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## **GIF NOISE STUDY: SUMMARY**

**Prepared for**

**WINTER HAVEN'S GILBERT AIRPORT**

**November 20, 2018**

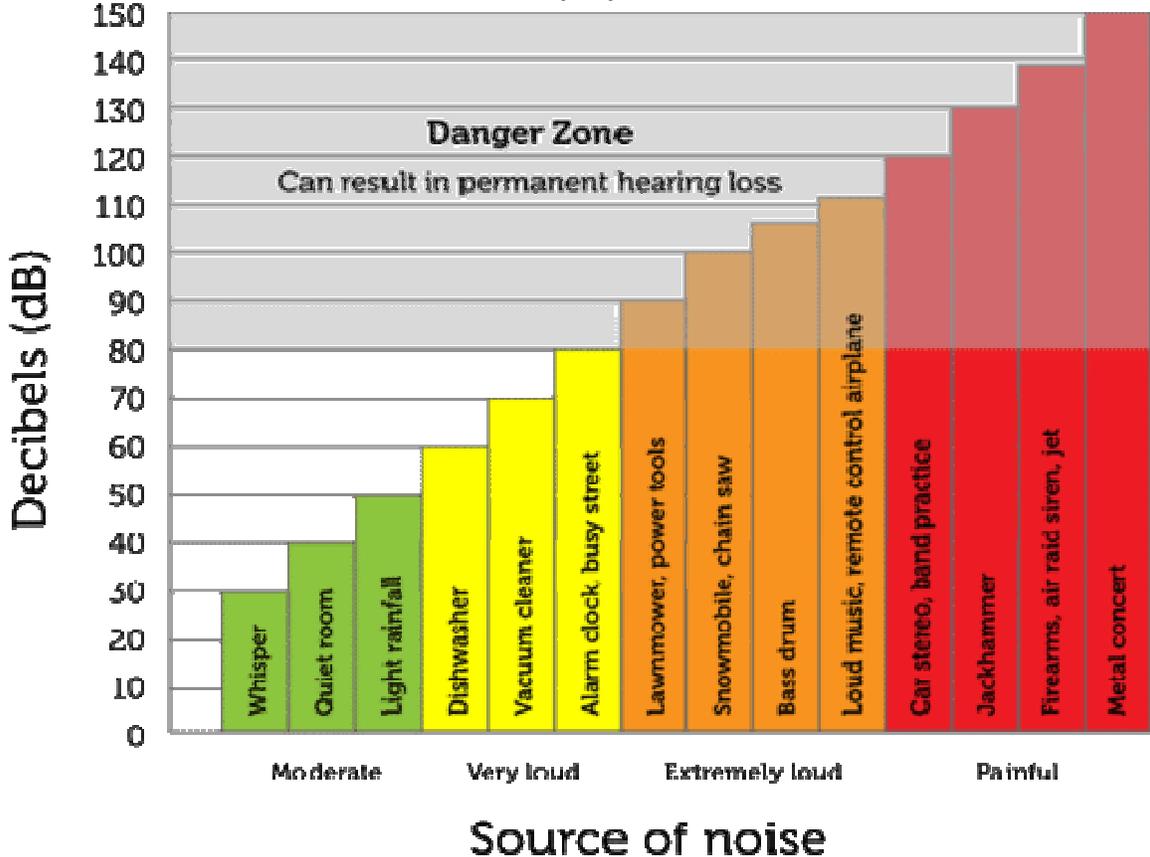
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# 1. Introduction

This noise study was conducted for Winter Haven's Gilbert Airport (GIF) and consists of the results of analyzing daily operations on an annual basis for the distribution of aircraft noise. The metric analyzed is the day-night average noise level over a 24-hour period (DNL). The Federal Aviation Administration (FAA) typically uses the 65 DNL as the highest allowable level of noise for residential compatible land use adjacent to an airport. The DNL is the average sound level measured in decibels (dB). The decibel is used to measure the intensity of sound in many different activities. Some typical activities that are heard daily have a wide arrange of varying levels of decibels as an output, as shown in Figure 1-1.

Figure 1-1  
 Decibel (dB) Chart



Source: CK-12 Physics

## 2. Purpose

The purpose of this study was to determine the location of the 65-DNL contour as it relates to the aircraft activity at Winter Haven's Gilbert Airport, with specific emphasis on a subject parcel of land. The 65-DNL contour line is the metric within which the FAA does not recommend residential or educational activities.

## 3. Data Used

The data used for this study was the approved forecast of the *2014 Winter Haven Gilbert Field Airport Master Plan Update*. The years that were used for this study are 2017 as the base year, and 2023 and 2028 as future years. The total annual number of operations were allocated into the percentages found in table 3.1 which represent the fleet mix at GIF.

**Table 3.1**

<b>Year (Total Annual Operations)</b>	<b>Single Engine</b>	<b>Multi-Engine</b>	<b>Jets</b>	<b>Rotorcraft</b>	<b>Other</b>
2017 (77,934)	84.19%	8.92%	1.73%	2.23%	2.93%
2023 (82,214)	82.18%	8.79%	2.76%	3.06%	3.23%
2028 (84,085)	81.97%	8.78%	2.86%	3.13%	3.26%

Source: 2014 Winter Haven Master Plan Update Forecast

The current list of based aircraft at the Airport as well as the aircraft data that was downloaded from the FAA Traffic Flow Management System Counts were used in determining the grouping of aircraft that would be used to simulate the annual operations within the FAA's Aviation Environmental Design Tool (AEDT). The current based aircraft were grouped into three AEDT equivalent aircraft as shown in Table 3.2.

