# Appendix N: Noise Technical Report

# Noise Technical Report

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

PREPARED BY:

CMT

MARCH 2026

# Table of Contents

## List of Tables



## List of Figures

# 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 scale[4], 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.

**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 |
| **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 |
| (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.<br>(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.<br>(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.<br>(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.<br>(5) Land use compatible provided special sound reinforcement systems are installed.<br>(6) Residential buildings require an NLR of 25.<br>(7) Residential buildings require an NLR of 30.<br>(8) Residential buildings not permitted.<br>Notes:<br>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.<br>2. SLUCM=Standard Land Use Coding Manual.<br>3. Y (Yes)=Land Use and related structures compatible without restrictions.<br>4. N (No)=Land Use and related structures are not compatible and should be prohibited.<br>5. NLR=Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.<br>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.<br>Sources: 14 CFR. Part 150 Airport Noise Compatibility Planning, Appendix A, Table 1. | | | | | | |

# 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 access 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 |

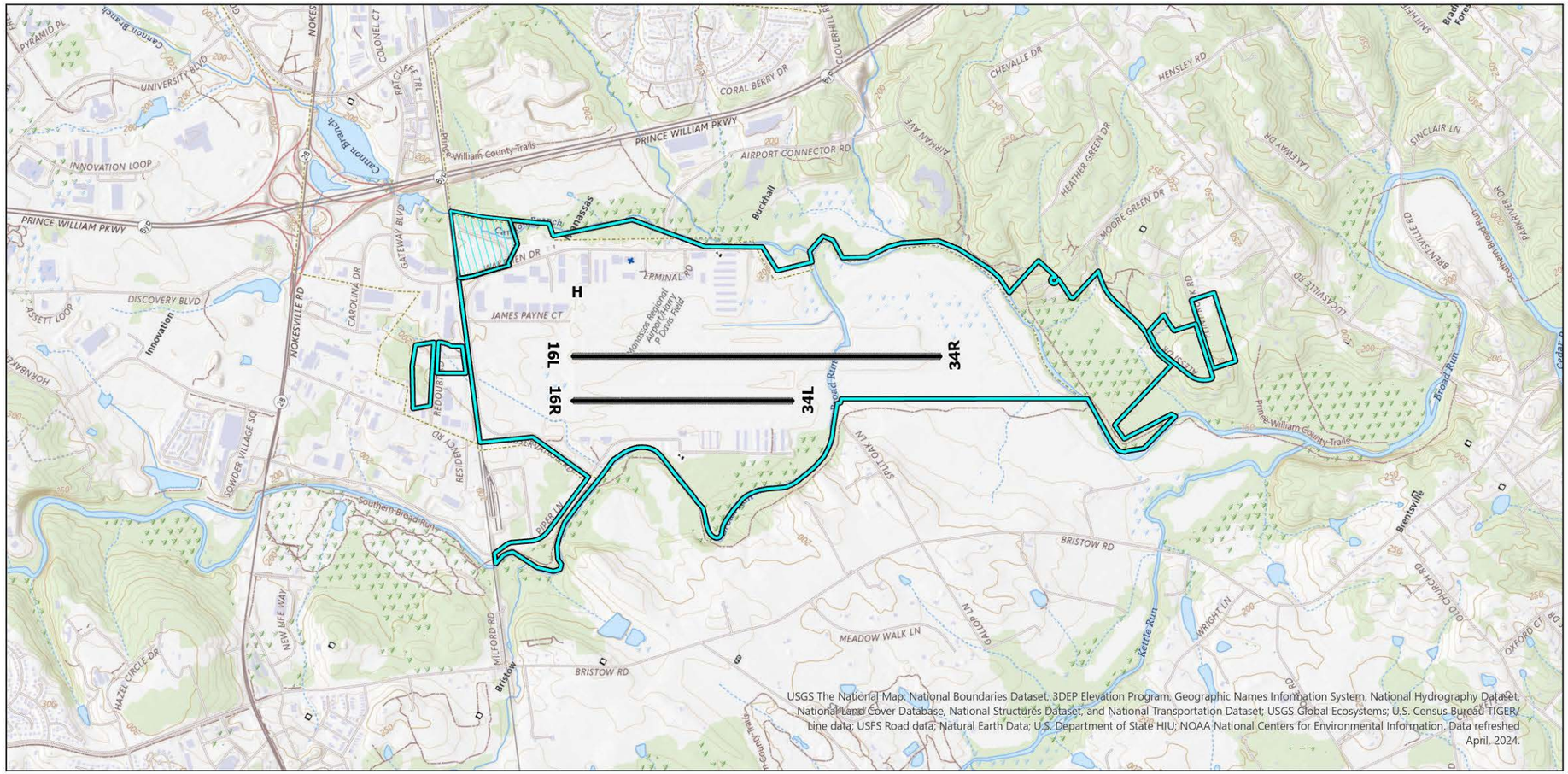
Source: AEDT version 3f.

