
Appendix N: Noise Technical Report

Noise Technical Report

Manassas Regional Airport (HEF) Part 139 Certification and Terminal Redevelopment Environmental Assessment (EA)

PREPARED BY:



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Table of Contents

1. Introduction	1
2. Noise Metrics.....	1
3. FAA Noise Compatible Land Use Guidelines.....	2
4. Noise Modeling And Analysis.....	4
4.1 Noise Model	4
4.2 AEDT Input Data.....	4
4.3 2023 Existing Conditions	7
4.4 2036 No-Action Alternative	19
4.5 2036 Alternative #2.....	23
4.6 2041 No Action.....	31
4.7 2041 Alternative #2.....	35
5. Significance Threshold	43

List of Tables

Table 1: FAA Land Use Compatibility Guidelines.....	2
Table 2: Airfield Runway Dimensions - Existing (2023) Condition	5
Table 3: Helipad Location	5
Table 4: 2023 Existing Condition Annual Aircraft Operations	7
Table 5: Itinerant Fleet Mix and Operations – 2023 Existing Condition	7
Table 6: Local Fleet Mix and Operations – 2023 Existing Condition	9
Table 7: Operations by Time of Day – 2023 Existing Condition.....	9
Table 8: Runway Use – 2023 Existing Condition	9
Table 9: Departure Stage Lengths – 2023 Existing Condition	10
Table 10: Flight Track Use – 2023 Existing Condition.....	16
Table 11: 2036 No-Action Forecast Annual Aircraft Operations	19
Table 12: 2036 No-Action Forecast Itinerant Fleet Mix and Operations	19
Table 13: 2036 No-Action Forecast Local Fleet Mix and Operations	20
Table 14: 2036 Alternative #2 Forecast Annual Aircraft Operations.....	23
Table 15: 2036 Alternative #2 Forecast Itinerant Fleet Mix and Operations	23
Table 16: 2036 Alternative #2 Forecast Local Fleet Mix and Operations.....	25
Table 17: Operations by Time of Day - 2036 Alternative #2	25
Table 18: Runway Use – 2036 Alternative #2	26
Table 19: Departure Stage Length – 2036 Alternative #2.....	26
Table 20: Air Carrier Jet Flight Track Use – 2036 Alternative #2.....	28
Table 21: 2041 No-Action Forecast Annual Aircraft Operations	31
Table 22: 2041 No-Action Forecast Itinerant Fleet Mix and Operations	31
Table 23: 2041 No-Action Forecast Local Fleet Mix and Operations	32
Table 24: 2041 Alternative #2 Forecast Annual Aircraft Operations.....	35
Table 25: 2041 Alternative #2 Forecast Itinerant Fleet Mix and Operations	35
Table 26: 2041 Alternative #2 Forecast Local Fleet Mix and Operations.....	37
Table 27: Operations by Time of Day - 2041 Alternative #2	37
Table 28: Runway Use – 2041 Alternative #2	37
Table 29: Departure Stage Lengths – 2041 Alternative #2	38
Table 30: Commercial Flight Track Use– 2041 Alternative #2.....	40
Table 31: Aircraft Noise Stages – AEDT vs. Actual	44

List of Figures

Figure 1. Airport Layout.....	6
Figure 2. 2023 Existing Departure Tracks	13
Figure 3. 2023 Existing Arrival Tracks	14
Figure 4. 2023 Existing Touch-and-Go Tracks	15
Figure 5. 2023 Existing DNL 65-75 dBA Contours	18
Figure 6. 2036 No Action DNL 65-75 dB Contours.....	22
Figure 7a. 2036 Alternative #2 DNL 65-75 dBA Contours.....	29
Figure 8. 2041 No Action DNL 65-75 dB Contours.....	34

Figure 9a. 2041 Alternative #2 DNL 65-75 dB Contour	41
Figure 10. 2036 Alternative #2 and No Action DNL 65 dB Contours	45
Figure 11. 2041 Alternative #2 and No Action DNL 65 dB Contour	46

1. Introduction

The National Environmental Policy Act (NEPA) mandates the disclosure of potential impacts caused by a sponsor's proposed action for federally funded programs. In the context of airport improvements, the Federal Aviation Administration (FAA) has developed two key guidance documents--Order 1050.1G – *Environmental Impacts: Policies and Procedures* and Order 5050.4B – *NEPA Implementing Instructions for Airport Actions*. These documents provide direction and methodologies for evaluating aircraft noise.

This document, referred to as the *Noise Technical Report* provides the data, and describes the overall approach and methods to conducting the noise analysis for the Environmental Assessment (EA) of the Manassas Regional Airport (HEF) Part 139 Certification and Terminal Redevelopment.

The EA evaluates two Build Alternatives referred to as Alternative #1 and Alternative #2 (both are described in detail in the EA). As noted in the EA, there are no changes in aircraft operations associated with Alternative #1. Under Alternative #2, it is anticipated that there will be changes in airport activity levels associated with the introduction of commercial aircraft operations. Therefore, only Alternative #2 is analyzed in this report. The noise analysis for the Alternative #2 was necessitated by the potential changes in runway utilization, which could lead to shifts in the noise contours and potentially introduce new non-compatible land use within HEF's Day-Night Level (DNL)¹ 65 decibel (dB)² contour.

The noise analysis presented in this appendix used the FAA's Aviation Environmental Design Tool (AEDT), Version 3f, the latest version at the time the analysis was performed. The FAA requires the use of AEDT to ensure a consistent review of NEPA-required noise assessments. Numerous input parameters are needed to execute the AEDT model, including the configuration of an airport's runways, the number of operations by aircraft type and time of day, and meteorological data. As noted on the FAA's website for AEDT:

*"AEDT is a software system that models aircraft performance in space and time to estimate fuel consumption, emissions, noise, and air quality consequences. AEDT is a comprehensive tool that provides information to FAA stakeholders on each of these specific environmental impacts. AEDT facilitates environmental review activities required under NEPA by consolidating the modeling of these environmental impacts in a single tool."*³

The following sections describe the metrics used to evaluate aircraft noise, the guidelines by which a noise impact would be identified, and the results of the aircraft noise assessment.

2. Noise Metrics

Sound is energy transferred through the air that our ears detect as small changes in air pressure - the more sound energy, the louder the sound. Noise, in its simplest definition, is unwanted sound. Because noise is subjective, some sounds, like a distant train whistle, can be pleasant for some, while others may be annoyed and consider it noise. The time at which the sound occurs also contributes to its relative annoyance. For instance, a person who likes train whistles may be annoyed by this same sound if it happens in the middle of the night while trying to sleep. Even sounds that are pleasant at one volume can become noise as they get louder. Noise has an objective, physical, and subjective non-physical component that considers a person's perception or reaction to a sound.

¹ A Day-Night Level (DNL) is an enhancement of the equivalent sound level (Leq) metric through the addition of a 10 dB penalty for nighttime (10pm – 7am) noise intrusion.

² A Decibel (dB) represents a relative measure or ratio to a reference sound pressure.

³ FAA, 2023, Aviation Environmental Design Tool: <https://aedt.faa.gov/>

The human ear hears sound pressures over a wide range. When measured on a logarithmic scale⁴, a dB level corresponds to how our ears interpret sound pressure levels. The human ear also responds to different pitches or frequencies of sound differently. We are less able to hear low frequencies like the rumble of thunder but more readily able to hear high frequencies like a baby's cry. The A-weighted measurement scale is used to better account for differences in how people respond to sound. This scale most closely approximates the relative loudness of sounds in the air as perceived by the human ear. It provides a more effective way to evaluate the effect of noise exposure on humans by focusing on those parts of the frequency spectrum where we hear most.

A DNL reflects a person's cumulative exposure to sound over 24 hours, expressed as the noise level for an average day of a year. DNL provides a mechanism to measure environmental noise uniformly. DNLs consider the amount of noise from each aircraft operation and the total number of operations throughout the day. The FAA and other federal agencies use DNL as the primary measure of aircraft noise impact because DNLs correlate well with the results of attitudinal surveys regarding noise. DNLs also account for the increased sensitivity to noise at night by artificially increasing each noise event that occurs during nighttime hours (i.e., 10:00 pm to 6:59 am) by 10 dB.

To illustrate the extent of aircraft noise surrounding an airport, DNL contour lines of 65, 70, and 75 dB are overlaid on maps. Like topographical maps showing terrain elevation in an area, the noise "contours" help compare changes to aircraft noise exposure in communities adjacent to an airport. The shape of the noise contours depends on many factors, including the number and type of aircraft arriving and departing over an area, the time of day that the aircraft operations occur, and the use of an airport's runways.

3. FAA Noise Compatible Land Use Guidelines

The FAA's guidelines establish the compatibility of various land uses with differing levels of aircraft noise. These guidelines are defined in Appendix A to Title 14, Part 150 of the Code of Federal Regulations (14 CFR Part 150). The FAA's land use compatibility table is provided in **Table 1**. These guidelines show the compatibility parameters for land uses such as residences, schools, churches, nursing homes, hospitals, and libraries. Notably, all land uses exposed to aircraft noise levels below DNL 65 dB are considered compatible land uses.

Land Use	Average Daily DNL (Expressed In DB)					
	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

⁴ A logarithmic scale is a method used to display numerical data that spans a broad range of values, especially when there are significant differences between the magnitudes of the numbers involved.

Table 1: FAA Land Use Compatibility Guidelines						
Land Use	Average Daily DNL (Expressed In DB)					
	Below 65	65 70	70 75	75 80	80 85	Over 85
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, Businesses 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
Communications	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
Agricultural (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 1: FAA Land Use Compatibility Guidelines

Land Use	Average Daily DNL (Expressed In DB)					
	Below 65	65 70	70 75	75 80	80 85	Over 85
<p>(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 and 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 dBA 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.</p> <p>(2) Measures to achieve NLR 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.</p> <p>(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.</p> <p>(4) Measures to achieve NLR 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 level is low.</p> <p>(5) Land use compatible provided special sound reinforcement systems are installed.</p> <p>(6) Residential buildings require an NLR of 25.</p> <p>(7) Residential buildings require an NLR of 30.</p> <p>(8) Residential buildings not permitted.</p> <p>Notes:</p> <p>1. The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable 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.</p> <p>2. SLUCM=Standard Land Use Coding Manual.</p> <p>3. Y (Yes)=Land Use and related structures compatible without restrictions.</p> <p>4. N (No)=Land Use and related structures are not compatible and should be prohibited.</p> <p>5. NLR=Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.</p> <p>6. 25 or 30=Land use and related structures generally compatible; measures to achieve Noise Level Reduction of 25 or 30 dB (i.e., a weighted sound level) must be incorporated into design and construction of structure. Noise Level Reduction is the amount of noise reduction in decibels achieved through incorporation of building sound insulation treatments (between outdoor and indoor levels) in the design and construction of a structure (14 CFR § 150.7). Building sound insulation treatments typically consist of acoustical replacement windows and doors.</p> <p>Sources: 14 CFR. Part 150 Airport Noise Compatibility Planning, Appendix A, Table 1.</p>						

4. Noise Modeling and Analysis

This section provides the HEF-specific flight data that was developed for use in AEDT and presents the AEDT-derived aircraft noise contours. The data and contours are provided for existing (Year 2023) conditions and future (Years 2036 and 2041) forecast conditions with Alternative #2 and without (i.e., the No Action). The year 2036 reflects the first full year of activity after completion of the planned passenger terminal and 2041 reflects conditions five years from the first full year of completion.

4.1 Noise Model

As previously stated, AEDT is used to develop DNL contours to assess the noise exposure for NEPA actions. AEDT calculates noise exposure through a ground-level grid point analysis around the study airport. The program computes the shortest path from each grid point to each flight track and calculates the noise exposure generated by each aircraft operation along each flight track. AEDT applies corrections to account for atmospheric acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft, and airplane speed variations. The noise exposure levels for each aircraft are then totaled at each grid location. The cumulative noise exposure levels at all grid points are then used to develop noise exposure contours for selected values (e.g., DNL 65, 70, and 75 dB).

4.2 AEDT Input Data

In the process of developing DNL contours, the AEDT considers both hard-coded and airport operations-specific factors. The hard-coded factors are part of the aircraft performance model assumptions. These include engine noise levels, thrust settings, aircraft arrival and departure flight profiles, and aircraft speed.

The airport operation-specific factors include local meteorological conditions, the number of aircraft operations, the aircraft type/engine combinations, runway use, and the assignment of aircraft operations to flight tracks, and operational time (day/night) during which operations occur. The following describes this airport-specific data.

4.2.1 Meteorological Data

The AEDT models the influences of meteorological conditions on aircraft performance and atmospheric sound absorption. The AEDT utilizes temperature, pressure, and relative humidity measurements to calculate atmospheric absorption coefficients of aircraft noise, which are used to adjust aircraft performance and sound propagation through the air. This study utilized the 10-year average (2013 – 2022) meteorological conditions within AEDT’s databases for HEF to calculate DNL. These meteorological conditions were:

- Temperature: 55.9 Fahrenheit
- Barometric Pressure: 1010.7 inches
- Relative Humidity: 73.8 percent

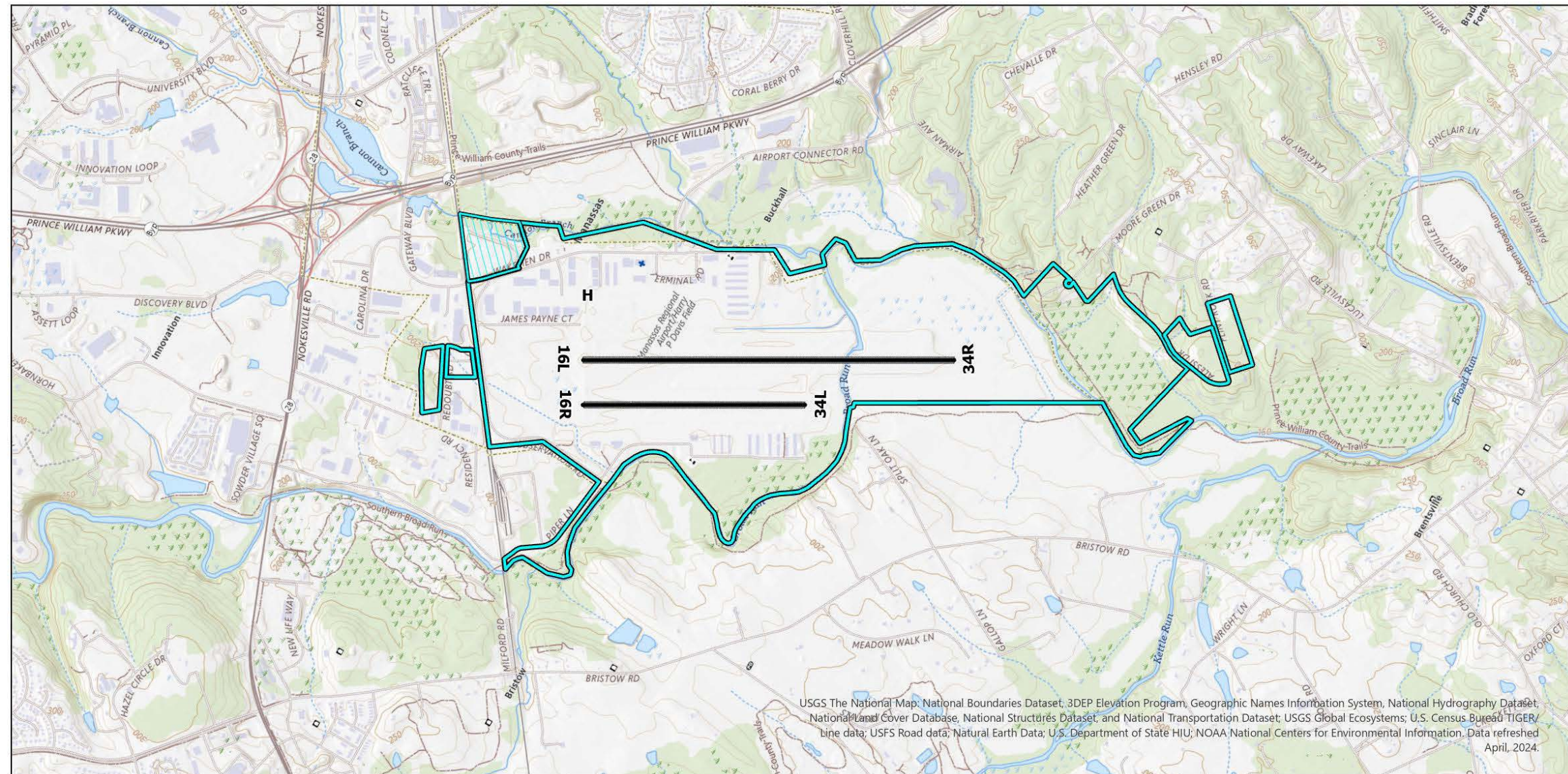
4.2.2 Airfield Data

HEF has two northwest/southeast parallel runways (16L/34R, 16R/34L). Runway 16L/34R is the longest runway on the airfield at 6,200 feet. **Table 2** and **Table 3** list the length and width of the two runways and identify the location of the helipad at HEF. **Figure 1** illustrates the location of the runways and helipad.