**Table 3.2**

<b>Aircraft</b>	<b>AEDT Equivalent Aircraft</b>
<b>Single Engine</b>	GASEPV
<b>Multi Engine</b>	BEC58P
<b>Jets</b>	LEAR35
<b>Rotorcraft</b>	BEC58P
<b>Other</b>	GASEPV

The FAA's Terminal Area Forecast (TAF) was used to determine the total number of operations for the year 2017. The total annual operations for the future years were taken from the Airport's 2014 Master Plan Update. Table 3.3 shows the total number of operations for each year broken down into their respective categories. Each of the operations were split in half to constitute takeoff and landings equally. Ten percent of the total number of operations were allocated to touch and go operations. All operations were run as day operations due to not having any metrics for night operations.

**Table 3.3**

<b>Year</b>	<b>Single Engine</b>	<b>Multi Engine</b>	<b>Jets</b>	<b>Helicopters</b>	<b>Other</b>	<b>Total Number of Operations</b>
2017	65,617	6,947	1,351	1,734	2,285	77,934
2023	67,575	7,225	2,268	2,505	2,641	82,214
2028	68,941	7,379	2,406	2,631	2,728	84,085

Source: 2014 Winter Haven Master Plan Update

The operations were also broken down into percentages for each of the Airport's four runway ends. Table 3.4 shows the allocation of percentages for each runway end.

**Table 3.4**

<b>Runway</b>	<b>Percentage of Operations</b>
5	43%
11	36%
23	13%
29	8%

With the total annual operations and data from the forecast from the 2014 Master Plan Update, the average number of daily operations is 214 operations for 2017. Table 3.5 shows the daily operations broken down into the AEDT equivalent aircraft.

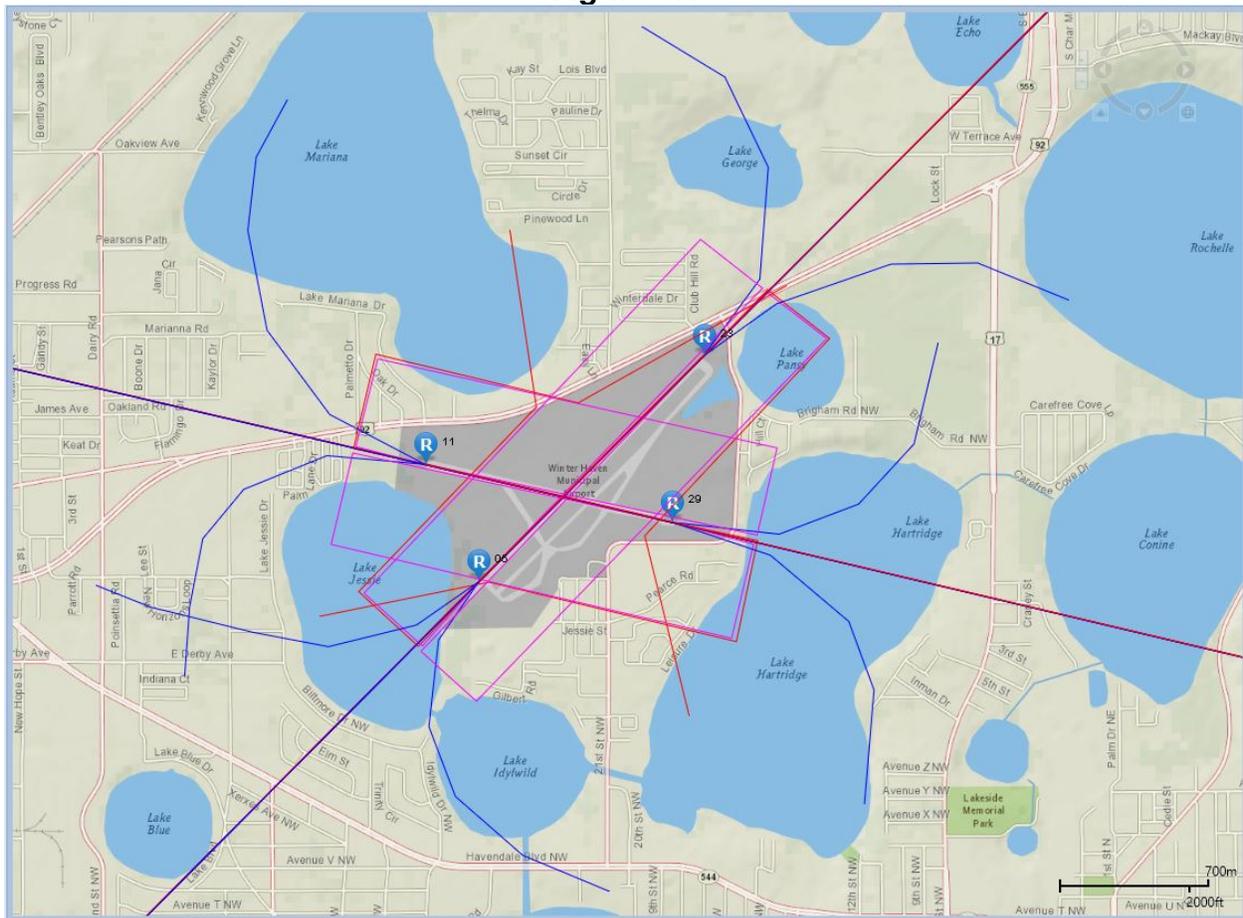
**Table 3.5**

<b>Aircraft</b>	<b>Daily Operation Average</b>
GASEPV (SINGLE ENGINE PISTON)	179.8
BEC58P (MULTI-ENGINE)	19.0
LEAR35 (JETS)	4.3
BEC58P (HELICOPTER)	4.3
OTHER (SINGLE ENGINE PISTON)	5.6