**Table 3: Helipad Location**

| Name | Latitude | Longitude |
|---|---|---|
| Helipad | 38.729027 | -77.515471 |

Source: AEDT version 3f.

**Figure 1. Airport Layout**




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.

**Table 4: 2023 Existing Condition Annual Aircraft Operations**

| 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.

**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 |
| 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** |

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.

| 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 Miliary 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% |

| Table 8: Runway Use – 2023 Existing Condition | | | | | |
|---|---|---|---|---|---|
| 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 Miliary 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.

| 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 | |
| **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

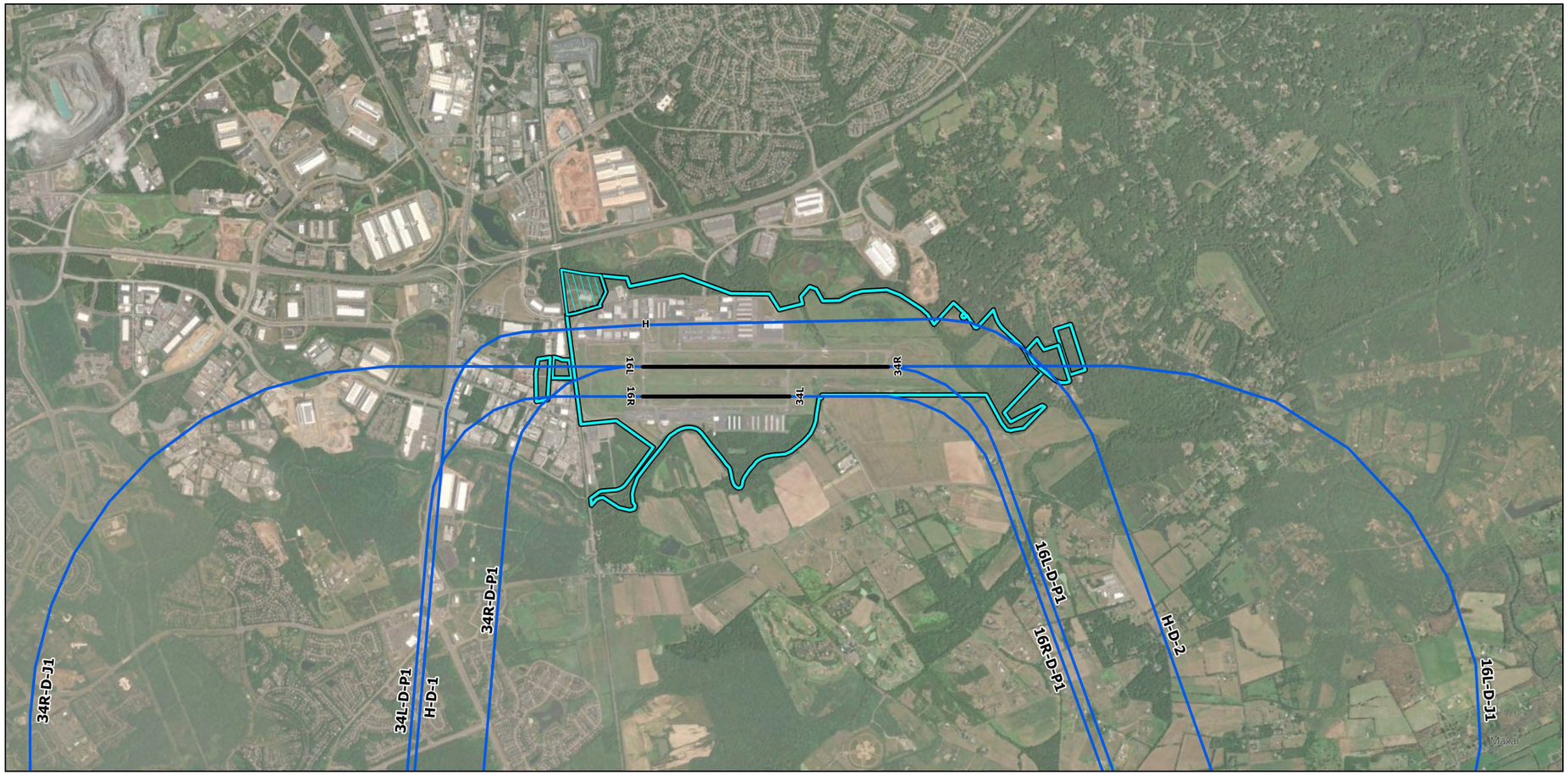
The AEDT uses airport-specific ground tracks and vertical flight profiles to compute three-dimensional flight paths for each modeled aircraft operation. The “default” AEDT vertical profiles, which consist of altitude, speed, and thrust settings, are compiled from data provided by aircraft manufacturers.