Table 2: Airfield Runway Dimensions Existing (2023) Condition		
Runway	Runway Length (Feet)	Runway Width (Feet)
16L/34R	6,200	100
16R/34L	3,715	75
Source: AEDT version 3f.		

Table 3: Helipad Location		
Name	Latitude	Longitude
Helipad	38.729027	-77.515471
Source: AEDT version 3f.		

Figure 1. Airport Layout



Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Sources: CMT, Inc., 2025.

4.3 2023 Existing Conditions

4.3.1 Input Data

This section presents and discusses the data used to evaluate aircraft noise for existing, year 2023, conditions at HEF. In 2023, there were 102,414 annual operations (an average of 281 daily operations). The annual operations, by operator category, are provided in **Table 4**. Aircraft operations data, including specific aircraft types (International Civil Aviation Organization (ICAO) aircraft codes), were extracted from Virtower an airport operations tracking system. The data were reviewed, and each aircraft type was assigned a corresponding AEDT aircraft/engine.

Year	Air Carrier	Air Taxi and Commuter	GA Itinerant	Military Itinerant	GA Local	Military Local	Total Operations
2023	0	18,644	35,405	1,951	46,391	23	102,414

GA – General aviation
Sources: FAA Air Traffic Activity System (ATADS), September 2024.

4.3.2 Fleet

The number of 2023 itinerant and local aircraft operations by the type of aircraft engine propulsion is provided in **Table 5** and **Table 6**, respectively. The AEDT uses the average daily operations data to calculate DNLs. Generally, any aircraft type whose average daily operations are below 1.0 is operationally insignificant from a modeling perspective unless it is very loud. For example, the Boeing F/A-18 Hornet only has 0.06 average daily operations but was included due to its outsized noise footprint.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
General Aviation/Military Jet	6104	Embraer Phenom 100 (EMB-500)	CNA510	796	2.18
	5346	Bombardier Challenger 650	CL600	738	2.02
	6060	Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	652	1.78
	1925	Gulfstream G550	GV	546	1.50
	4917	Embraer Phenom 300 (EMB-505)	CNA55B	514	1.42
	1238	Bombardier Challenger 300	CL600	482	1.32
	2026	Bombardier Learjet 60	LEAR35	460	1.26
	1319	Dassault Falcon 50-EX	FAL900EX	460	1.26
	6108	Cirrus SF-50 Vision	ECLIPSE500	448	1.22
	1921	Gulfstream G450	GIV	426	1.16
	1789	McDonnell Douglas A-4 Skyhawk ¹	A4C	208	0.58
Turboprop	1489	Pilatus PC-12	CNA208	4,276	11.72
	1483	Raytheon Super King Air 200	DHC6	916	2.50

Table 5: Itinerant Fleet Mix and Operations 2023 Existing Condition					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
	6301	Beechcraft T-6 Texan 2 (FAS)	CNA208	756	2.06
	5996	Raytheon Super King Air 300	DHC6	506	1.38
	6332	Socata TBM-9 (FAS)	CNA208	376	1.02
	1465	Piper PA46-TP Meridian	CNA208	286	0.78
	4893	Raytheon Beech 99	DHC6	24	0.06
	1221	Lockheed C-130 Hercules	C130	24	0.06
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	12,308	33.72
	1265	Cessna 172 Skyhawk	CNA172	11,210	30.72
	6649	Diamond DA20	CNA172	3,918	10.74
	6286	Diamond DA40	GASEPV	2,350	6.44
	1882	Cessna 150 Series	GASEPF	2,084	5.72
	1262	Cessna 182	CNA182	1,578	4.32
	6263	Cessna 162 (FAS)	GASEPF	1,394	3.82
	3178	Piper PA-28 Cherokee Series	PA28	956	2.62
	6281	Cirrus SR22 Turbo (FAS)	COMSEP	892	2.44
6330	Vans RV-7	GASEPV	706	1.94	
Helicopter	1	Robinson R22	R22	3,874	10.62
	3161	Robinson R44 Raven / Lycoming O-540-F1B5)	R44	948	2.60
	4125	Bell 429	B429	654	1.80
	4097	Eurocopter EC-T2 (CPDS)	EC130	210	0.58
Total:				56,000	153
<p>ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. General Aviation operations are conducted in accordance with FAR Part 91 for personal or business reasons, and the operator may not operate for-hire flights. Air Taxi operations are conducted in accordance with FAR Part 135 as on-demand/charter flights in an aircraft with 30 or fewer passenger seats and a payload capacity of 7,500 lb. or less. Military operations are excluded from the Virtower system for national security reasons. This data was derived from data provided by the Manassas Airport and RS&H Noise Study Report, 2002. (1) This aircraft was a substitution for the BAE Hawk/L39 Albatross, which is applied by AEDT for this aircraft. Source: Manassas Regional Airport Virtower System, January 1, 2023 – December 31, 2022; CMT, Inc., 2025.</p>					

Table 6: Local Fleet Mix and Operations 2023 Existing Condition					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	25,628	70
	1265	Cessna 172 Skyhawk	CNA172	16,634	46
	6319	Piper PA-44-180 (FAS)	PA30	4,152	11
Total:				46,414	127

ANP – Aircraft Noise and Performance data.
 Note: Annual and Average Day operations may not equal the total due to rounding. In Order JO 7210.3DD – Facility Operation and Administration, the FAA defines an itinerant operation as one count for an IFR or VFR flight that either takes off or lands. A local operation is defined as two counts for each low approach below traffic pattern altitude that is a stop-and-go or touch-and-go operation (a takeoff and a landing). However, the AEDT User Manual defines an aircraft operation as a single flight of an aircraft (takeoff, landing, circuit, touch-and-go, or overflight). This difference in tabulation methods affects the total local operations count input into AEDT. Using the data contained in Table 4 extracted from the FAA's Air Traffic Activity System (ATADS), 46,414 local operations were recorded at HEF Airport in 2023. As a result, the total number of local operations input in the AEDT would be 23,207, half the amount of the FAA reported figure as shown in Table 6.
 Source: Manassas Regional Airport Virtower System, January 1, 2023 – December 31, 2023; CMT, Inc., 2025.

4.3.3 Time of Day

The FAA defines nighttime operations for noise analysis as those occurring between 10:00 PM and 6:59 AM. During this period, all flights (takeoff, landing, or touch-and-go) are assigned a 10-dB penalty when calculating DNL to account for the increased likelihood of community annoyance and potential sleep disturbance. **Table 7** provides the day/night percentages of flight operations (i.e., departures and arrivals) by aircraft propulsion category. The overall average of day/night operations is also provided. As shown, in 2023 94 percent (%) of the flight operations occurred during daytime hours, and 6% occurred at night.

Table 7: Operations by Time of Day 2023 Existing Condition								
Aircraft Propulsion	Percent of Departures				Percent of Arrivals			
	Day		Night		Day		Night	
	7:00 AM	9:59 PM	10:00 PM	6:59 AM	7:00 AM	9:59 PM	10:00 PM	6:59 AM
GA/Military	95%		5%		95%		5%	
Turboprop	94%		6%		92%		8%	
Piston	99%		1%		99%		1%	
Helicopter	89%		11%		91%		9%	
Overall	94%		6%		94%		6%	

Notes: GA/Military = General Aviation and Military Jets
 The FAA defines nighttime for the purposes of NEPA noise studies as any operation occurring between 10:00 PM – 6:59 AM.
 Source: Manassas Regional Airport Virtower System, January 1, 2023 – December 31, 2023; CMT, Inc., 2025.

4.3.4 Runway Use

The data presented in **Table 8** represents an average day in 2023 and considers all operations from the 2023 calendar year at HEF from all runway ends. As shown, 100% percent of the jet and turboprop operations were on the longer and wider primary runway - Runway 16L/34R.

Table 8: Runway Use 2023 Existing Condition					
Aircraft Propulsion	Percent use by Runway				Total
	16L	34R	16R	34L	
Departure Day (7:00 AM – 9:59 PM)					
GA/Military	40%	60%	-	-	100%
Turboprop	50%	50%	-	-	100%

Aircraft Propulsion	Percent use by Runway				Total
	16L	34R	16R	34L	
Piston	29%	37%	16%	18%	100%
Departure Night (10:00 PM – 6:59 AM)					
GA/Military	50%	50%	-	-	100%
Turboprop	25%	75%	-	-	100%
Piston	44%	29%	5%	22%	100%
Arrival Day (7:00 AM – 9:59 PM)					
GA/Military	44%	56%	-	-	100%
Turboprop	60%	40%	-	-	100%
Piston	31%	36%	15%	19%	100%
Arrival Night (10:00 PM – 6:59 AM)					
GA/Military	46%	54%	-	-	100%
Turboprop	78%	22%	-	-	100%
Piston	46%	29%	14%	12%	100%

Note: GA/Military = General Aviation and Military Jets
Source: Manassas Regional Airport Virtower System, January 1, 2023 – December 31, 2023; CMT, Inc., 2025.

4.3.5 Departure Stage Length

Departure stage lengths are used in AEDT to account for variations in aircraft takeoff weight based on the flying distance in nautical miles between the origin airport (HEF) and the planned destination. The further the destination from HEF, the more fuel the aircraft requires. The extra fuel affects the aircraft's climb performance. A heavier airplane uses more runway to take off and climbs slower. AEDT uses stage (i.e., trip) lengths to account for the variations in aircraft departure weight. The departure stage lengths used in AEDT for the 2023 Existing Condition are presented in **Table 9**. Notably, the stage lengths in Table 10 are the maximum stage lengths in AEDT for each of the aircraft types.

Aircraft Type(s)	AEDT ANP ID	Percent Stage Length			Total
		Stage 1	Stage 2	Stage 3	
		<500 NM	501 1,000 NM	1,001 1,500 NM	
General Aviation/Military Jet					
Embraer Phenom 100 (EMB-500)	CNA510	100%	-	-	100%
Bombardier Challenger 650	CL600	100%	-	-	100%
Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	100%	-	-	100%
Gulfstream G550	GV	100%	-	-	100%
Embraer Phenom 300 (EMB-505)	CNA55B	100%	-	-	100%
Bombardier Challenger 300	CL600	100%	-	-	100%
Bombardier Learjet 60	LEAR35	100%	-	-	100%
Dassault Falcon 50-EX	FAL900EX	-	-	100%	100%
Cirrus SF-50 Vision	ECLIPSE500	-	-	100%	100%
Gulfstream G450	GIV	100%	-	-	100%
McDonnell Douglas A-4 Skyhawk	A4C	100%	-	-	100%

Table 9: Departure Stage Lengths 2023 Existing Condition					
Aircraft Type(s)	AEDT ANP ID	Percent Stage Length			
		Stage 1	Stage 2	Stage 3	Total
		<500 NM	501 1,000 NM	1,001 1,500 NM	
Boeing F/A-18 Hornet	F-18	100%	-	-	100%
Turboprop					
Pilatus PC-12	CNA208	100%	-	-	100%
Raytheon Super King Air 300	DHC6	100%	-	-	100%
Socata TBM-9 (FAS)	CNA208	100%	-	-	100%
Piper PA46-TP Meridian	CNA208	100%	-	-	100%
Raytheon Super King Air 200	DHC6	100%	-	-	100%
Beechcraft T-6 Texan 2 (FAS)	CNA208	100%	-	-	100%
Raytheon Beech 99	DHC6	100%	-	-	100%
Lockheed C-130 Hercules	C130	-	100%	-	100%
Piston					
Piper PA-28 Cherokee Series	GASEPF	100%	-	-	100%
Cessna 172 Skyhawk	CNA172	100%	-	-	100%
Diamond DA20	CNA172	100%	-	-	100%
Diamond DA40	GASEPV	100%	-	-	100%
Cessna 150 Series	GASEPF	100%	-	-	100%
Cessna 182	CNA182	100%	-	-	100%
Cessna 162 (FAS)	GASEPF	100%	-	-	100%
Piper PA-28 Cherokee Series	PA28	100%	-	-	100%
Cirrus SR22 Turbo (FAS)	COMSEP	100%	-	-	100%
Vans RV-7	GASEPV	100%	-	-	100%
Helicopter					
Robinson R22	R22	100%	-	-	100%
Robinson R44 Raven / Lycoming O-540-F1B5)	R44	100%	-	-	100%
Bell 429	B429	100%	-	-	100%
Eurocopter EC-T2 (CPDS)	EC130	100%	-	-	100%
ANP – Aircraft Noise and Performance data.					
Note: Flight stage lengths were calculated using the Great Circle Mapper (www.gcmap.com). The AEDT 3f aircraft database does not include departure profiles >1 for most general aviation aircraft. The only GA aircraft in the study fleet mix with an available departure profile in the AEDT >1 are the Dassault Falcon 50-EX, Cirrus SF-50 Vision, and Lockheed C-130 Hercules. The highest available stage length was utilized in these cases, as reflected in the chart. The AEDT does not model every aircraft type for the purposes of noise analysis; this is reflected in the ANP ID, which may not match the aircraft type description. For example, the Bombardier Learjet 60 maps to the LEAR35 in AEDT. In these cases, the AEDT airplane is a surrogate for the specific aircraft type not currently modeled in the application.					
Source: Manassas Regional Airport Virtower System, January 1, 2023 – December 31, 2023; CMT, Inc., 2025.					