## 4. Flight Tracks

The AEDT program has predetermined flight tracks for each airport represented in the software. The flight tracks used for Runway 5-23 and Runway 11-29 were a combination of the default flight tracks found in the AEDT software and drawn out typical flight tracks that aircraft use to land and depart at a typical airport. Figure 4.1 shows the flight tracks that were used for each runway end.

Figure 4.1



Source: AEDT 2D

Each of the arrival operations were allocated based on the percentages found in Table 3.4. For the departure tracks, the percentages found in Table 3.4 was applied as well, but the operations were divided into 50 percent of the operations going straight out, 25 percent of the operations departing to the left and the other 25 percent departing to the right. This was done to simulate how aircraft actually depart.

Each of the operations that were run on each track had the same metrics applied to each run. Figure 4.2 shows the metrics applied to each of the tracks. This metric can be found when creating the annualization used to run the operations allocated to it.

**Figure 4.2**

Metric Result Options (Applies to All Metrics)	
Noise altitude cutoff AFE (ft):	10000
Mixing height AFE (ft):	3000
Fuel sulfur content:	0.0006
Sulfur to sulfate conversion rate:	0.024

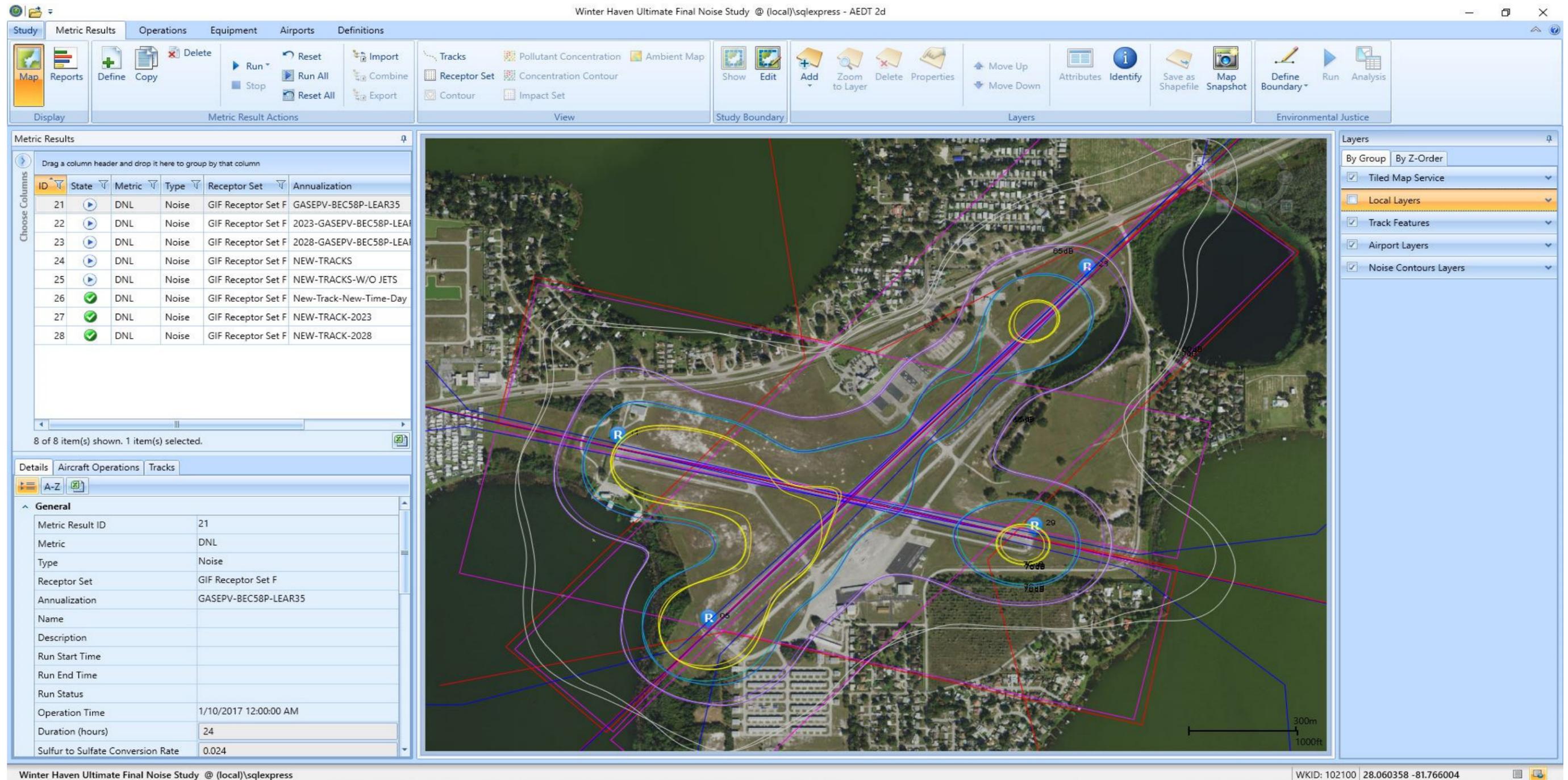
Source: AEDT 2D

## 5. Noise Software Used

The noise modelling software used for this study is the FAA's Aviation Environmental Design Tool (AEDT), which is a software recognized by the FAA for typical noise studies. "AEDT is a software system that dynamically models aircraft performance in space and time to produce fuel burn, emissions, and noise. Full flight gate-to-gate analyses are possible for study sizes ranging from a single flight at an airport to scenarios at the regional, national, and global levels. AEDT is currently used by the U.S. government to consider the interdependencies between aircraft-related fuel burn, noise and emissions" – FAA Aviation Environmental Design Tool (AEDT).