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

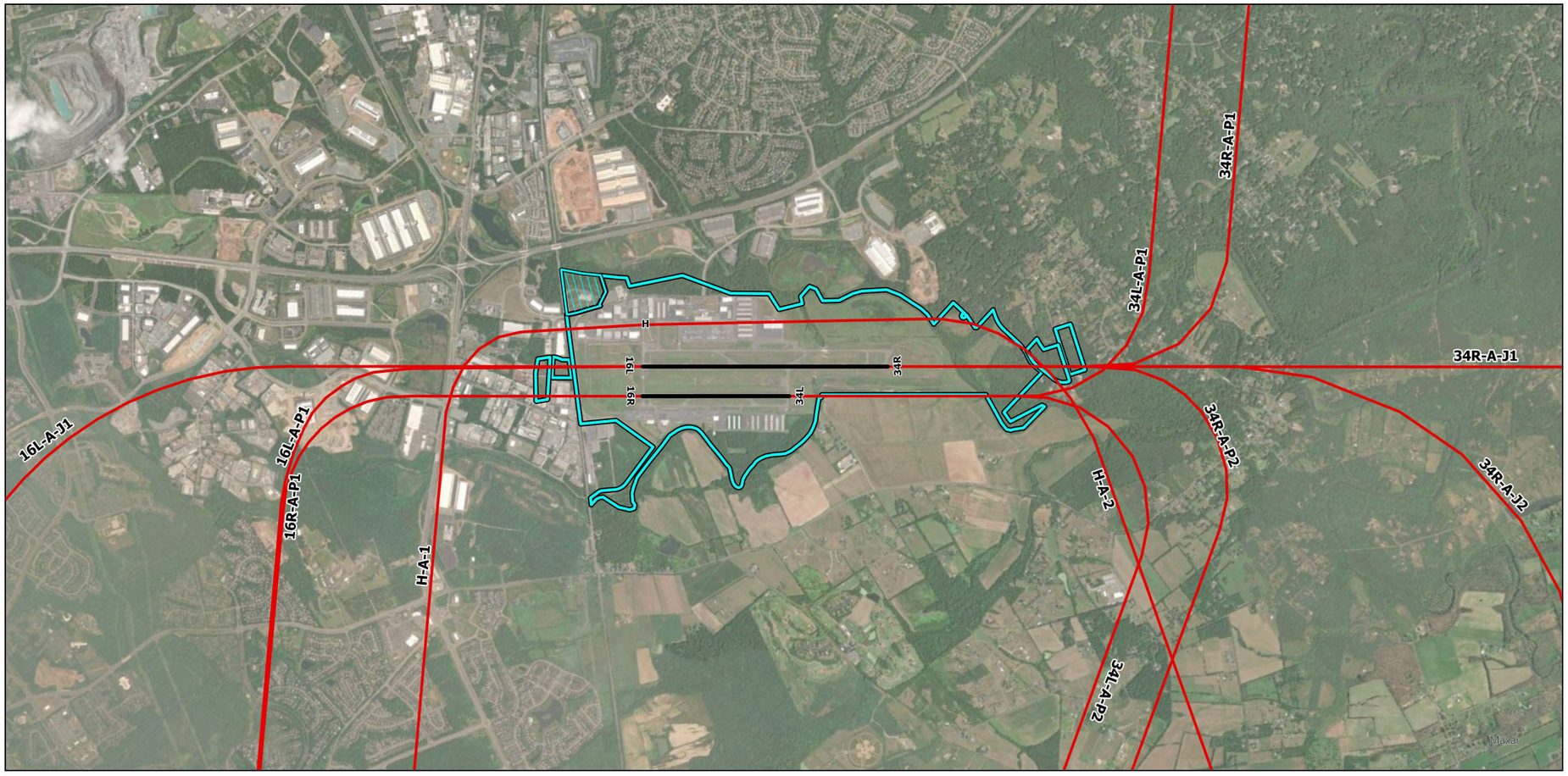
**Manassas Regional Airport PART 139 Certification and Terminal Redevelopment**