4.3.6 Flight Tracks

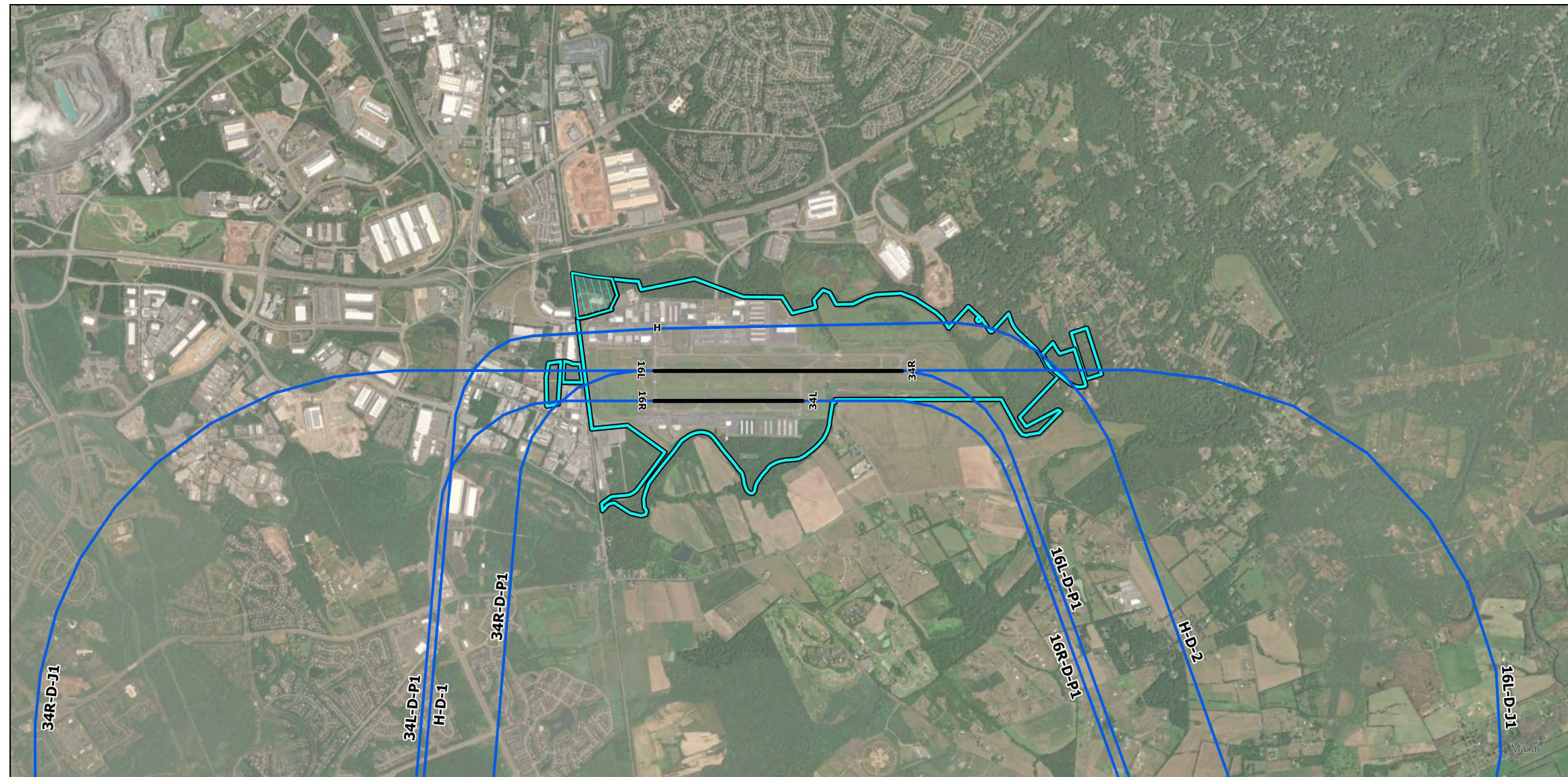
The AEDT uses airport-specific ground tracks and vertical flight profiles to compute three-dimensional flight paths for each modeled aircraft operation. The “default” AEDT vertical profiles, which consist of altitude, speed, and thrust settings, are compiled from data provided by aircraft manufacturers.

Representative flight tracks for general aviation jet/turboprop and piston engine aircraft arrivals and departures were developed from Geographic Information System (GIS) flight track data provided by Manassas Airport staff. The modeled departure, arrival, and touch-and-go flight tracks are depicted in **Figure 2**, **Figure 3**, and **Figure 4**, respectively.

Specific aircraft types were assigned to flight tracks based on flight performance characteristics and operational information derived from Virtower data. For instance, due to their higher takeoff/climb speed, aircraft mass, and larger minimum turn radius, jet airplanes could not be assigned to the tighter departure tracks utilized by piston airplanes.

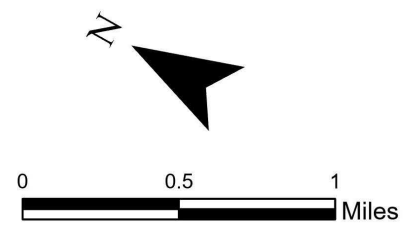
The AEDT aircraft track usage, obtained from HEF's NOMS for the period January 1, 2023, through December 31, 2023, is presented in **Table 10**. The track names identify the runway, whether the track is for arrivals or departures, and the engine propulsion of the aircraft on a track (e.g., 16LAJ are jet arrivals on Runway 16L).

Figure 2. 2023 Existing Departure Tracks



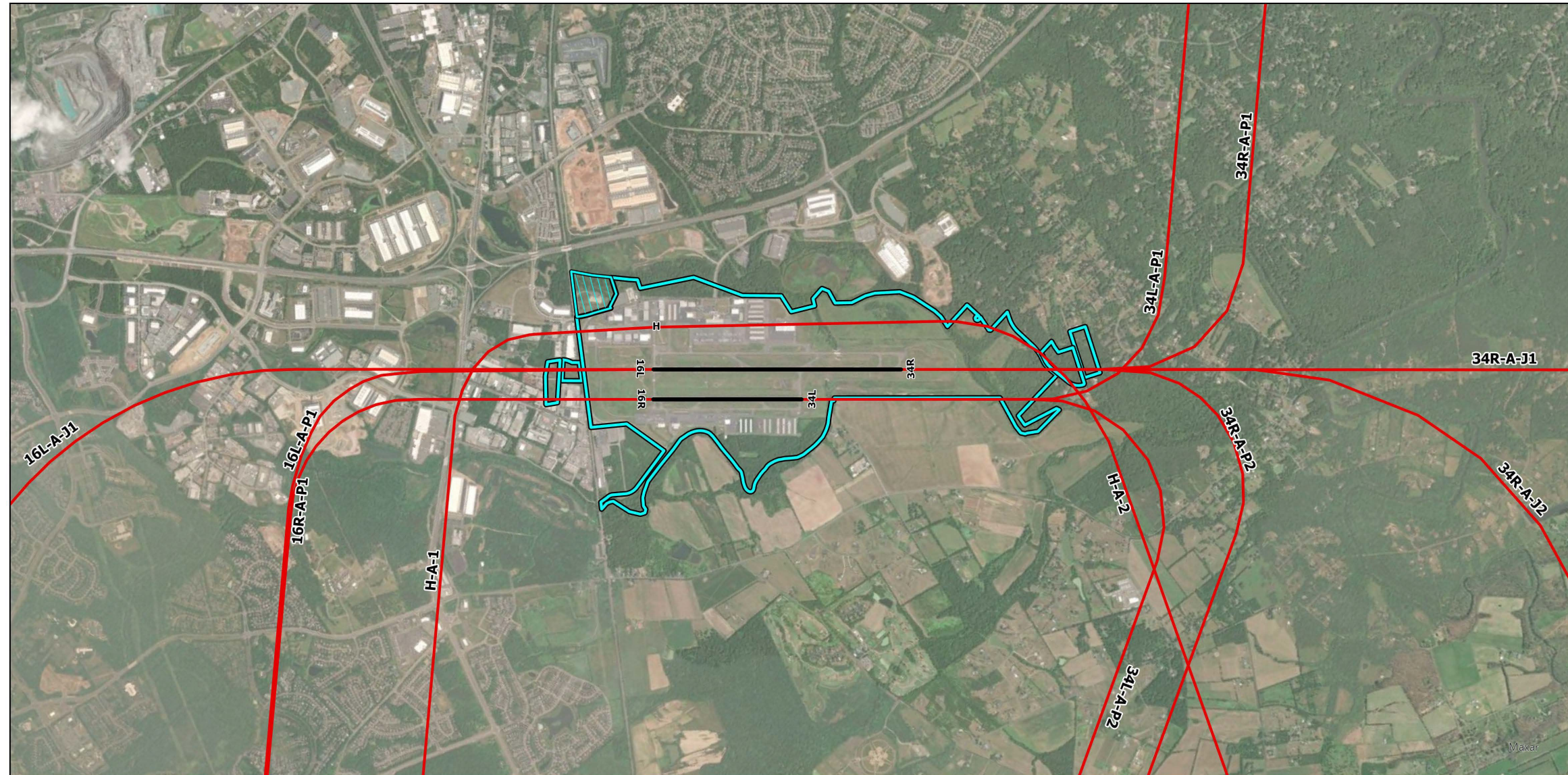
- Runway
- Departure Track
- Airport Property
- Amazon Data Center Parcel

**Manassas Regional Airport PART 139
Certification and Terminal Redevelopment**



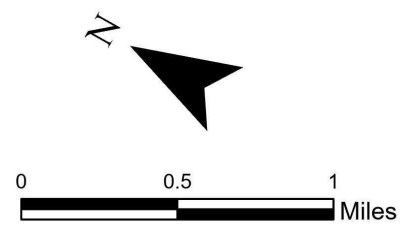
Sources: CMT, Inc., 2025.

Figure 3. 2023 Existing Arrival Tracks



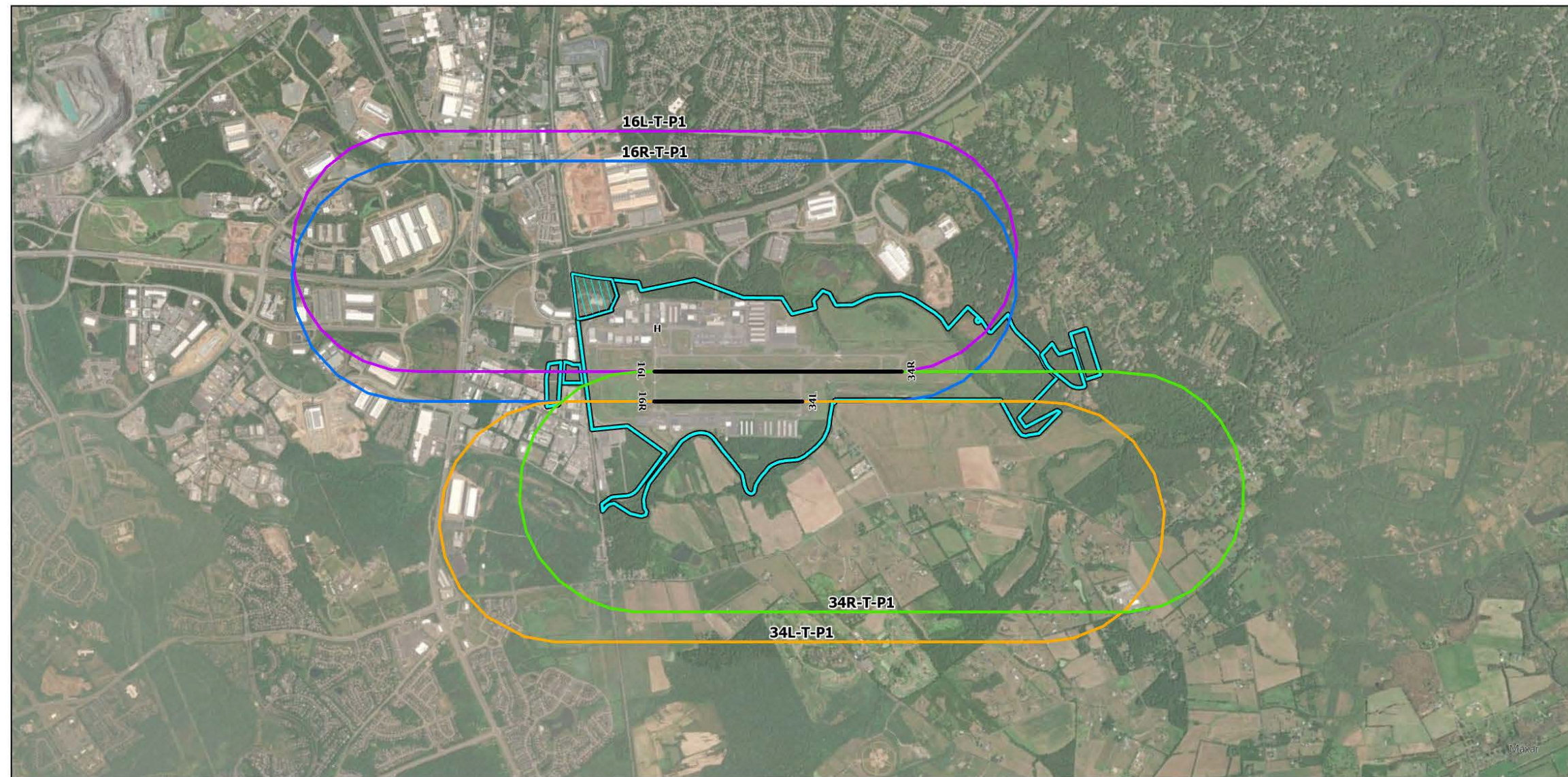
- Runway
- Arrival Track
- ▭ Airport Property
- ▨ Amazon Data Center Parcel

**Manassas Regional Airport PART 139
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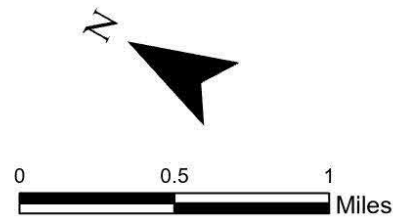
Sources: CMT, Inc., 2025.

Figure 4. 2023 Existing Touch-and-Go Tracks



- Runway
- Touch-and-Go Tracks
- 16L-T-P1
- 16R-T-P1
- 34L-T-P1
- 34R-T-P1
- Airport Property
- Amazon Data Center Parcel

**Manassas Regional Airport PART 139
Certification and Terminal Redevelopment**



Sources: CMT, Inc., 2025.