Figure 5-1 shows a snapshot of the program depicting the noise contours created with the 2017 operations at GIF.

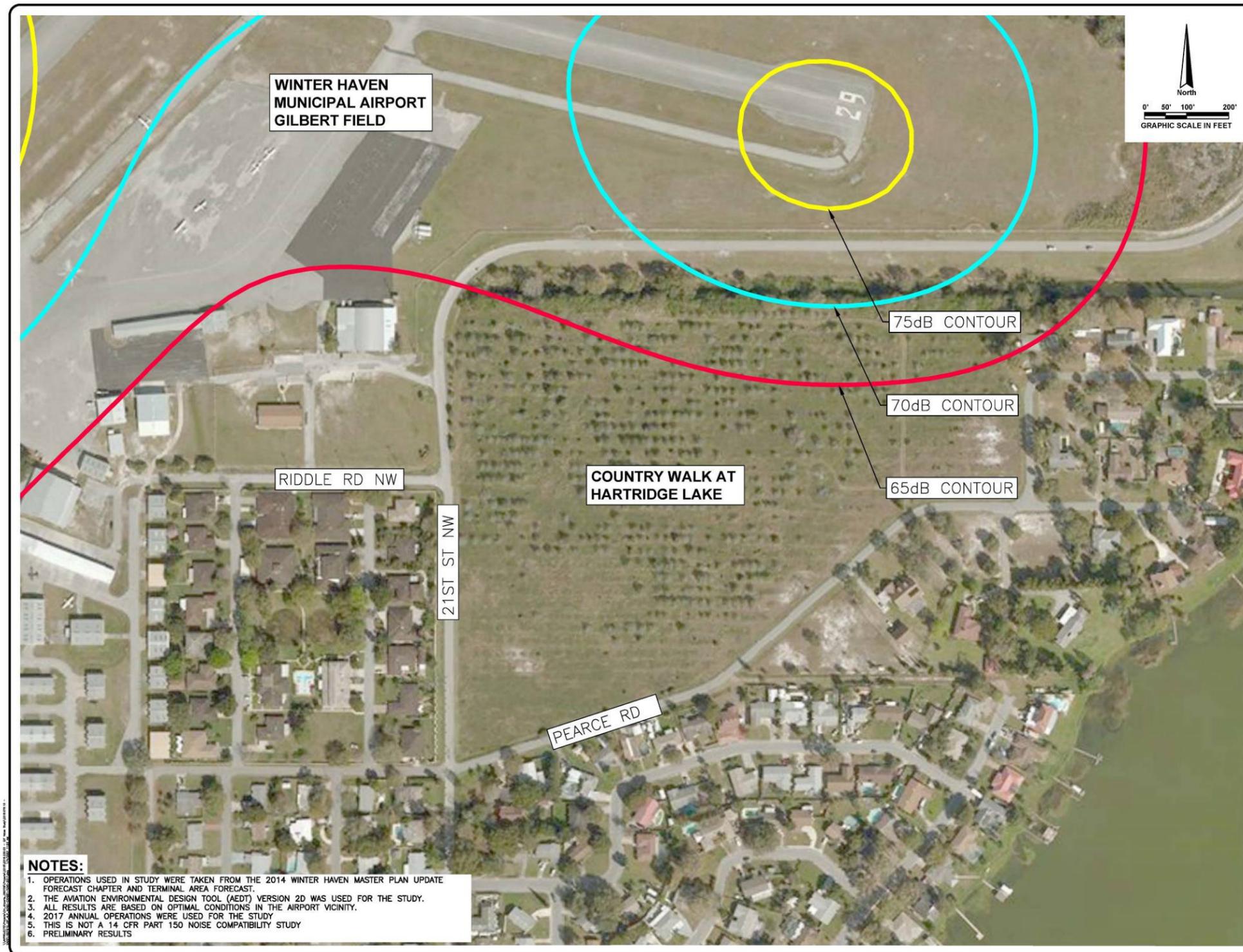
Figure 5-1  
AEDT 2d Noise Modeling Software



## 6. Results

The 65-DNL contour line was generated using the above referenced AEDT equivalent aircraft operations flown in 2017. The total duration of the study within AEDT constituted a full year. The 65-DNL contour line impacts the subject parcel of land on the north side of the parcel. Figure 6-1 and Figure 6-2 depict the 65-DNL contour line over the subject parcel of land and over the entire Airport respectively. In Appendix A, the results of the increased operations for years 2023 and 2028 can be found.