N

0 0.5 1 Miles

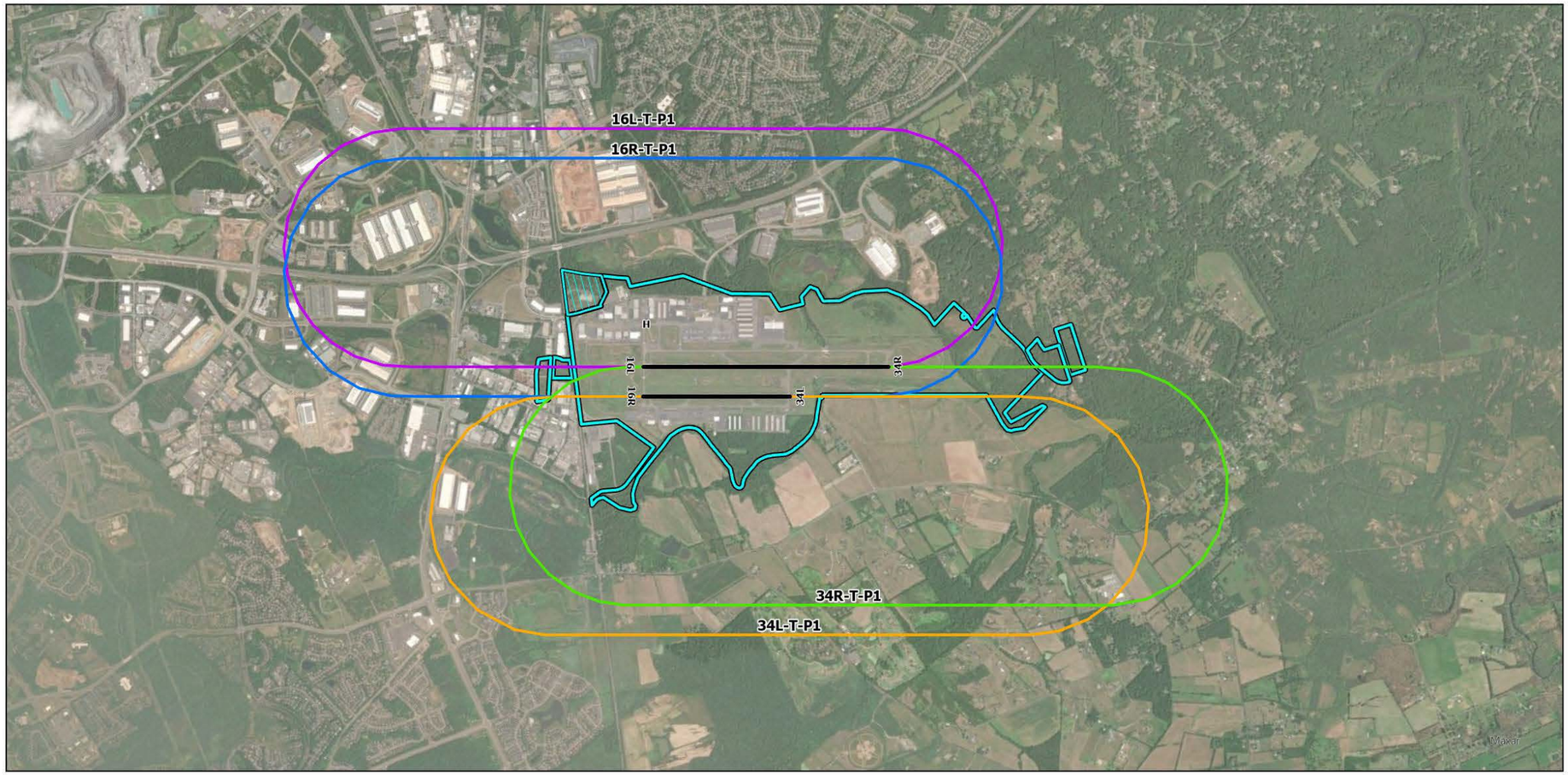
Sources: CMT, Inc., 2025.

**Figure 3. 2023 Existing Arrival Tracks**




Sources: CMT, Inc., 2025.