Table 10: Flight Track Use 2023 Existing Condition

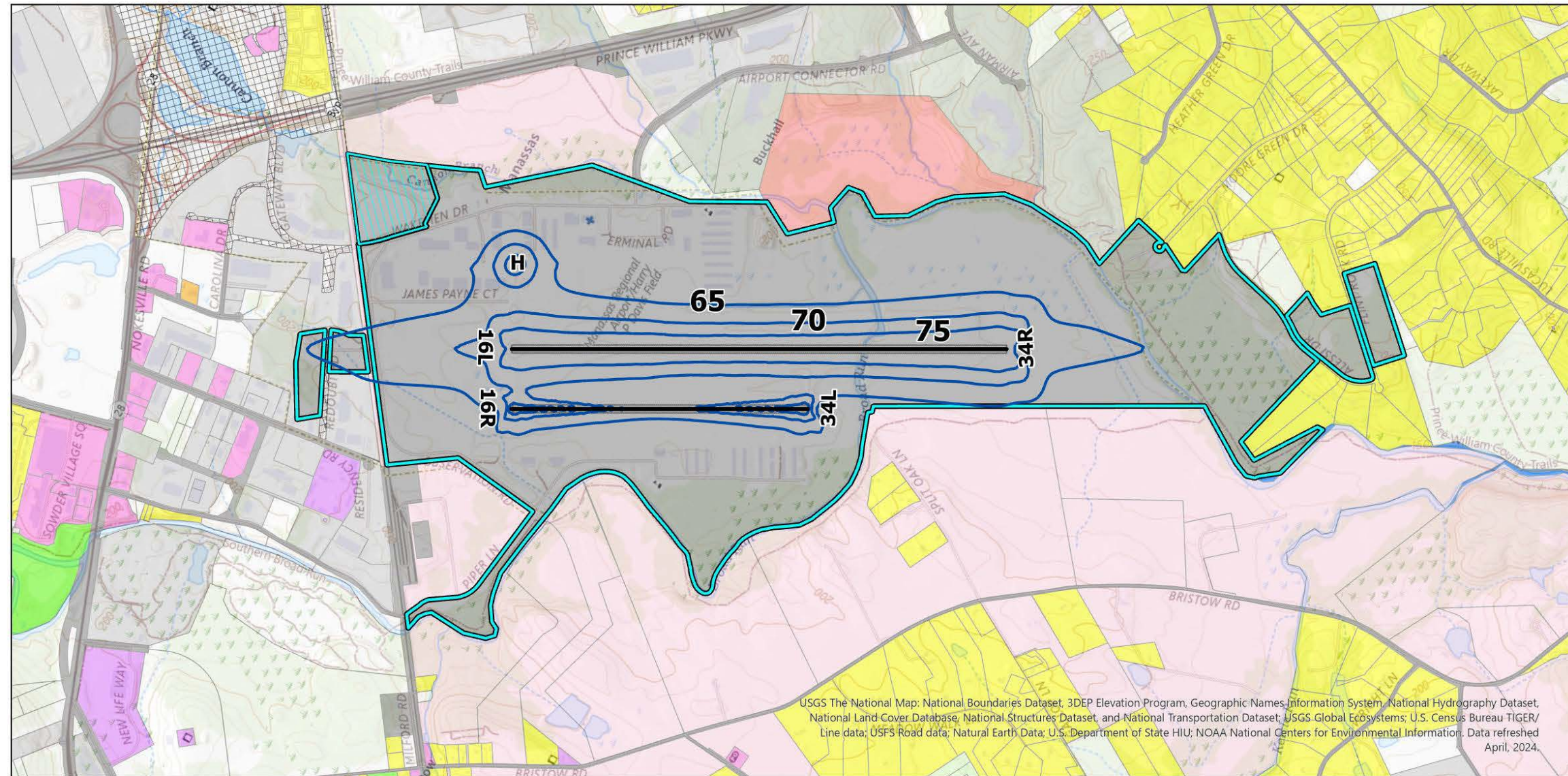
RWY	Percent Use by Track																					
	Arrivals										Departures								Touch and Go'S			
	16LAJ	16LAP	16RAP	34LAP1	34LAP2	34RAJ1	34RAJ2	34RAP1	34RAP2	HA1	HA2	16LDJ	16LDP	16RDP	34LDP	34RDJ	34RDP	HD1	HD2	16LT	16RT	34LT
16L	36%	64%									36%	64%							100%			
16R			100%										100%							100%		
34L				50%	50%									100%							100%	
34R						15%	15%	35%	35%						31%	69%						100%
H										50%	50%							50%	50%			

Note: Track Name Key - H = Helipad, A = Arrival, D = Departure, T = Touch-and-Go, P = Piston, J = Jet.
 Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

4.3.7 Aircraft Noise Contours

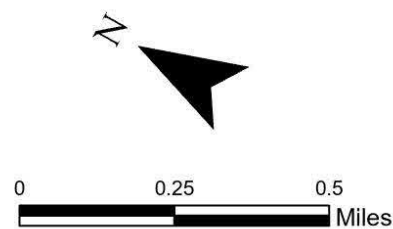
A receptor grid was created in AEDT. The program calculated the noise exposure for each simulated flight at each grid point. AEDT used the cumulative results to produce a DNL noise contour. **Figure 5** depicts the 2023 Existing Year DNL 65, 70, and 75 dB contours. DNL 65 dB is the threshold of significant noise for the noise effects of the FAA's actions. As illustrated, the 2023 Existing DNL 65 dB contour encompasses two acres of non-airport property. The two acres are located on the north end of Runways 16R and 16L. The land use of the two acres is industrial, a land use that is considered compatible with aircraft noise (see **Table 1**).

Figure 5. 2023 Existing DNL 65-75 dBA Contours



- Runway
- ▭ 2023 Existing DNL Contours (dBA)
- ▭ Airport Property
- ▭ Amazon Data Center Parcel
- ▭ Agriculture
- ▭ Airport
- ▭ Commercial
- ▭ Golf Course
- ▭ Industrial
- ▭ Institutional
- ▭ City of Manassas
- ▭ Open Space
- ▭ Residential
- ▭ Rail
- ▭ Recreational
- ▭ School (Private)
- ▭ Utility
- ▭ State Land
- ▭ Right-of-Way
- ▭ Water

Manassas Regional Airport PART 139 Certification and Terminal Redevelopment



Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

4.4 2036 No-Action

4.4.1 Input Data

In 2036 without either Alternative (i.e., the No-Action), annual operations at HEF are forecast to total 119,830 (an average of 328 daily operations). The annual operations, by operator category, are provided in **Table 11**.

Year	Air Carrier	Air Taxi and Commuter	GA Itinerant	Military Itinerant	GA Local	Military Local	Total Operations
2036	0	17,905	44,135	2,425	55,194	171	119,830

GA – General aviation
 Note: RS&H developed the general aviation forecast, which was used exclusively for the 2036 and 2041 No-Action Alternative scenarios.
 Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025

4.4.2 Fleet

For the evaluation of future (2036) conditions without the No Action, per the HEF Master Plan Update⁵ (i.e., the master plan), there would be no changes to HEF’s runways (length, width, or location) nor changes to the percent operations by time of day, runway or track utilization, or number/location of tracks when compared to the 2023 Existing Condition. The forecast itinerant and local aircraft operations and fleet mix for the future (2036) No-Action Alternative are presented in **Table 12** and **Table 13**, respectively. These data were derived using an FAA approved forecast developed for the HEF master plan.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
General Aviation/ Military Jet	6104	Embraer Phenom 100 (EMB-500)	CNA510	908	2.49
	5346	Bombardier Challenger 650	CL600	848	2.32
	6060	Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	744	2.04
	1925	Gulfstream G550	GV	632	1.73
	4917	Embraer Phenom 300 (EMB-505)	CNA55B	592	1.62
	1238	Bombardier Challenger 300	CL600	556	1.52
	2026	Bombardier Learjet 60	LEAR35	532	1.46
	1319	Dassault Falcon 50-EX	FAL900EX	524	1.44
	6108	Cirrus SF-50 Vision	ECLIPSE500	510	1.40
	1921	Gulfstream G450	GIV	492	1.35
	1789	McDonnell Douglas A-4 Skyhawk ¹	A4C	262	0.72

⁵ Manassas Regional Airport Master Plan Update Working Paper 1 Version 6.0, RS&H, July 2024

Table 12: 2036 No Action Forecast Itinerant Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
	4236	Boeing F/A-18 Hornet	F-18	30	0.08
Turboprop	1489	Pilatus PC-12	CNA208	4,910	13.45
	1483	Raytheon Super King Air 200	DHC6	1,118	3.06
	6310	Beechcraft T-6 Texan 2 (FAS)	CNA208	958	2.62
	5996	Raytheon Super King Air 300	DHC6	584	1.60
	6332	Socata TBM-9 (FAS)	CNA208	428	1.17
	1465	Piper PA46-TP Meridian	CNA208	326	0.89
	4895	Raytheon Beech 99	DHC6	30	0.08
	1221	Lockheed C-130 Hercules	C130	30	0.08
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	14,132	38.72
	1265	Cessna 172 Skyhawk	CNA172	12,878	35.28
	6649	Diamond DA20	CNA172	4,486	12.29
	6286	Diamond DA40	GASEPV	2,698	7.39
	1882	Cessna 150 Series	GASEPF	2,388	6.54
	1262	Cessna 182	CNA182	1,812	4.96
	6263	Cessna 162 (FAS)	GASEPF	1,598	4.38
	3178	Piper PA-28 Cherokee Series	PA28	1,094	3.00
	6281	Cirrus SR22 Turbo (FAS)	COMSEP	1,024	2.81
6330	Vans RV-7	GASEPV	816	2.24	
Helicopter	1	Robinson R22	R22	4,486	12.29
	3161	Robinson R44 Raven / Lycoming O-540-F1B5)	R44	1,152	3.16
	4125	Bell 429	B429	706	1.93
	4097	Eurocopter EC-T2 (CPDS)	EC130	184	0.50
Total:				64,465	177
ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. (1) This aircraft was a substitution for the BAE Hawk/L39 Albatross, which is applied by AEDT for this aircraft. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025					

Table 13: 2036 No Action Forecast Local Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	30,570	84
	1265	Cessna 172 Skyhawk	CNA172	19,842	54
	6319	Piper PA-44-180 (FAS)	PA30	4,952	14
Total:				55,364	152
ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding.					

Table 13: 2036 No Action Forecast Local Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025					

4.4.3 Time of Day

To evaluate future aircraft noise with the 2036 No Action, the time-of-day percentages that were used to evaluate the 2023 Existing Condition were assumed (see **Table 7**).

4.4.4 Runway Use

The runway use percentages for arrivals and departures were assumed to be the same as the 2023 Existing Condition (see **Table 8**).

4.4.5 Departure Stage Length

The same percentage of departure stage length that were used to evaluate the 2023 Existing Condition were assumed for the evaluation of the 2036 No Action (see **Table 9**).

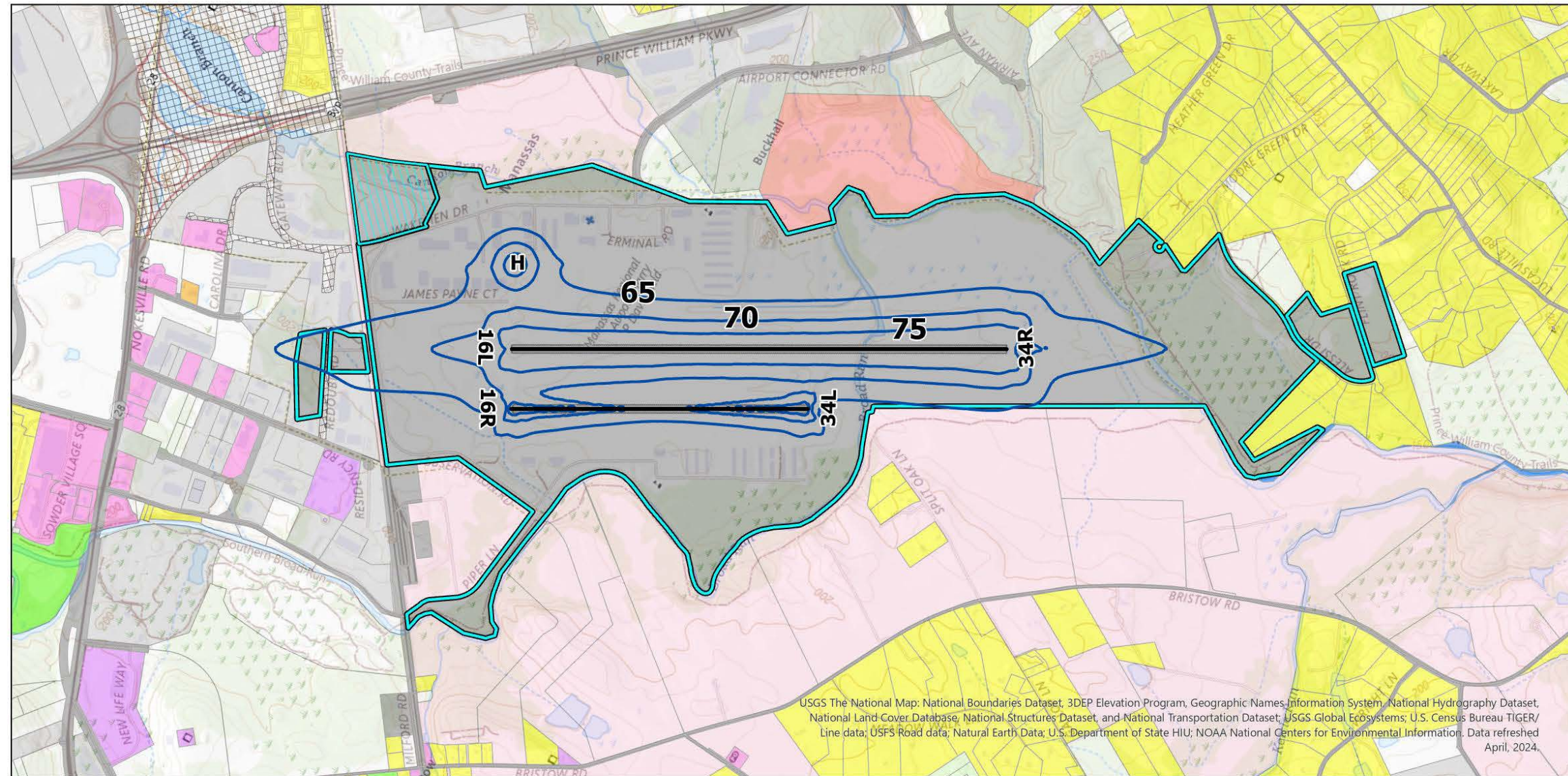
4.4.6 Flight Tracks

For the 2036 No Action, the distribution of aircraft on flight tracks was assumed to be the same as the 2023 Existing Condition (see **Table 10**).

4.4.7 Noise Contours

Figure 6 depicts the 2036 No-Action DNL 65, 70, and 75 dB aircraft noise contours. As illustrated, the 2036 No-Action DNL 65 dB contour encompasses seven acres of non-airport property. Most of the seven acres are located north of Runway 16R and 16L. The land use of the property in this area is industrial. The remaining land within the DNL 65 dB contour is located southwest of Runway 34R. The land use of this property is agricultural. These non-airport land uses are considered compatible with aircraft noise (see **Table 1**).

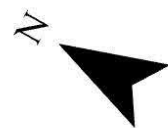
Figure 6. 2036 No Action DNL 65-75 dB Contours



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information. Data refreshed April, 2024.

- Runway
- ▭ 2035 No Action DNL Contours (dBA)
- ▭ Airport Property
- ▭ Amazon Data Center Parcel
- ▭ Agriculture
- ▭ Airport
- ▭ Commercial
- ▭ Golf Course
- ▭ Industrial
- ▭ Institutional
- ▭ City of Manassas
- ▭ Open Space
- ▭ Residential
- ▭ Rail
- ▭ Recreational
- ▭ School (Private)
- ▭ Utility
- ▭ State Land
- ▭ Right-of-Way
- ▭ Water

Manassas Regional Airport PART 139 Certification and Terminal Redevelopment



Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

4.5 2036 Alternative #2

4.5.1 Input Data

By 2036, with Alternative #2, (i.e., the Action Alternative) annual operations at HEF are forecast to total 138,810 (an average of 380 daily operations). The operations, by operator category, are provided in **Table 14**. Notably, the only difference in operations in 2036 with Alternative #2 when compared to the No Action is the addition of the air carrier operations.

Year	Air Carrier	Air Taxi and Commuter	GA Itinerant	Military Itinerant	GA Local	Military Local	Total Operations
2036	18,980	17,905	44,135	2,425	55,194	171	138,810

GA – General aviation
 Note: RS&H developed the general aviation forecast, which was used exclusively for the 2036 and 2041 No-Action Alternative scenarios.
 Sources: RS&H General Aviation Forecast 2024, Avports Commercial Airline Forecast; CMT, Inc., 2025.

