopters)	25T01H	100.00%	
25 (Helicopters) Total	-	*100.00%*	-
30	30T01	3.46%	2.67%
30	30T02	15.89%	13.25%
30	30T03	80.64%	84.08%
30 Total	-	*100.00%*	*100.00%*
30 (Helicopters)	30T02H	100.00%	
30 (Helicopters) Total	-	*100.00%*	-
34	34T01	100.00%	
34 Total	-	*100.00%*	-
34 (Helicopters)	34T01H	100.00%	
34 (Helicopters) Total	-	*100.00%*	-