**Figure 4. 2023 Existing Touch-and-Go Tracks**




Sources: CMT, Inc., 2025.

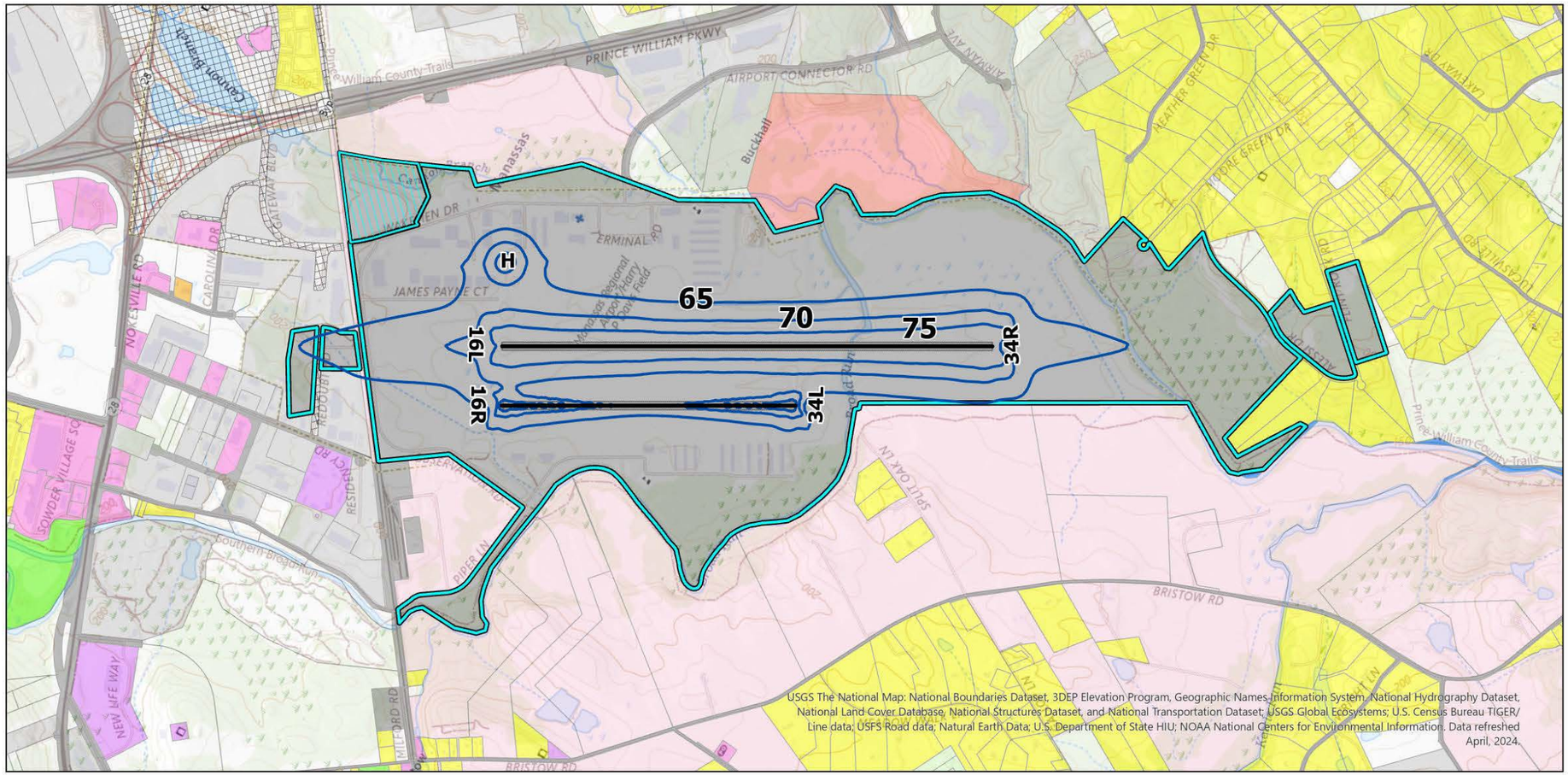
| Table 10: Flight Track Use – 2023 Existing Condition | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RWY | Percent Use by Track | | | | | | | | | | | | | | | | | | | | | | |
| | Arrivals | | | | | | | | | | | 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 | 34RT |
| 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**




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**.

**Table 11: 2036 No-Action Forecast Annual Aircraft Operations**

| 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 Update[5] (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.