4.5.2 Fleet

For the evaluation of the Future (2036) conditions with Alternative #2, per the master plan, there would be no changes to HEF’s runways (length, width, or location). However, as stated above, there would be a change to the number of aircraft operations with the addition of the air carrier operations. The forecast fleet of air carrier aircraft is presented in **Table 15**. These data were derived using a hybrid of the FAA-approved RS&H forecast developed as part of the HEF master plan and the commercial airline forecast provided by HEF representatives. Although the remaining fleet of aircraft would be the same when compared to the No Action, for completeness, **Table 15** and **Table 16** present the entire fleet of aircraft modeled in AEDT for the 2036 Alternative #2.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
Air Carrier Jet	6599	Airbus A320-NEO	A320-270N	6,570	18.00
	3426	Airbus A321-200 Series	A321-232	2,190	6.00
	5978	Airbus A321-NEO	A321-232	2,190	6.00
	6576	Boeing 737-800	737800	1,460	4.00
	5301	Airbus A220-100	737700	3,650	10.00
	6473	Airbus A220-300	737700	2,920	8.00
General Aviation/Military Jet	6104	Embraer Phenom 100 (EMB-500)	CNA510	908	2.49
	5346	Bombardier Challenger 650	CL600	848	2.32
	6060	Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	744	2.04
	1925	Gulfstream G550	GV	632	1.73
	4917	Embraer Phenom 300 (EMB-505)	CNA55B	592	1.62

Table 15: 2036 Alternative #2 Forecast Itinerant Fleet Mix and Operations

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
	1238	Bombardier Challenger 300	CL600	556	1.52
	2026	Bombardier Learjet 60	LEAR35	532	1.46
	1319	Dassault Falcon 50-EX	FAL900EX	524	1.44
	6108	Cirrus SF-50 Vision	ECLIPSE500	510	1.40
	1921	Gulfstream G450	GIV	492	1.35
	1789	McDonnell Douglas A-4 Skyhawk ¹	A4C	262	0.72
	4236	Boeing F/A-18 Hornet	F-18	30	0.08
Turboprop	1489	Pilatus PC-12	CNA208	4,910	13.45
	1483	Raytheon Super King Air 200	DHC6	1,118	3.06
	6310	Beechcraft T-6 Texan 2 (FAS)	CNA208	958	2.62
	5996	Raytheon Super King Air 300	DHC6	584	1.60
	6332	Socata TBM-9 (FAS)	CNA208	428	1.17
	1465	Piper PA46-TP Meridian	CNA208	326	0.89
	4895	Raytheon Beech 99	DHC6	30	0.08
	1221	Lockheed C-130 Hercules	C130	30	0.08
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	14,132	38.72
	1265	Cessna 172 Skyhawk	CNA172	12,878	35.28
	6649	Diamond DA20	CNA172	4,486	12.29
	6286	Diamond DA40	GASEPV	2,698	7.39
	1882	Cessna 150 Series	GASEPF	2,388	6.54
	1262	Cessna 182	CNA182	1,812	4.96
	6263	Cessna 162 (FAS)	GASEPF	1,598	4.38
	3178	Piper PA-28 Cherokee Series	PA28	1,094	3.00
	6281	Cirrus SR22 Turbo (FAS)	COMSEP	1,024	2.81
	6330	Vans RV-7	GASEPV	816	2.24
Helicopter	1	Robinson R22	R22	4,486	12.29
	3161	Robinson R44 Raven / Lycoming O-540-F1B5)	R44	1,152	3.16

Table 15: 2036 Alternative #2 Forecast Itinerant Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
	4125	Bell 429	B429	706	1.93
	4097	Eurocopter EC-T2 (CPDS)	EC130	184	0.50
Total:				83,445	229
ANP – Aircraft Noise and Performance data. Note: Annual and Average Day operations may not equal the total due to rounding. (1) This aircraft was a substitution for the BAE Hawk/L39 Albatross, which is applied by AEDT for this aircraft. Sources: RS&H General Aviation Forecast 2024, Avports Commercial Airline Forecast; CMT, Inc., 2025.					

Table 16: 2036 Alternative #2 Forecast Local Fleet Mix and Operations					
Category	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	30,570	84
	1265	Cessna 172 Skyhawk	CNA172	19,842	54
	6319	Piper PA-44-180 (FAS)	PA30	4,952	14
Total:				55,364	152
ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025.					

4.5.3 Time of Day

Table 17 presents the percentage of day/night operations (departures and arrivals) for the air carrier jet operations. For completeness, the percentages for the general aviation/military jets, turboprops, pistons, and helicopters are also presented. As shown, with the addition of the air carrier jets, in 2036 with the Alternative #2, 90% of the operations on an average day would occur during daytime hours and 10% would occur during nighttime hours.

Table 17: Operations by Time of Day 2036 Alternative #2				
Aircraft Propulsion	Percent of Departures		Percent of Arrivals	
	Day	Night	Day	Night
	7:00 AM – 9:59 PM	10:00 PM – 6:59 AM	7:00 AM – 9:59 PM	10:00 PM – 6:59 AM
Air carrier Jet	74%	26%	72%	28%
GA/Military	95%	5%	95%	5%
Turboprop	94%	6%	92%	8%
Piston	99%	1%	99%	1%
Helicopter	89%	11%	91%	9%
Overall	90%	10%	90%	10%
Notes: GA/Military = General Aviation and Military jets. The FAA defines nighttime for the purposes of NEPA noise studies as any operation occurring between 10:00 PM – 6:59 AM. Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.				

4.5.4 Runway Use

The data presented in **Table 18** represents an average day in 2036 and considers all operations from the 2036 forecast at HEF from all runway ends. As shown, 100% of jet and turboprop operations were assumed to occur on Runway 16L/34R.

Table 18: Runway Use 2036 Alternative #2					
Aircraft Propulsion	Percent Runway use				Total
	16L	34R	16R	34L	
Departure Day (7:00 AM – 9:59 PM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	40%	60%	-	-	100%
Turboprop	50%	50%	-	-	100%
Piston	29%	37%	16%	18%	100%
Departure Night (10:00 PM – 6:59 AM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	50%	50%	-	-	100%
Turboprop	25%	75%	-	-	100%
Piston	44%	29%	5%	22%	100%
Arrival Day (7:00 AM – 9:59 PM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	44%	56%	-	-	100%
Turboprop	60%	40%	-	-	100%
Piston	31%	36%	15%	19%	100%
Arrival Night (10:00 PM – 6:59 AM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	46%	54%	-	-	100%
Turboprop	78%	22%	-	-	100%
Piston	46%	29%	14%	12%	100%

Note: GA/Military = General Aviation and Military jets.
Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.

4.5.5 Departure Stage Length

Except for the airline jet operations, the percent stage length data in **Table 19** is the same as the 2023 Existing Condition (previously presented in **Table 9**). The percentages of stage length for the airline jet operations were based on the destination locations and schedule associated with the forecasted operations provided by HEF for this analysis.

Table 19: Departure Stage Length 2036 Alternative #2					
Aircraft Type(s)	AEDT ANP ID	Percent Stage Length			Total
		Stage 1	Stage 2	Stage 3	
		<500 NM	501 1,000	1,001 1,500 NM	
Air Carrier Jet					
Airbus A320-NEO	A320-270N	33%	44%	22%	100%
Airbus A321-200 Series	A321-232	17%	33%	50%	100%
Airbus A321-NEO	A321-232	17%	33%	50%	100%

Table 19: Departure Stage Length 2036 Alternative #2

Aircraft Type(s)	AEDT ANP ID	Percent Stage Length				Total
		Stage 1	Stage 2	Stage 3		
		<500 NM	501 1,000	1,001 1,500 NM		
Boeing 737-800	737800	50%	50%	-	100%	
Airbus A220-100	737700	80%	-	20%	100%	
Airbus A220-300	737700	-	100%	-	100%	
General Aviation/Military Jet						
Embraer Phenom 100 (EMB-500)	CNA510	100%	-	-	100%	
Bombardier Challenger 650	CL600	100%	-	-	100%	
Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	100%	-	-	100%	
Gulfstream G550	GV	100%	-	-	100%	
Embraer Phenom 300 (EMB-505)	CNA55B	100%	-	-	100%	
Bombardier Challenger 300	CL600	100%	-	-	100%	
Bombardier Learjet 60	LEAR35	100%	-	-	100%	
Dassault Falcon 50-EX	FAL900EX	-	-	100%	100%	
Cirrus SF-50 Vision	ECLIPSE500	-	-	100%	100%	
Gulfstream G450	GIV	100%	-	-	100%	
McDonnell Douglas A-4 Skyhawk	A4C	100%	-	-	100%	
Boeing F/A-18 Hornet	F-18	100%	-	-	100%	
Turboprop						
Pilatus PC-12	CNA208	100%	-	-	100%	
Raytheon Super King Air 300	DHC6	100%	-	-	100%	
Socata TBM-9 (FAS)	CNA208	100%	-	-	100%	
Piper PA46-TP Meridian	CNA208	100%	-	-	100%	
Raytheon Super King Air 200	DHC6	100%	-	-	100%	
Beechcraft T-6 Texan 2 (FAS)	CNA208	100%	-	-	100%	
Raytheon Beech 99	DHC6	100%	-	-	100%	
Lockheed C-130 Hercules	C130	-	100%	-	100%	
Piston						
Piper PA-28 Cherokee Series	GASEPF	100%	-	-	100%	
Cessna 172 Skyhawk	CNA172	100%	-	-	100%	
Diamond DA20	CNA172	100%	-	-	100%	
Diamond DA40	GASEPV	100%	-	-	100%	
Cessna 150 Series	GASEPF	100%	-	-	100%	
Cessna 182	CNA182	100%	-	-	100%	
Cessna 162 (FAS)	GASEPF	100%	-	-	100%	
Piper PA-28 Cherokee Series	PA28	100%	-	-	100%	
Cirrus SR22 Turbo (FAS)	COMSEP	100%	-	-	100%	
Vans RV-7	GASEPV	100%	-	-	100%	

Aircraft Type(s)	AEDT ANP ID	Percent Stage Length			
		Stage 1	Stage 2	Stage 3	Total
		<500 NM	501 1,000	1,001 1,500 NM	
Helicopter					
Robinson R22	R22	100%	-	-	100%
Robinson R44 Raven / Lycoming O-540-F1B5)	R44	100%	-	-	100%
Bell 429	B429	100%	-	-	100%
Eurocopter EC-T2 (CPDS)	EC130	100%	-	-	100%
Note: Flight stage lengths were calculated using the Great Circle Mapper (www.gcmap.com). The AEDT 3f aircraft database does not include departure profiles >1 for most general aviation aircraft. The only aircraft in the study fleet mix with an available departure profile in the AEDT >1 are the Dassault Falcon 50-EX, Cirrus SF-50 Vision, and Lockheed C-130 Hercules. The highest available stage length was utilized in these cases, as reflected in the chart. The AEDT does not model every aircraft type for the purposes of noise analysis; this is reflected in the ANP ID, which may not match the aircraft type description. For example, the Bombardier Learjet 60 maps to the LEAR35 in AEDT. In these cases, the AEDT airplane is a surrogate for the specific aircraft type not currently modeled in the application. Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.					

4.5.6 Flight Tracks

The distribution of the general aviation/military jet, turboprop, piston, and helicopters on flight tracks was assumed to be the same as the 2023 Existing Condition (see **Table 10**). The percentages of flight tracks in **Table 20** for the airline jet operations were based on the destination locations and schedule associated with the forecasted operations provided by HEF for this analysis.

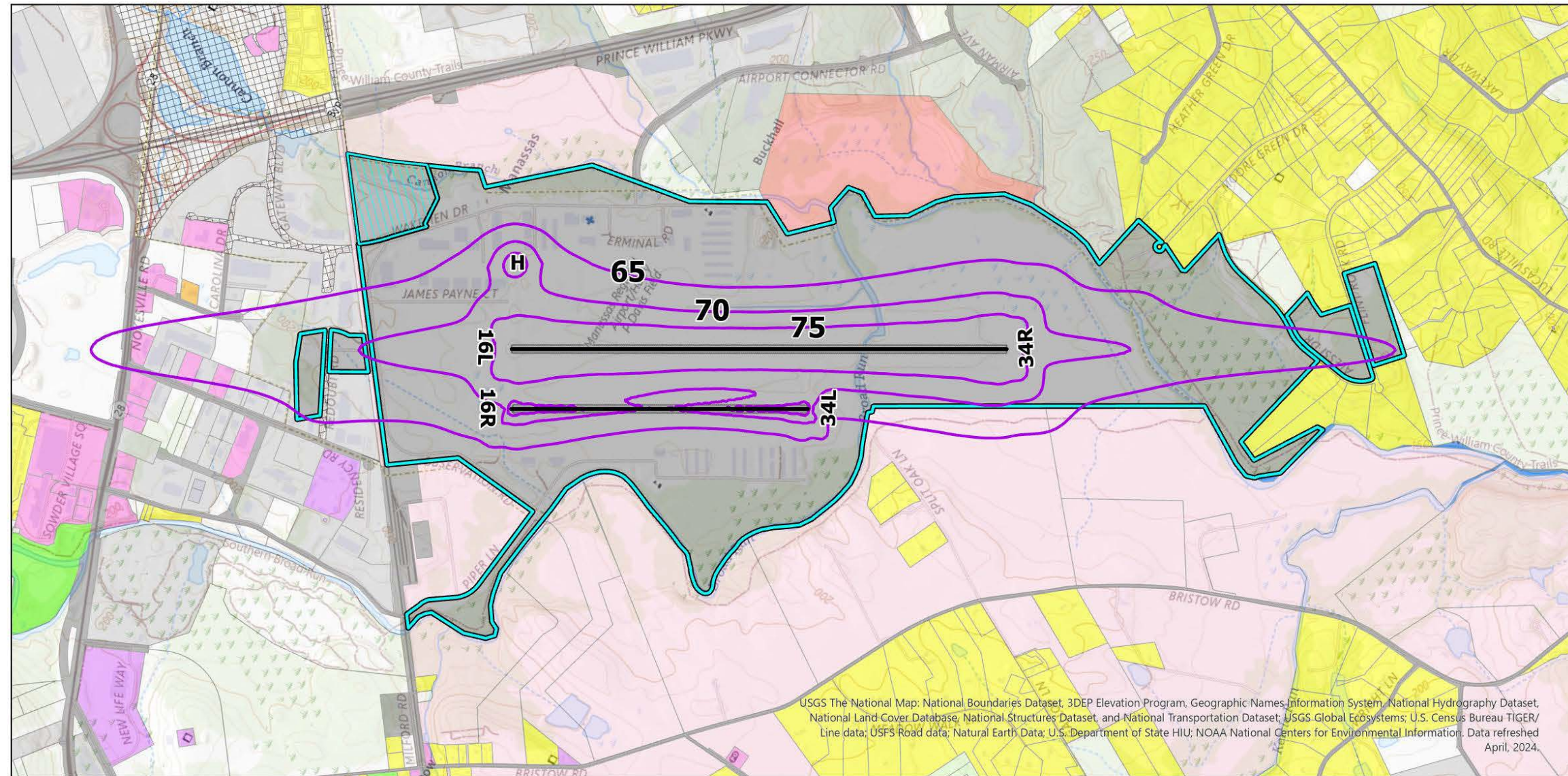
Percent Track Use				
Arrivals			Departures	
16LAJ	34RAJ1	34RAJ2	16LDJ	34RDJ
44%	28%	28%	44%	56%
Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.				