Figure 6-1  
2017 Noise Contours Over Subject Parcel



- NOTES:**
1. OPERATIONS USED IN STUDY WERE TAKEN FROM THE 2014 WINTER HAVEN MASTER PLAN UPDATE FORECAST CHAPTER AND TERMINAL AREA FORECAST.
  2. THE AVIATION ENVIRONMENTAL DESIGN TOOL (AEDT) VERSION 2D WAS USED FOR THE STUDY.
  3. ALL RESULTS ARE BASED ON OPTIMAL CONDITIONS IN THE AIRPORT VICINITY.
  4. 2017 ANNUAL OPERATIONS WERE USED FOR THE STUDY
  5. THIS IS NOT A 14 CFR PART 150 NOISE COMPATIBILITY STUDY
  6. PRELIMINARY RESULTS

**WINTER HAVEN**  
*The Chain of Lakes City*

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**NOISE STUDY**

**WINTER HAVEN GILBERT FIELD NOISE CONTOURS 2017**

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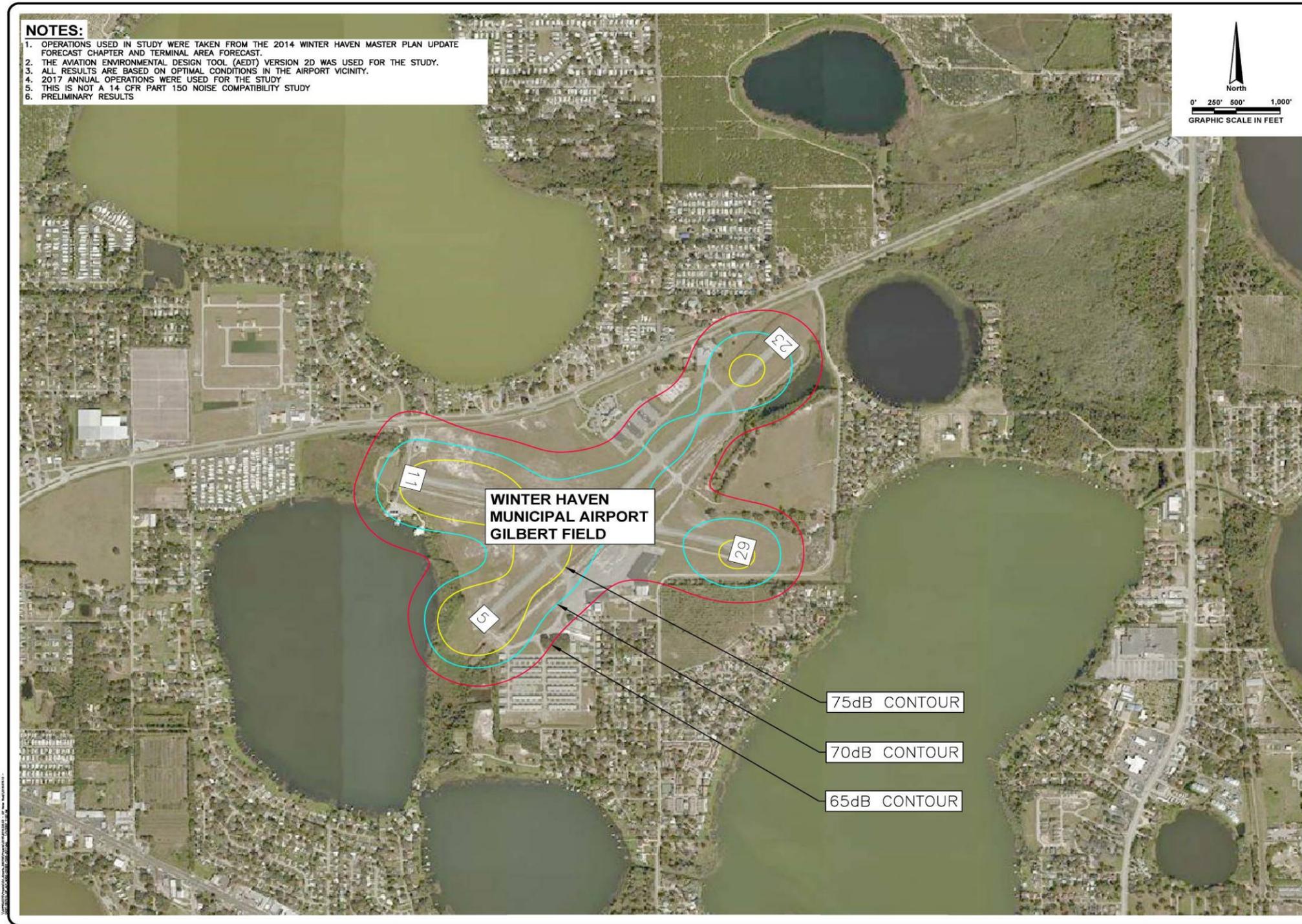
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Figure 6-2  
2017 Noise Contours Over Entire Airport