**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 |
| 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**).

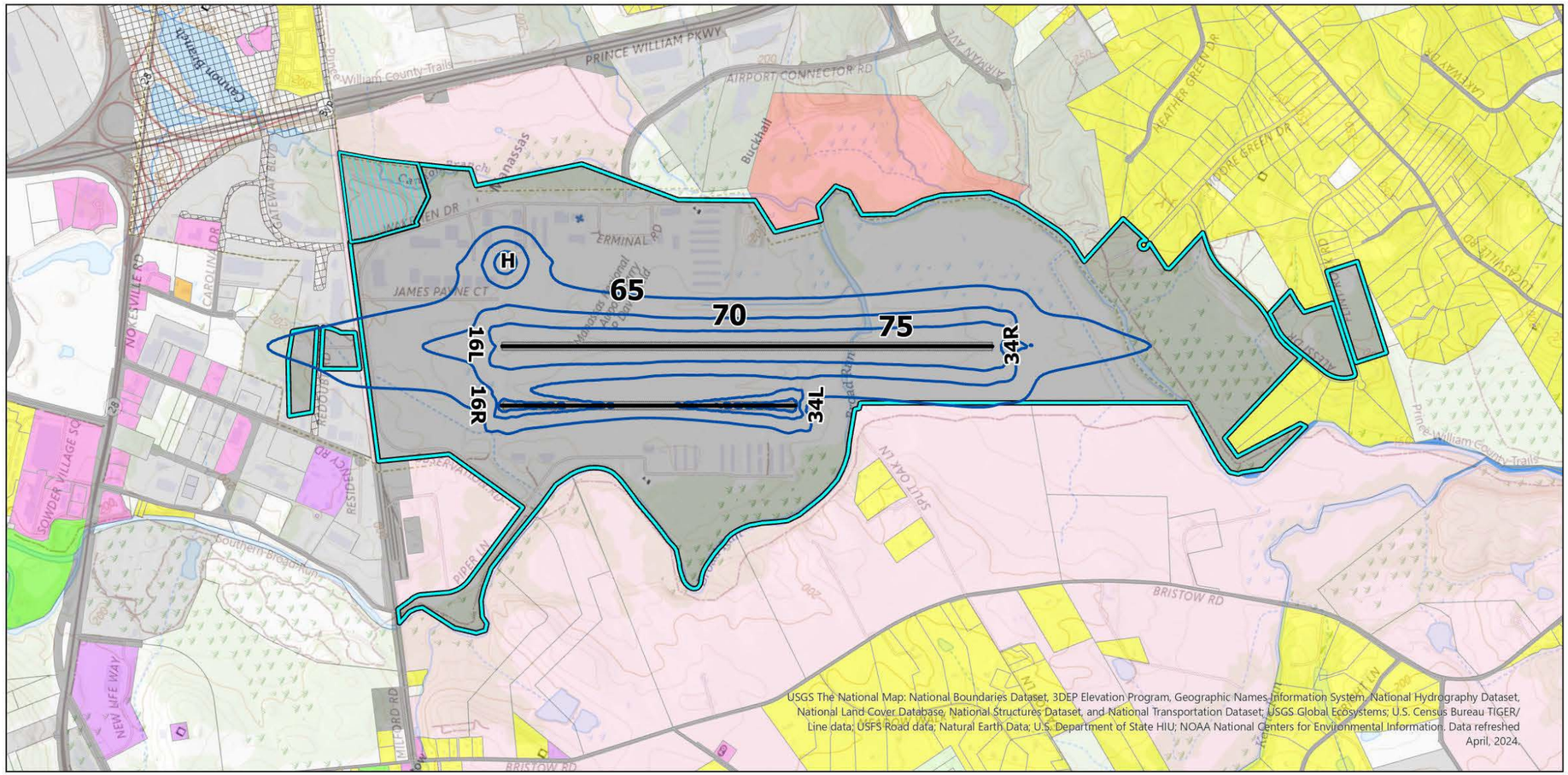
4.4.6 Flight Tracks

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**




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.