4.5.7 Noise Contours

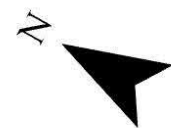
Figure 7a depicts the 2036 Alternative #2 DNL 65, 70, and 75 dB contours. As illustrated, the 2036 Alternative #2 DNL 65 dB contour encompasses 87 acres of non-airport property—an increase of 80 acres when compared to the 2036 No Action.

The non-airport property within the DNL 65 dB contour that is north of Runway 16R and 16L is in commercial, industrial, and open space use. The non-airport property south and west of the end of Runway 34R is in agricultural, open space and residential use. One residential property, **Figure 7b**, is expected to experience an increase in DNL of 4.8 dBA compared to the No Action Alternative and would be newly exposed to DNL 65 dBA. The agricultural and open space uses are compatible with aircraft noise (see **Table 1**) and the residential property, **Figure 7b**, within the DNL 65 dB contour are considered non-compatible with aircraft noise.

Figure 7a. 2036 Alternative #2 DNL 65-75 dBA Contours



- Runway
- 2035 Proposed Action DNL Contours (dBA)
- Airport Property
- Amazon Data Center Parcel
- Agriculture
- Airport
- Commercial
- Golf Course
- Industrial
- Institutional
- City of Manassas
- Open Space
- Residential
- Rail
- Recreational
- School (Private)
- Utility
- State Land
- Right-of-Way
- Water



Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Figure 7b. 2036 Alternative #2 DNL 65-75 dBA Contours



- Runway
- 2035 Proposed Action DNL Contours (dBA)
- Airport Property
- Amazon Data Center Parcel



Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

4.6 2041 No Action

4.6.1 Input Data

In 2041, the No-Action annual operations at HEF are forecast to total 128,305 (an average of 352 daily operations). The operations, by operator category, are provided in **Table 21**.

Year	Air Carrier	Air Taxi and Commuter	GA Itinerant	Military Itinerant	GA LOCAL	Military Local	Total Operations
2041	0	20,326	46,825	2,425	58,558	171	128,305
GA – General aviation Note: RS&H developed the general aviation forecast, which was used exclusively for the No-Action Alternative scenarios. Avports supplied the commercial airline forecast, which was incorporated with the RS&H general aviation forecast for the Action Alternative scenarios for 2036 and 2041. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025							

4.6.2 Fleet

For the evaluation of the 2041 conditions with the No Action, per the master plan, there would be no change to HEF's runways (length, width, or location) nor changes to the percent operations by time of day, runway or track utilization, or number/location of tracks when compared to the 2023 Existing Condition. The forecast aircraft operations and fleet mix for the 2041 No-Action are presented in **Table 22** and **Table 23**. These data were derived using an FAA approved forecast developed as part of the HEF master plan.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
General Aviation/ Military Jet	6104	Embraer Phenom 100 (EMB-500)	CNA510	982	2.70
	5346	Bombardier Challenger 650	CL600	918	2.52
	6060	Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	806	2.20
	1925	Gulfstream G550	GV	684	1.88
	4917	Embraer Phenom 300 (EMB-505)	CNA55B	640	1.76
	1238	Bombardier Challenger 300	CL600	602	1.64
	2026	Bombardier Learjet 60	LEAR35	576	1.58
	1319	Dassault Falcon 50-EX	FAL900EX	566	1.56
	6108	Cirrus SF-50 Vision	ECLIPSE500	552	1.52
	1921	Gulfstream G450	GIV	532	1.46
	1789	McDonnell Douglas A-4 Skyhawk ¹	A4C	262	0.72
	4236	Boeing F/A-18 Hornet	F-18	30	0.08
Turboprop	1489	Pilatus PC-12	CNA208	5,316	14.56
	1483	Raytheon Super King Air 200	DHC6	1,118	3.06

Table 22: 2041 No Action Forecast Itinerant Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average Day
	6310	Beechcraft T-6 Texan 2 (FAS)	CNA208	958	2.62
	5996	Raytheon Super King Air 300	DHC6	632	1.72
	6332	Socata TBM-9 (FAS)	CNA208	462	1.26
	1465	Piper PA46-TP Meridian	CNA208	352	0.96
	4895	Raytheon Beech 99	DHC6	30	0.08
	1221	Lockheed C-130 Hercules	C130	30	0.08
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	15,296	41.90
	1265	Cessna 172 Skyhawk	CNA172	13,938	38.18
	6649	Diamond DA20	CNA172	4,856	13.30
	6286	Diamond DA40	GASEPV	2,920	8.00
	1882	Cessna 150 Series	GASEPF	2,584	7.08
	1262	Cessna 182	CNA182	1,962	5.38
	6263	Cessna 162 (FAS)	GASEPF	1,730	4.74
	3178	Piper PA-28 Cherokee Series	PA28	1,184	3.24
	6281	Cirrus SR22 Turbo (FAS)	COMSEP	1,108	3.04
6330	Vans RV-7	GASEPV	882	2.42	
Helicopter	1	Robinson R22	R22	4,856	13.30
	3161	Robinson R44 Raven / Lycoming O-540-F1B5)	R44	1,248	3.42
	4125	Bell 429	B429	764	2.10
	4097	Eurocopter EC-T2 (CPDS)	EC130	200	0.54
Total:				69,576	191
ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. (1) This aircraft was a substitution for the BAE Hawk/L39 Albatross, which is applied by AEDT for this aircraft. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025.					

Table 23: 2041 No Action Forecast Local Fleet Mix and Operations					
Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	32,428	89
	1265	Cessna 172 Skyhawk	CNA172	21,048	58
	6319	Piper PA-44-180 (FAS)	PA30	5,254	14
Total:				58,730	161
ANP – Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025.					

4.6.3 Time of Day

To evaluate future aircraft noise with the 2041 No Action, the time of day percentages that were used to evaluate the 2023 Existing Condition were assumed (see **Table 7**).

4.6.4 Runway Use

The runway use percentages for arrivals and departures were assumed to be the same as the 2023 Existing Condition (see **Table 8**).

4.6.5 Departure Stage Length

The same percentages of departure stage length that were used to evaluate the 2023 Existing Condition were assumed for the evaluation of the 2041 No Action (**Table 9**).

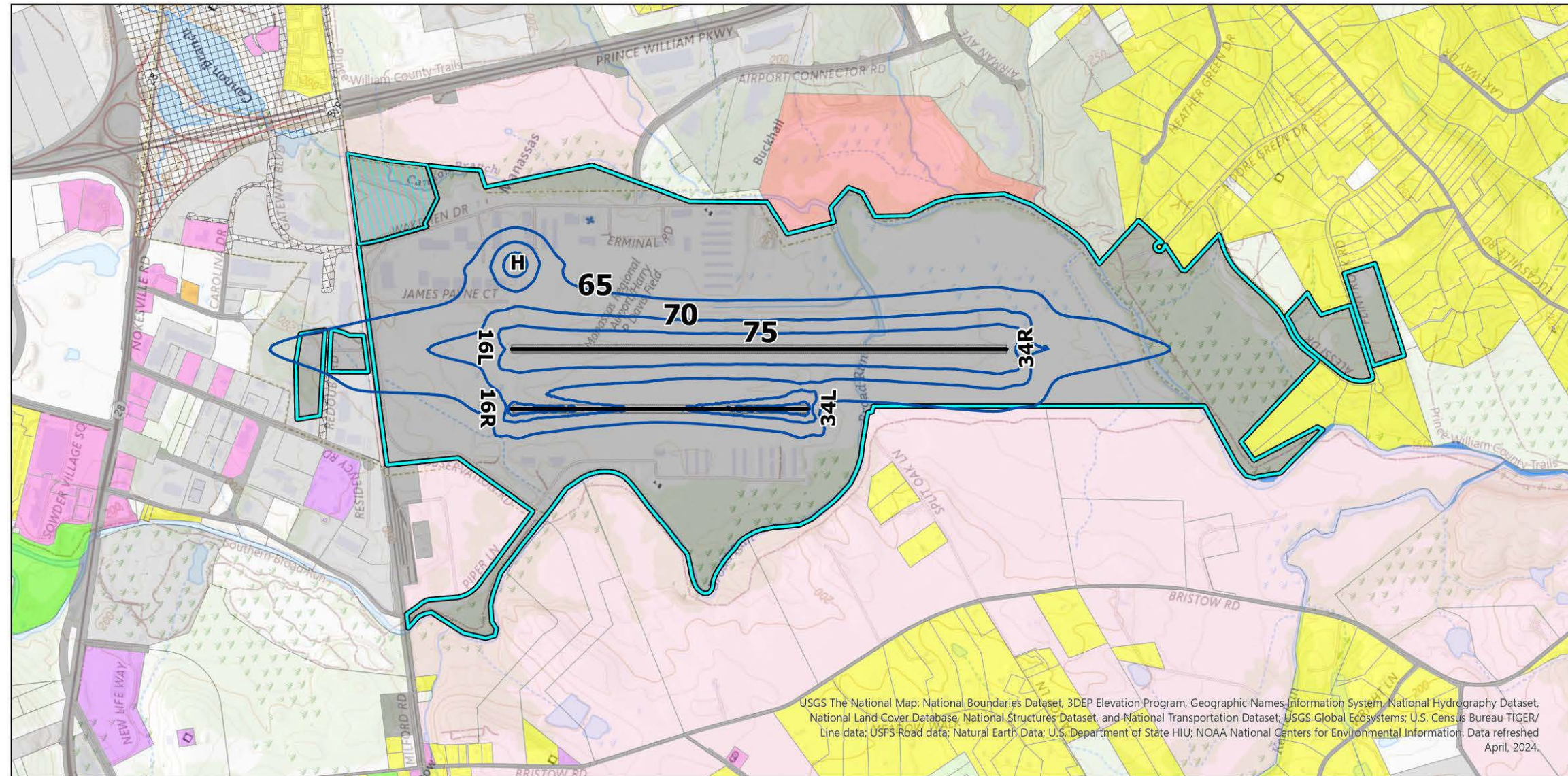
4.6.6 Flight Tracks

For the 2041 No Action, the distribution of aircraft on flight tracks was assumed to be the same as the 2023 Existing Condition (**Table 10**).

4.6.7 Noise Contours

Figure 8 depicts the 2041 No-Action DNL 65, 70, and 75 dB contours. As illustrated, the 2041 No-Action DNL 65 dB contour encompasses 9 acres of non-airport property north and southwest of the airport. The non-airport property north of Runway Ends 16R and 16L is industrial. The non-airport property southwest of Runway End 34R is in agricultural use. These land uses are considered compatible with aircraft noise (see **Table 1**).

Figure 8. 2041 No Action DNL 65-75 dB Contours



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information. Data refreshed April, 2024.

- Runway
- 2040 No Action DNL Contours (dBA)
- Airport Property
- Amazon Data Center Parcel
- Agriculture
- Airport
- Commercial
- Golf Course
- Industrial
- Institutional
- City of Manassas
- Open Space
- Residential
- Rail
- Recreational
- School (Private)
- Utility
- State Land
- Right-of-Way
- Water

Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

4.7 2041 Alternative #2

4.7.1 Input Data

In 2041, with Alternative #2, annual operations at HEF are forecast to total 149,475 (an average of 410 daily operations). The operations, by operator category, are provided in **Table 24**. Notably, the only difference in operations with Alternative #2 when compared to the No Action is the addition of the air carrier operations.

Year	Air Carrier	Air Taxi and Commuter	GA Itinerant	Military Itinerant	GA Local	Military Local	Total Operations
2041	21,170	20,326	46,825	2,425	58,558	171	149,475

GA – General aviation
 Note: RS&H developed the general aviation forecast, which was used exclusively for the No-Action Alternative scenarios. Avports supplied the commercial airline forecast, which was incorporated with the RS&H general aviation forecast for the Action Alternative scenarios for 2036 and 2041.
 Sources: RS&H General Aviation Forecast 2025, Avports Commercial Airline Forecast; CMT, Inc., 2025.

4.7.2 Fleet

For the evaluation of the 2041 conditions with the Alternative #2, per the master plan, there would be no changes to HEF’s runways (length, width, or location). However, as stated above, there would be a change to the number of aircraft operations with the addition of the air carrier operations. The forecast fleet of air carrier aircraft is presented in **Table 25**. These data were derived using a hybrid of the FAA-approved RS&H forecast developed as part of the HEF master plan and the HEF commercial airline forecast. Although the remaining fleet of aircraft would be the same when compared to the No Action, for completeness, **Table 25** and **Table 26** present the entire fleet of aircraft modeled in AEDT for the 2041 Alternative #2.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
Air Carrier Jet	6599	Airbus A320-NEO	A320-270N	7,300	20.00
	3426	Airbus A321-200 Series	A321-232	1,460	4.00
	5978	Airbus A321-NEO	A321-232	4,380	12.00
	6576	Boeing 737-800	737800	1,460	4.00
	5301	Airbus A220-100	737700	3,650	10.00
	6473	Airbus A220-300	737700	2,920	8.00
General Aviation/Military Jet	6104	Embraer Phenom 100 (EMB-500)	CNA510	982	2.70
	5346	Bombardier Challenger 650	CL600	918	2.52
	6060	Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	806	2.20
	1925	Gulfstream G550	GV	684	1.88
	4917	Embraer Phenom 300 (EMB-505)	CNA55B	640	1.76

Table 25: 2041 Alternative #2 Forecast Itinerant Fleet Mix and Operations

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
	1238	Bombardier Challenger 300	CL600	602	1.64
	2026	Bombardier Learjet 60	LEAR35	576	1.58
	1319	Dassault Falcon 50-EX	FAL900EX	566	1.56
	6108	Cirrus SF-50 Vision	ECLIPSE500	552	1.52
	1921	Gulfstream G450	GIV	532	1.46
	1789	McDonnell Douglas A-4 Skyhawk ¹	A4C	262	0.72
	4236	Boeing F/A-18 Hornet	F-18	30	0.08
Turboprop	1489	Pilatus PC-12	CNA208	5,316	14.56
	1483	Raytheon Super King Air 200	DHC6	1,118	3.06
	6310	Beechcraft T-6 Texan 2 (FAS)	CNA208	958	2.62
	5996	Raytheon Super King Air 300	DHC6	632	1.72
	6332	Socata TBM-9 (FAS)	CNA208	462	1.26
	1465	Piper PA46-TP Meridian	CNA208	352	0.96
	4895	Raytheon Beech 99	DHC6	30	0.08
Piston	1221	Lockheed C-130 Hercules	C130	30	0.08
	2102	Piper PA-28 Cherokee Series	GASEPF	15,296	41.90
	1265	Cessna 172 Skyhawk	CNA172	13,938	38.18
	6649	Diamond DA20	CNA172	4,856	13.30
	6286	Diamond DA40	GASEPV	2,920	8.00
	1882	Cessna 150 Series	GASEPF	2,584	7.08
	1262	Cessna 182	CNA182	1,962	5.38
	6263	Cessna 162 (FAS)	GASEPF	1,730	4.74
	3178	Piper PA-28 Cherokee Series	PA28	1,184	3.24
	6281	Cirrus SR22 Turbo (FAS)	COMSEP	1,108	3.04
Helicopter	6330	Vans RV-7	GASEPV	882	2.42
	1	Robinson R22	R22	4,856	13.30
	3161	Robinson R44 Raven / Lycoming O-540-F1B5)	R44	1,248	3.42
	4125	Bell 429	B429	764	2.10
	4097	Eurocopter EC-T2 (CPDS)	EC130	200	0.54
Total:				90,746	249

ANP - Aircraft Noise and Performance data

Note: Annual and Average Day operations may not equal the total due to rounding.