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2017**

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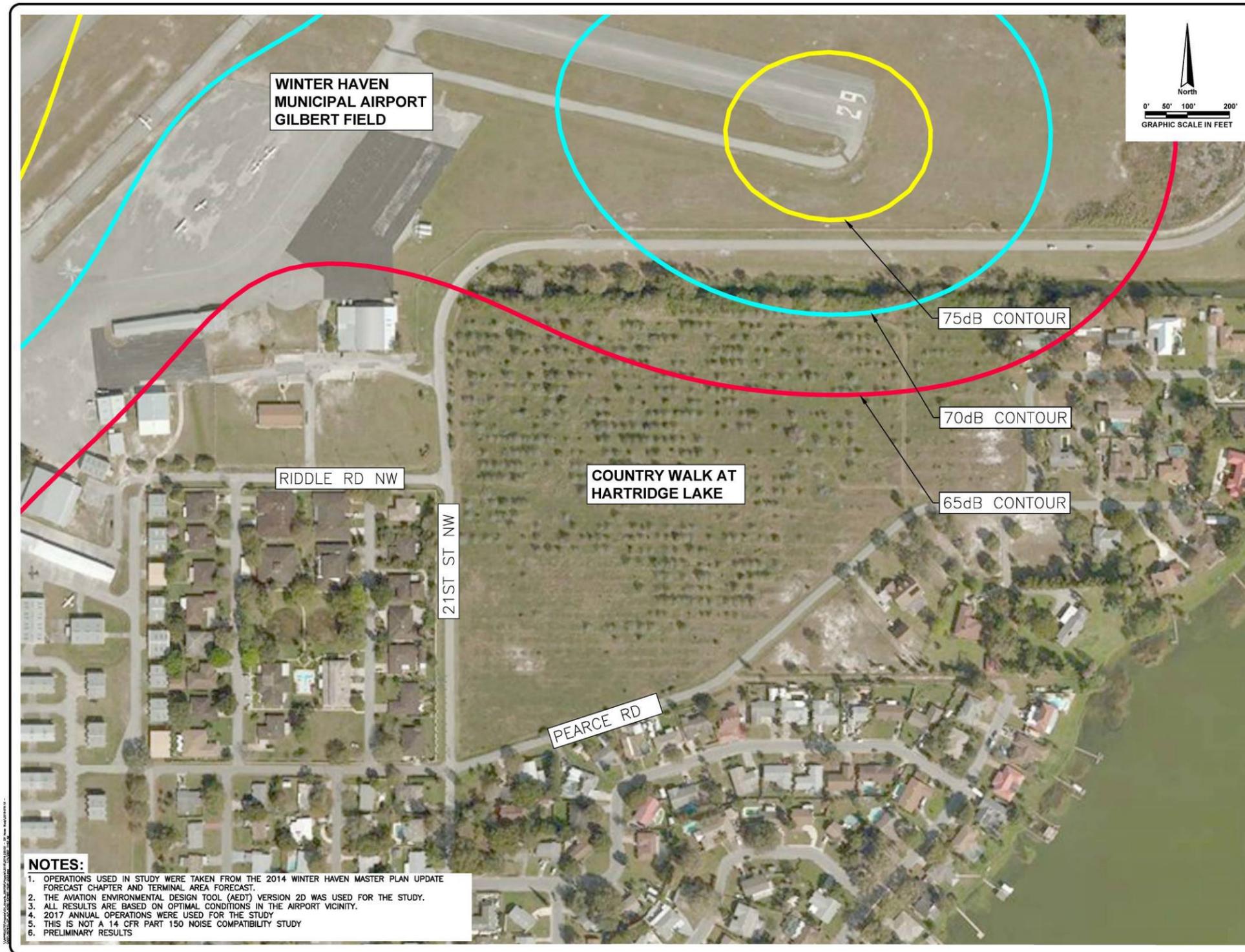
## 7. Conclusion

The 65-DNL contour line impacts the subject parcel of land along its northern edge. 14 CFR Part 150 recommends that no residential areas be located within the 65-DNL contour line. The FAA states: "The responsibility for determining the acceptable and permissible land uses ... rests with the local authorities ... (14 CFR) Part 150 is 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. " -14 CFR Part 150, Table 1.

Within the State of Florida, Chapter 333 of the Florida Statutes determines the compatibility of land uses to an airport. Chapter 333 states that unless an airport noise study has been studied in compliance with 14 CFR Part 150 or through another study approved by the FAA, new residential construction is not allowed within an oval area centered on each runway end. The width of the oval should be equal to one-half the length of the longest runway at the airport, centered on the centerline of the runway. This oval would cover the entire subject parcel. However, as this study has been developed using the FAA approved technology, it is believed that this study should be submitted to the FAA for review and potential approval. It is believed that based on the AEDT model, that at least a portion of the subject parcel could be developed for residential use.

## Appendix A

2023 Noise Contours Over Subject Parcel



- NOTES:**
1. OPERATIONS USED IN STUDY WERE TAKEN FROM THE 2014 WINTER HAVEN MASTER PLAN UPDATE FORECAST CHAPTER AND TERMINAL AREA FORECAST.
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  6. PRELIMINARY RESULTS