**Table 14: 2036 Alternative #2 Forecast Annual Aircraft 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.

**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 |
| 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 | | | | |
| | | Stage 1 | Stage 2 | Stage 3 | | Total |
| | | <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 | | | |
| | | Stage 1 | Stage 2 | Stage 3 | Total |
| | | <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% |

| Table 19: Departure Stage Length – 2036 Alternative #2 | | | | | |
|---|---|---|---|---|---|
| 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.<br>Source: RS&H General Aviation Forecast, Avports Commercial Airline Forecast; CMT, Inc., 2025. | | | | | |

### 4.5.6 Flight Tracks

The distribution of the general aviation/miliary 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.

| Table 20. Air Carrier Jet Flight Track Use – 2036 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. | | | | |

### 4.5.7 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**

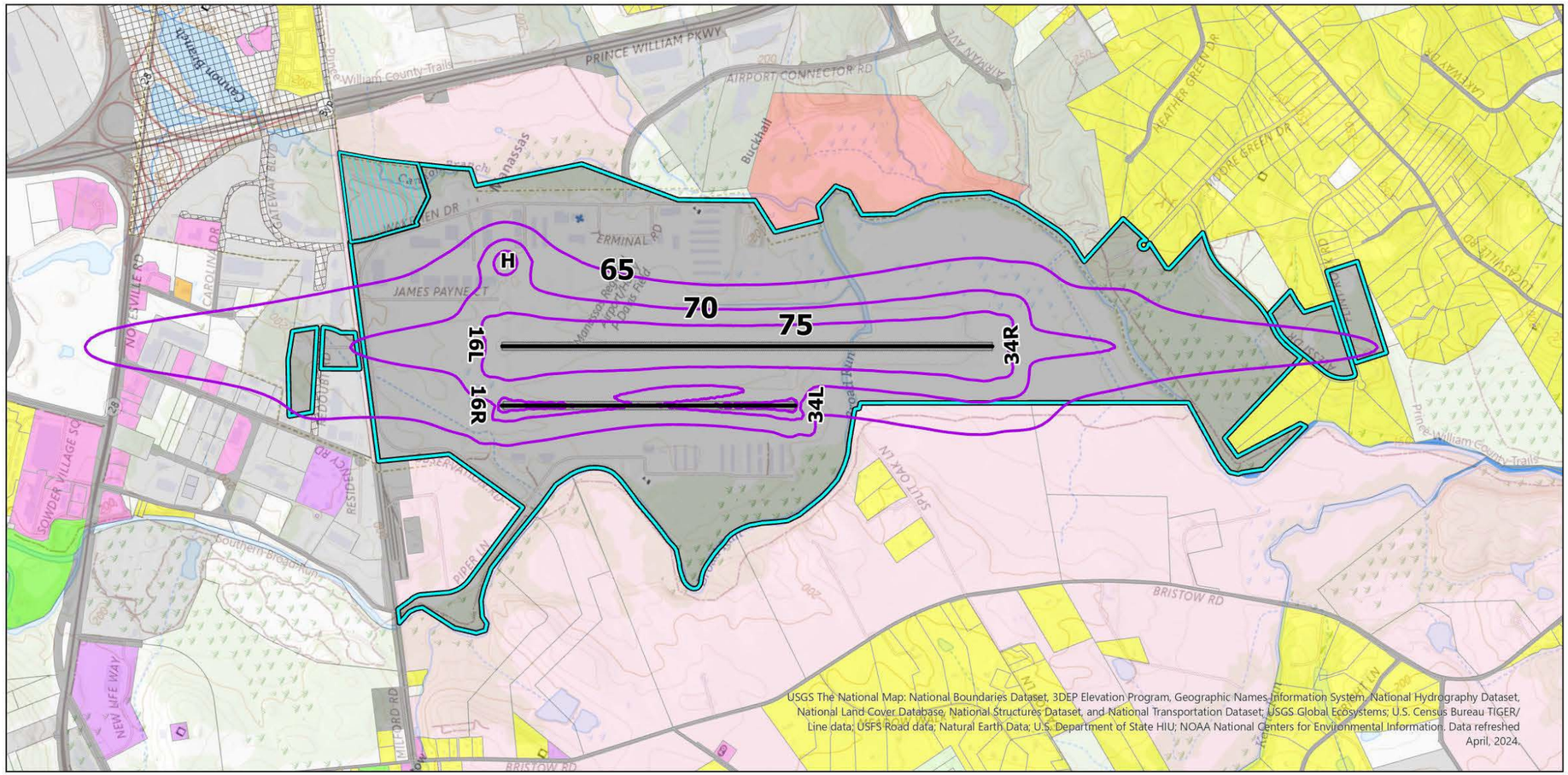


**Figure 7b. 2036 Alternative #2 DNL 65-75 dBA Contours**


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**.

**Table 21: 2041 No-Action Forecast Annual Aircraft Operations**

| 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.