(1) This aircraft was a substitution for the BAE Hawk/L39 Albatross, which is applied by AEDT for this aircraft.

Sources: RS&H General Aviation Forecast 2024, Avports Commercial Airline Forecast; CMT, Inc., 2025.

Aircraft Propulsion	AEDT Equipment ID	Aircraft Type(s)	AEDT ANP ID	Operations	
				Annual	Average day
Piston	2102	Piper PA-28 Cherokee Series	GASEPF	32,428	89
	1265	Cessna 172 Skyhawk	CNA172	21,048	58
	6319	Piper PA-44-180 (FAS)	PA30	5,254	14
Total:				58,730	161
ANP - Aircraft Noise and Performance data Note: Annual and Average Day operations may not equal the total due to rounding. Sources: RS&H General Aviation Forecast 2024; CMT, Inc., 2025.					

4.7.3 Time of Day

Table 27 provides the percentage of day/night operations (departures and arrivals) for the air carrier jet operations. For completeness, the percentages of general aviation/military jets, turboprops, pistons, and helicopters are also presented. As shown, overall 90% of the operations were assumed to occur during daytime hours and 10% were assumed to occur at night.

Aircraft Propulsion	Percent of DEPARTURES				Percent of ARRIVALS			
	Day		Night		Day		Night	
	7:00 AM	9:59 PM	10:00 PM	6:59 AM	7:00 AM	9:59 PM	10:00 PM	6:59 AM
Air Carrier Jet	72%		28%		72%		28%	
GA/Military	95%		5%		95%		5%	
Turboprop	94%		6%		92%		8%	
Piston	99%		1%		99%		1%	
Helicopter	89%		11%		91%		9%	
Overall	90%		10%		90%		10%	
Notes: GA/Military = General Aviation and Military jets. The FAA defines nighttime for the purposes of NEPA noise studies as any operation occurring between 10:00 PM – 6:59 AM. Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.								

4.7.4 Runway Use

The runway use data presented in **Table 28** represents an average day in 2041 and considers all operations from the 2041 forecast at HEF. As shown, 100% of the jet and turboprop operations were assumed to occur on Runway 16L/34R.

Aircraft Propulsion	Percent Runway Use				Total
	16L	34R	16R	34L	
Departure Day (7:00 AM – 9:59 PM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	40%	60%	-	-	100%
Turboprop	50%	50%	-	-	100%
Piston	29%	37%	16%	18%	100%
Departure Night (10:00 PM – 6:59 AM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	50%	50%	-	-	100%

Table 28: Runway Use 2041 Alternative #2					
Aircraft Propulsion	Percent Runway Use				Total
	16L	34R	16R	34L	
Turboprop	25%	75%	-	-	100%
Piston	44%	29%	5%	22%	100%
Arrival Day (7:00 AM – 9:59 PM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	44%	56%	-	-	100%
Turboprop	60%	40%	-	-	100%
Piston	31%	36%	15%	19%	100%
Arrival Night (10:00 PM – 6:59 AM)					
Air Carrier Jet	44%	56%	-	-	
GA/Military	46%	54%	-	-	100%
Turboprop	78%	22%	-	-	100%
Piston	46%	29%	14%	12%	100%

Note: GA/Military = General Aviation and Military jets.
Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.

4.7.5 Departure Stage Length

In 2041 with Alternative #2, except for the air carrier jet operations, the percentage of departures by stage length would be the same as the 2023 Existing Condition (previously presented in **Table 9**). **Table 29** presents the stage length assumptions for commercial airline jet operations. The percentages of stage length for the airline jet operations were based on the destination locations and schedule associated with the forecasted operations provided by HEF for this analysis.

Table 29: Departure Stage Lengths 2041 Alternative #2					
Aircraft Type(s)	AEDT ANP ID	Percent stage length			
		Stage 1	Stage 2	Stage 3	Total
		<500 NM	501 1,000 NM	1,001 1,500 NM	
Air Carrier Jet					
Airbus A320-NEO	A320-270N	40%	40%	20%	100%
Airbus A321-200 Series	A321-232	13%	50%	38%	100%
Airbus A321-NEO	A321-232	13%	50%	38%	100%
Boeing 737-800	737800	50%	50%	-	100%
Airbus A220-100	737700	80%	-	20%	100%
Airbus A220-300	737700	-	100%	-	100%
General Aviation/Military Jet					
Embraer Phenom 100 (EMB-500)	CNA510	100%	-	-	100%
Bombardier Challenger 650	CL600	100%	-	-	100%
Cessna CitationJet CJ3 (Cessna 525B)	CNA525C	100%	-	-	100%
Gulfstream G550	GV	100%	-	-	100%
Embraer Phenom 300 (EMB-505)	CNA55B	100%	-	-	100%
Bombardier Challenger 300	CL600	100%	-	-	100%

Table 29: Departure Stage Lengths 2041 Alternative #2

Aircraft Type(s)	AEDT ANP ID	Percent stage length				Total
		Stage 1	Stage 2	Stage 3		
		<500 NM	501 1,000 NM	1,001 1,500 NM		
Bombardier Learjet 60	LEAR35	100%	-	-	100%	
Dassault Falcon 50-EX	FAL900EX	-	-	100%	100%	
Cirrus SF-50 Vision	ECLIPSE500	-	-	100%	100%	
Gulfstream G450	GIV	100%	-	-	100%	
McDonnell Douglas A-4 Skyhawk	A4C	100%	-	-	100%	
Boeing F/A-18 Hornet	F-18	100%	-	-	100%	
Turboprop						
Pilatus PC-12	CNA208	100%	-	-	100%	
Raytheon Super King Air 300	DHC6	100%	-	-	100%	
Socata TBM-9 (FAS)	CNA208	100%	-	-	100%	
Piper PA46-TP Meridian	CNA208	100%	-	-	100%	
Raytheon Super King Air 200	DHC6	100%	-	-	100%	
Beechcraft T-6 Texan 2 (FAS)	CNA208	100%	-	-	100%	
Raytheon Beech 99	DHC6	100%	-	-	100%	
Lockheed C-130 Hercules	C130	-	100%	-	100%	
Piston						
Piper PA-28 Cherokee Series	GASEPF	100%	-	-	100%	
Cessna 172 Skyhawk	CNA172	100%	-	-	100%	
Diamond DA20	CNA172	100%	-	-	100%	
Diamond DA40	GASEPV	100%	-	-	100%	
Cessna 150 Series	GASEPF	100%	-	-	100%	
Cessna 182	CNA182	100%	-	-	100%	
Cessna 162 (FAS)	GASEPF	100%	-	-	100%	
Piper PA-28 Cherokee Series	PA28	100%	-	-	100%	
Cirrus SR22 Turbo (FAS)	COMSEP	100%	-	-	100%	
Vans RV-7	GASEPV	100%	-	-	100%	
Helicopter						
Robinson R22	R22	100%	-	-	100%	
Robinson R44 Raven / Lycoming O-540-F1B5)	R44	100%	-	-	100%	
Bell 429	B429	100%	-	-	100%	
Eurocopter EC-T2 (CPDS)	EC130	100%	-	-	100%	

Note: Flight stage lengths were calculated using the Great Circle Mapper (www.gcmap.com). The AEDT 3f aircraft database does not include departure profiles >1 for most general aviation aircraft. The only aircraft in the study fleet mix with an available departure profile in the AEDT >1 are the Dassault Falcon 50-EX, Cirrus SF-50 Vision, and Lockheed C-130 Hercules. The highest available stage length was utilized in these cases, as reflected in the chart. The AEDT does not model every aircraft type for the purposes of noise analysis; this is reflected in the ANP ID, which may not match the aircraft type description. For example, the Bombardier Learjet 60 maps to the LEAR35 in AEDT. In these cases, the AEDT airplane is a surrogate for the specific aircraft type not currently modeled in the application.

Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025.

4.7.6 Flight Tracks

The distribution of general aviation/military jet, turboprop, piston, and helicopters on flight tracks was assumed to be the same as the 2023 Existing Condition (see **Table 10**). The percentages of flight tracks in **Table 30** for the airline jet operations were based on the destination locations and schedule associated with the forecasted operations provided by HEF for this analysis.

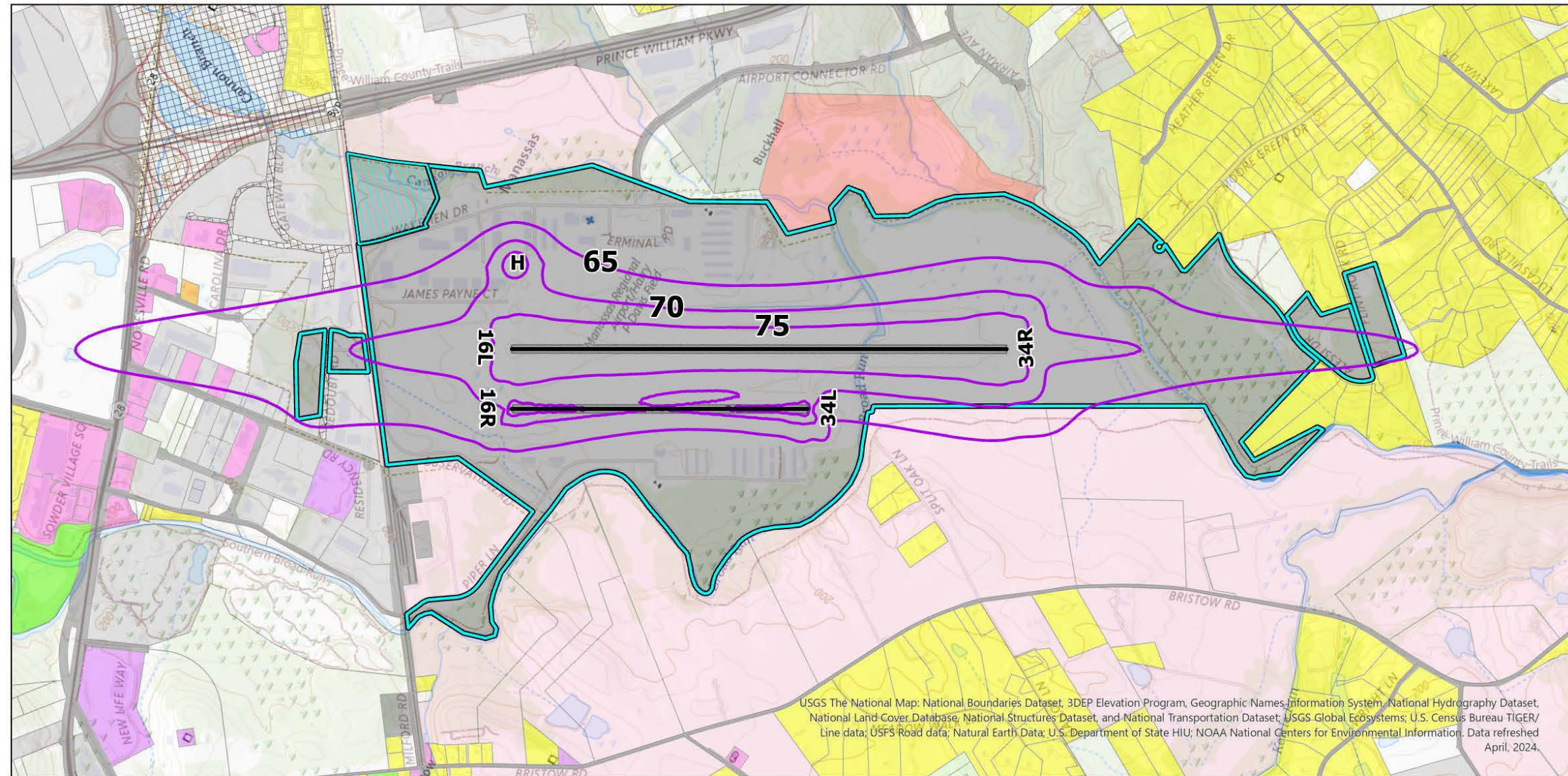
Table 30: Commercial Flight Track Use 2041 Alternative #2				
Percent Track use				
Arrivals			Departures	
16LAJ	34RAJ1	34RAJ2	16LDJ	34RDJ
44%	28%	28%	44%	56%
Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025				

4.7.7 Noise Contours

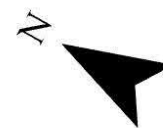
Figure 9a depicts the Future (2041) Alternative #2 DNL 65, 70, and 75 dB contours. As illustrated, the 2041 Alternative #2 DNL 65+ dB contour encompasses 101 acres of non-airport property.

The non-airport property within the DNL 65 dB contour that is north of Runway 16R and 16L is in commercial, industrial, and open space use. The non-airport property south and west of the end of Runway 34R is in agricultural, open space and residential use. Two residential properties, **Figure 9b**, are expected to experience an increase in DNL of 5.0 and 5.1 dBA compared to the No Action Alternative and would be newly exposed to DNL 65 dBA. The agricultural and open space uses are compatible with aircraft noise (see **Table 1**) and the two residential properties, **Figure 9b**, within the DNL 65 dB contour are considered non-compatible with aircraft noise.