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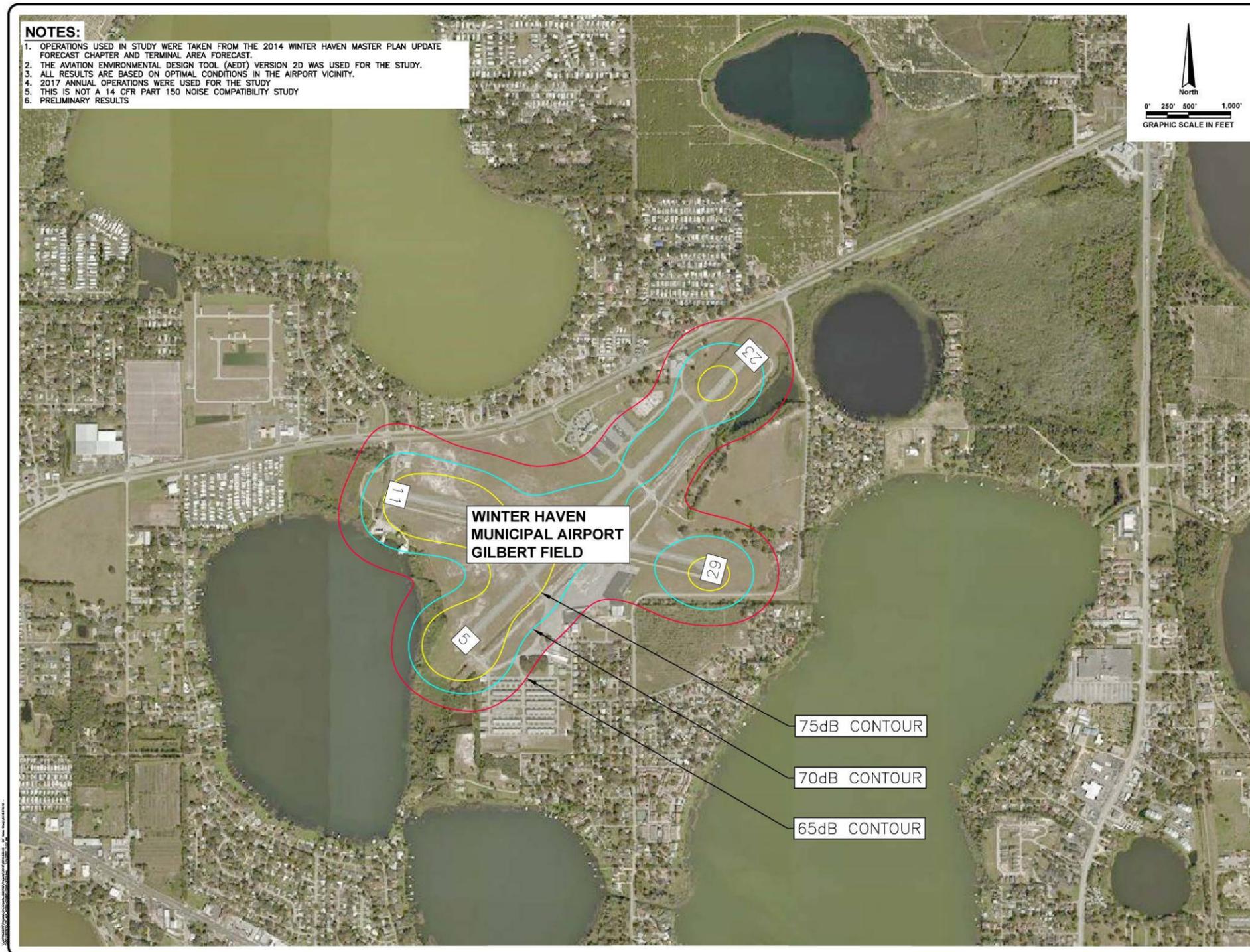
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2023 Noise Contours Over Entire Airport



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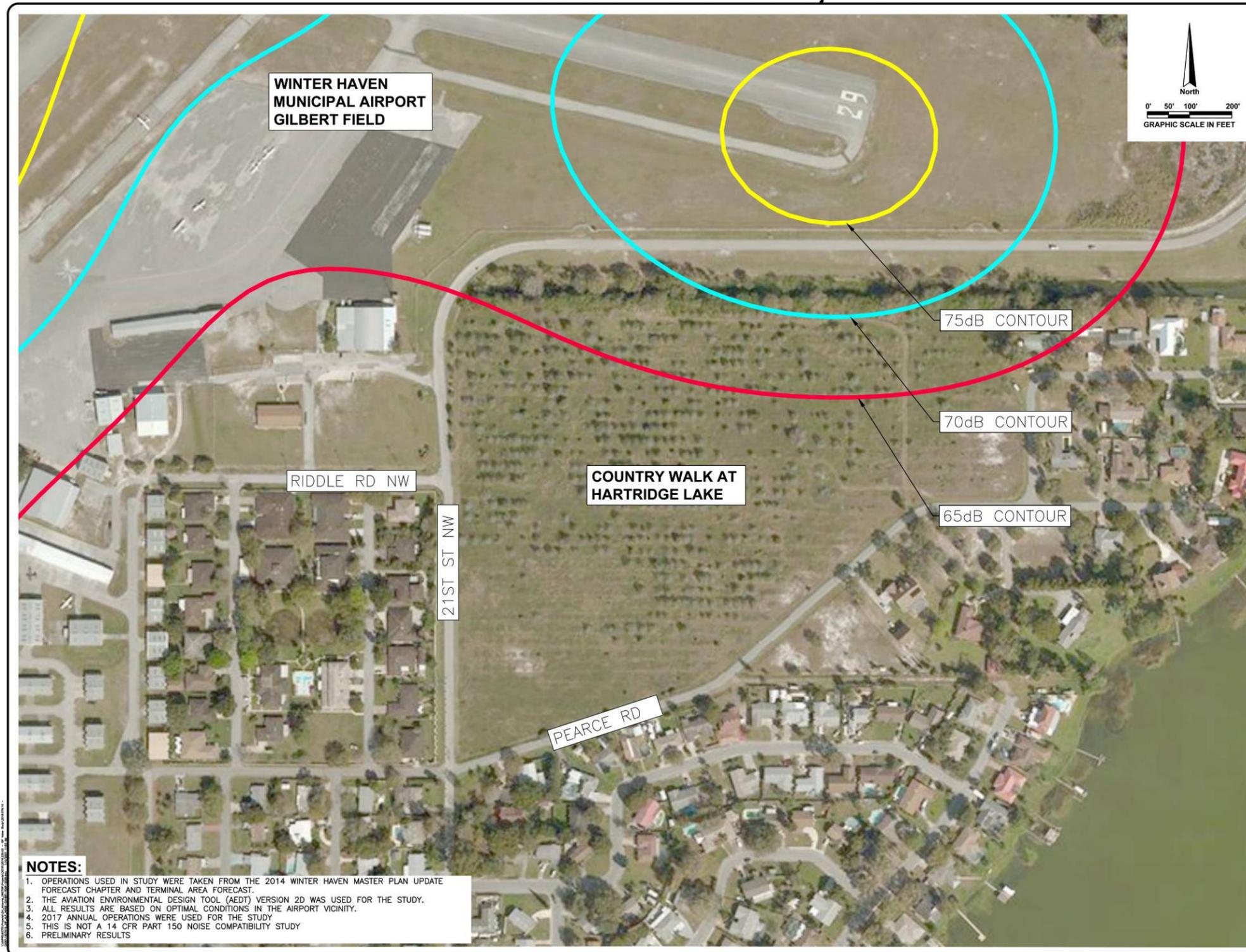
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**EX.3**