Figure 9a. 2041 Alternative #2 DNL 65-75 dB Contour

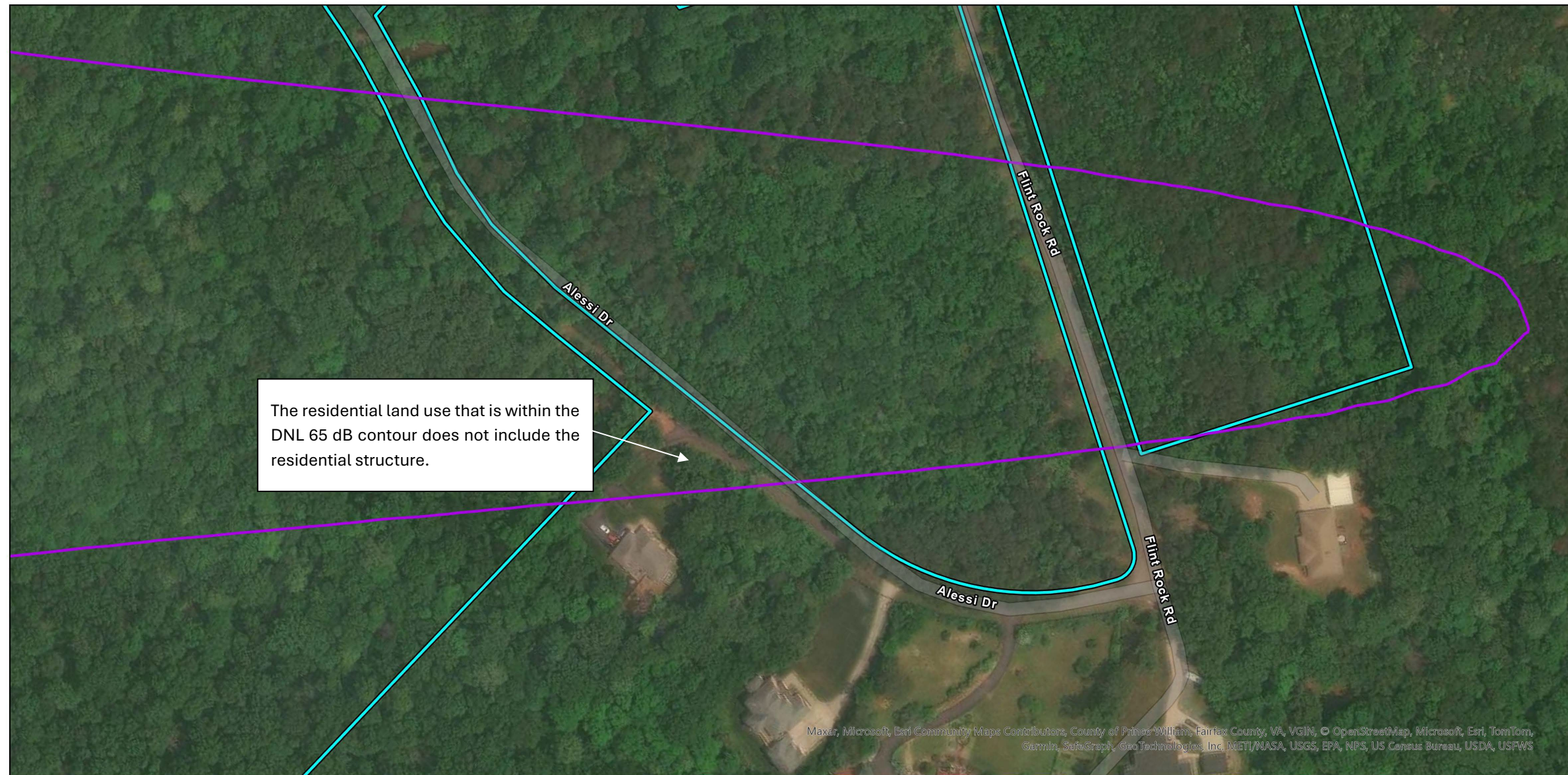






- | | | |
|---|------------------|------------------|
| Runway | Commercial | Recreational |
| 2040 Proposed Action DNL Contours (dBA) | Golf Course | School (Private) |
| Airport Property | Industrial | Utility |
| Amazon Data Center Parcel | Institutional | State Land |
| Agriculture | City of Manassas | Right-of-Way |
| Airport | Open Space | Water |
| | Residential | |
| | Rail | |

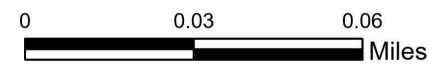
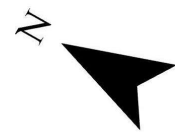


Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Figure 9b. 2041 Alternative #2 DNL 65-75 dB Contours



-  Runway
-  2040 Proposed Action DNL Contour (dBA)
-  Airport Property
-  Amazon Data Center Parcel



**Manassas Regional Airport PART 139
Certification and Terminal Redevelopment**

Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

5. Significance Threshold

FAA guidance stipulates that a noise impact is considered significant when a proposed action results in noncompatible land use(s) being newly exposed to DNL 65 dB or there is an increase of DNL 1.5 dB or more at a noise-sensitive land use that without the action would be exposed to DNL 65 dB. **Figure 10** and **Figure 11** illustrate the changes to HEF's aircraft noise contours in the Future (2036 and 2041) with the Alternative #2.

The comparison of the 2036 and 2041 No Action contours, and the Alternative #2 contours indicates that the two non-compatible land uses (residential properties) will be newly exposed to aviation noise under Alternative #2 in both of the evaluated future years scenarios. However, with mitigation measures, such as land acquisition or sound insulation, the effects of the aviation noise can be minimized.

Notably, the noise analysis conducted utilizes conservative assumptions that represent worst-case scenarios. This is due to both the forecasted fleet mix assumptions and the inherent modeling assumptions within AEDT. As illustrated in **Table 31**, in 2036, approximately 35 percent of commercial service are anticipated to be Airbus A320-NEO aircraft, and 12 percent A321-NEO aircraft, both of which are certified as Noise Stage 5, the quietest aircraft noise certification standard currently in effect. In 2041, these proportions increase to approximately 36 percent A320-NEO and 21 percent A321-NEO. However, it is critical to note that AEDT does not include specific noise profiles for the A320-NEO or A321-NEO aircraft. Instead, AEDT applies noise profiles for surrogate aircraft that are louder (certified to Stage 3 and 4 noise standards) and have older generation engines. Consequently, nearly half (47 percent) of the operations modeled in 2036, and more than half (57 percent) of the operations modeled in 2041 are represented by aircraft that are louder than those actually anticipated to operate at the airport. **Table 31** presents the noise stages utilized by AEDT compared to the actual certificated noise level. The actual noise stages were obtained from the most up to date source being the European Union Aviation Safety Agency (EASA).⁶

Furthermore, AEDT incorporates additional conservative operational assumptions. For example, all departure operations are modeled at 100 percent takeoff power, whereas in practice aircraft typically operate at reduced thrust for the vast majority of departures in order to save fuel, reduce wear and tear on engines and minimize noise.⁷

Based on the use of surrogate aircraft and AEDT's default operational assumptions, the noise modeling results presented in this PEA are conservative.

⁶ European Union Aviation Safety Agency (EASA): Noise Type Certificate Data Sheets for Noise (TCDSN), <https://www.easa.europa.eu/en/document-library/type-certificates/tcdsn>

⁷ FAA, Aviation Environmental Design Tool: <https://aedt.faa.gov/>

Table 31. Aircraft Noise Stages AEDT vs. Actual					
Aircraft	Engine	Noise Stage		Daily Operations	
		AEDT^a	Actual^b	2036	2041
Airbus A320-NEO	PW1127G-JM	4	5	18	20
Airbus A321-200 Series	CFM56-5B4/P	3	3	6	4
Airbus A321-NEO	PW1133G-JM	3	5	6	12
Boeing 737-800	CFM56-7B27E	3	3	4	4
Airbus A220-100	PW1524G	3	5	10	10
Airbus A220-300	PW1524G	3	5	8	8

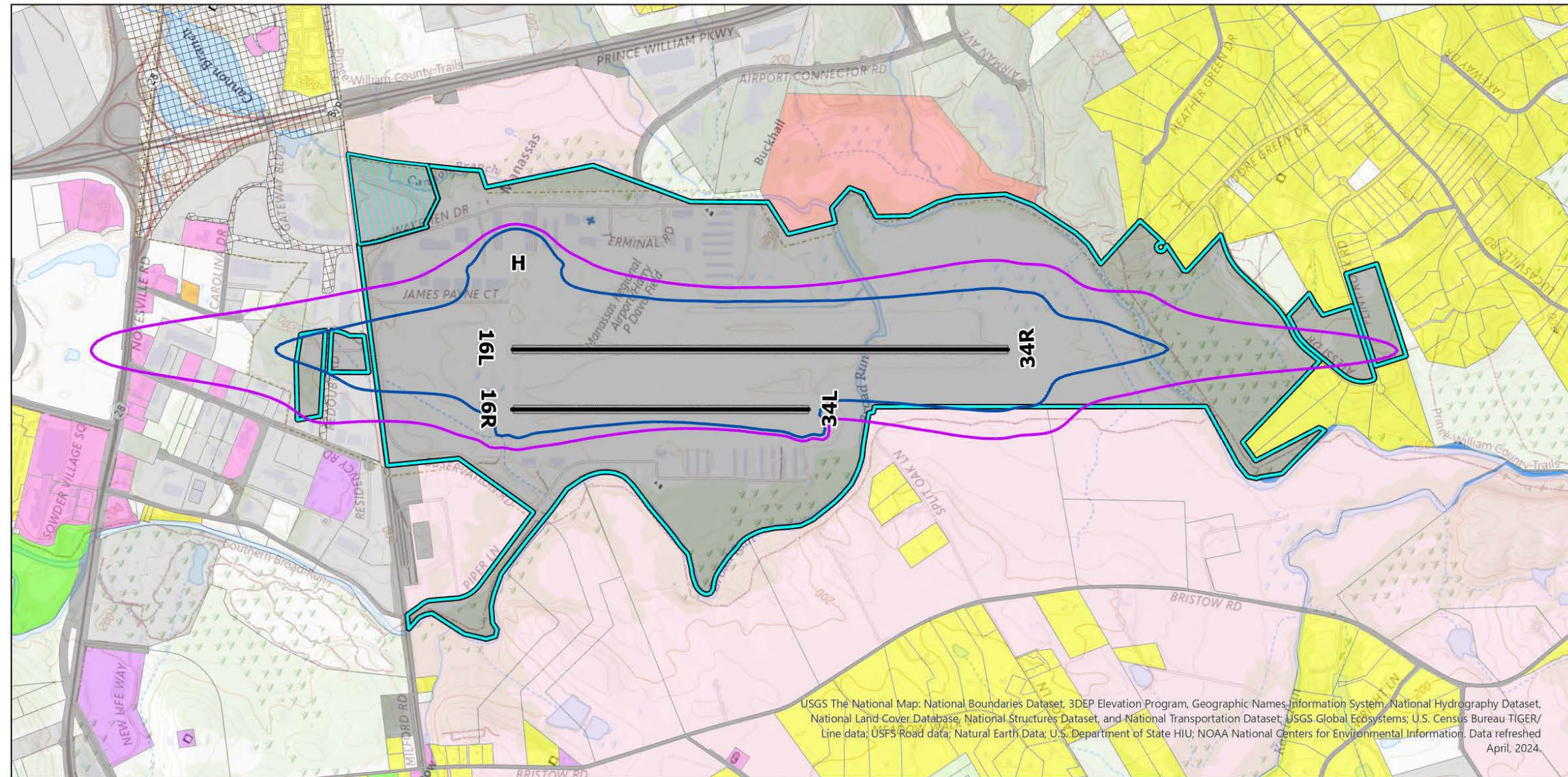
Notes: The Airbus aircraft noise stages are certified by the European Union Aviation Safety Agency (EASA). The Boeing aircraft noise stages are certified by the FAA.

Sources:

^a FAA AEDT, <https://aedt.faa.gov/>

^b European Union Aviation Safety Agency (EASA): Noise Type Certificate Data Sheets for Noise (TCDSN)

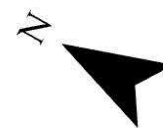
Figure 10. 2036 Alternative #2 and No Action DNL 65 dB Contours



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information. Data refreshed April, 2024.

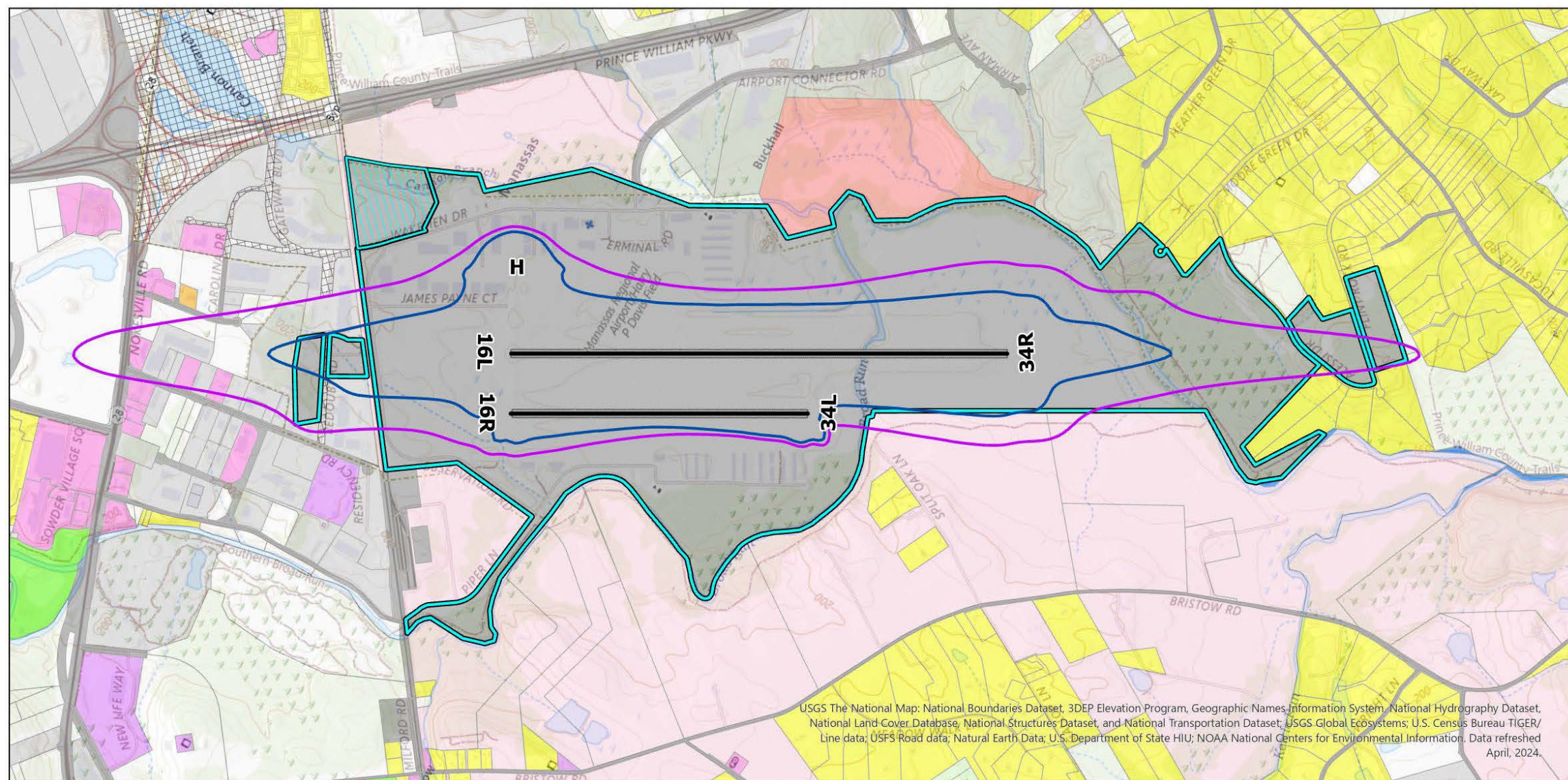
- | | | |
|---|--------------------|--------------------|
| — Runway | ■ Airport | ■ Rail |
| □ 2035 No Action DNL 65 dBA Contour | ■ Commercial | ■ Recreational |
| □ 2035 Proposed Action DNL 65 dBA Contour | ■ Golf Course | ■ School (Private) |
| □ Airport Property | ■ Industrial | ■ Utility |
| □ Amazon Data Center Parcel | ■ Institutional | ■ State Land |
| ■ Agriculture | ■ City of Manassas | ■ Right-of-Way |
| | ■ Open Space | ■ Water |
| | ■ Residential | |

Manassas Regional Airport PART 139 Certification and Terminal Redevelopment



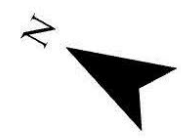
Sources: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025.

Figure 11. 2041 Alternative #2 and No Action DNL 65 dB Contour



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental Information. Data refreshed April, 2024.

- | | | |
|---|------------------|------------------|
| Runway | Airport | Rail |
| 2040 No Action DNL 65 dBA Contour | Commercial | Recreational |
| 2040 Proposed Action DNL 65 dBA Contour | Golf Course | School (Private) |
| Airport Property | Industrial | Utility |
| Amazon Data Center Parcel | Institutional | State Land |
| Agriculture | City of Manassas | Right-of-Way |
| | Open Space | Water |
| | Residential | |



Manassas Regional Airport PART 139 Certification and Terminal Redevelopment

Source: Aviation Environmental Design Tool (Version 3f), CMT, Inc., 2025