2028 Noise Contours Over Subject Parcel



- NOTES:**
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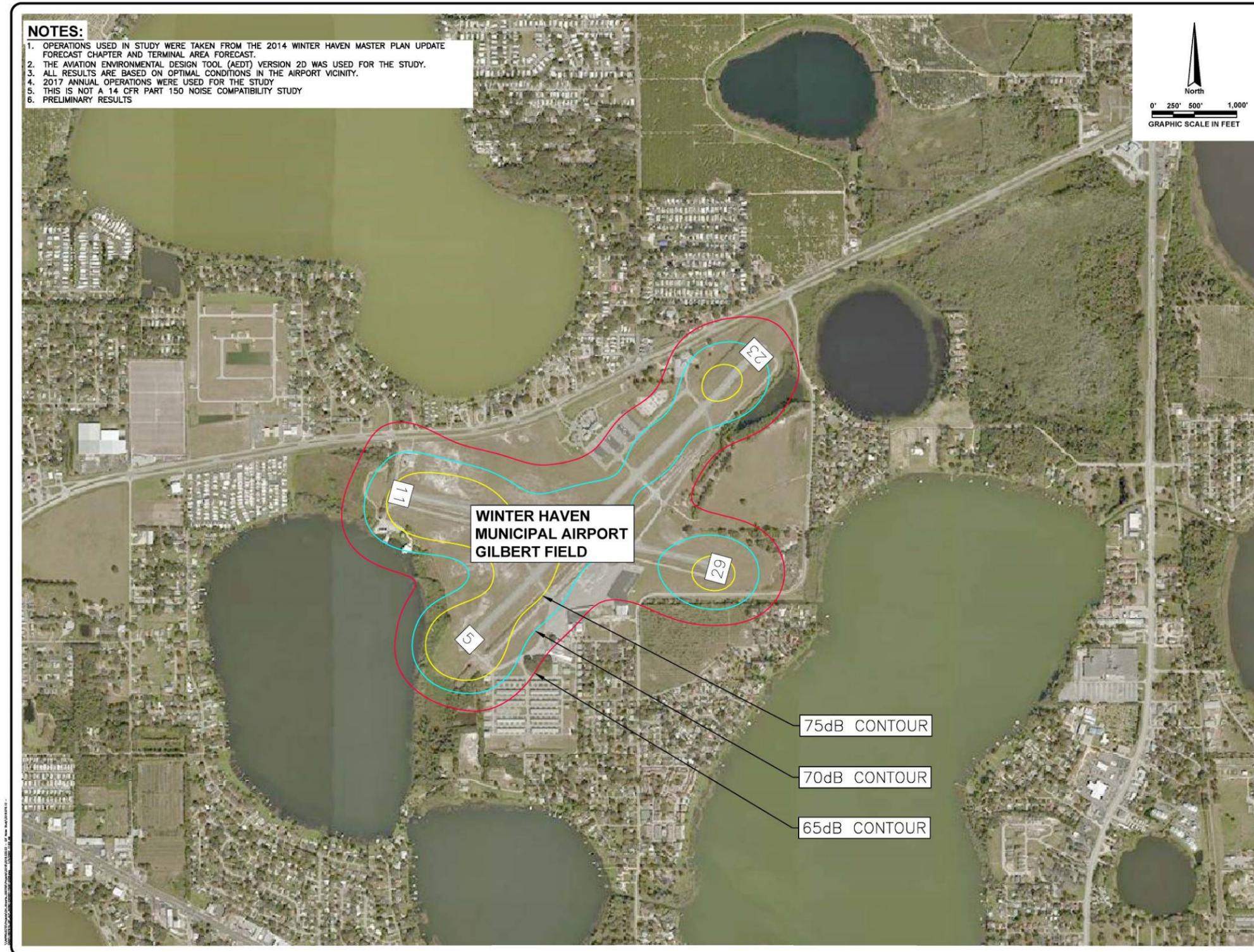
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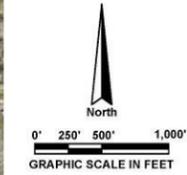
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2028 Noise Contours Over Entire Airport



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