**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 |
| 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**).

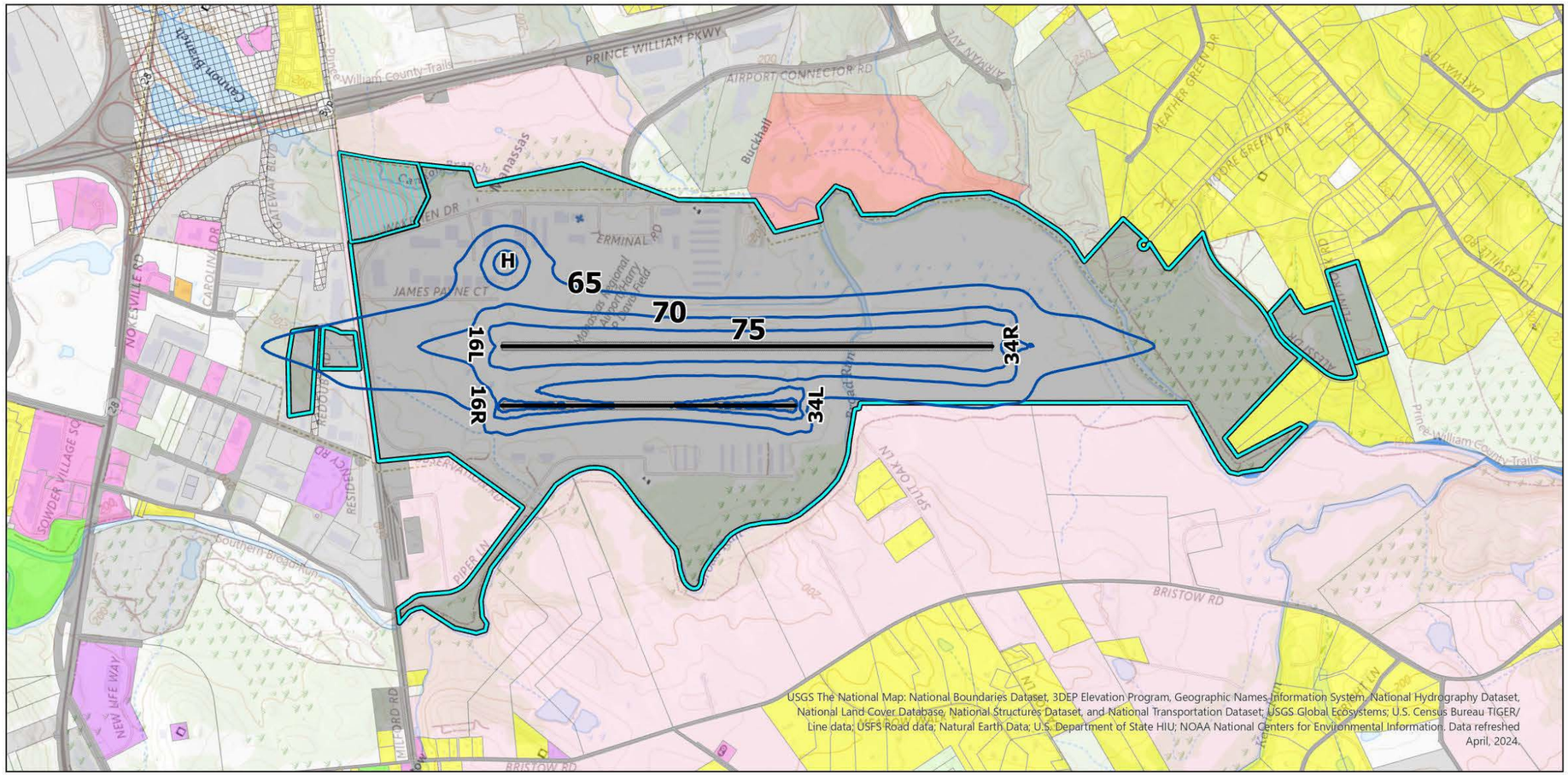
### 4.6.6 Flight Tracks

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**




Sources: Aviation Environnemental 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.

**Table 24: 2041 Alternative #2 Forecast Annual Aircraft 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.

**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 |
| 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 |
| | 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:** | **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.

| Table 26: 2041 Alternative #2 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.

### 4.7.3 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.

| Table 27: Operations by Time of Day - 2041 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 | 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.

| Table 28: Runway Use – 2041 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% |

| 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.<br>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 | | | |
| | | Stage 1 | Stage 2 | Stage 3 | Total |
| | | <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**

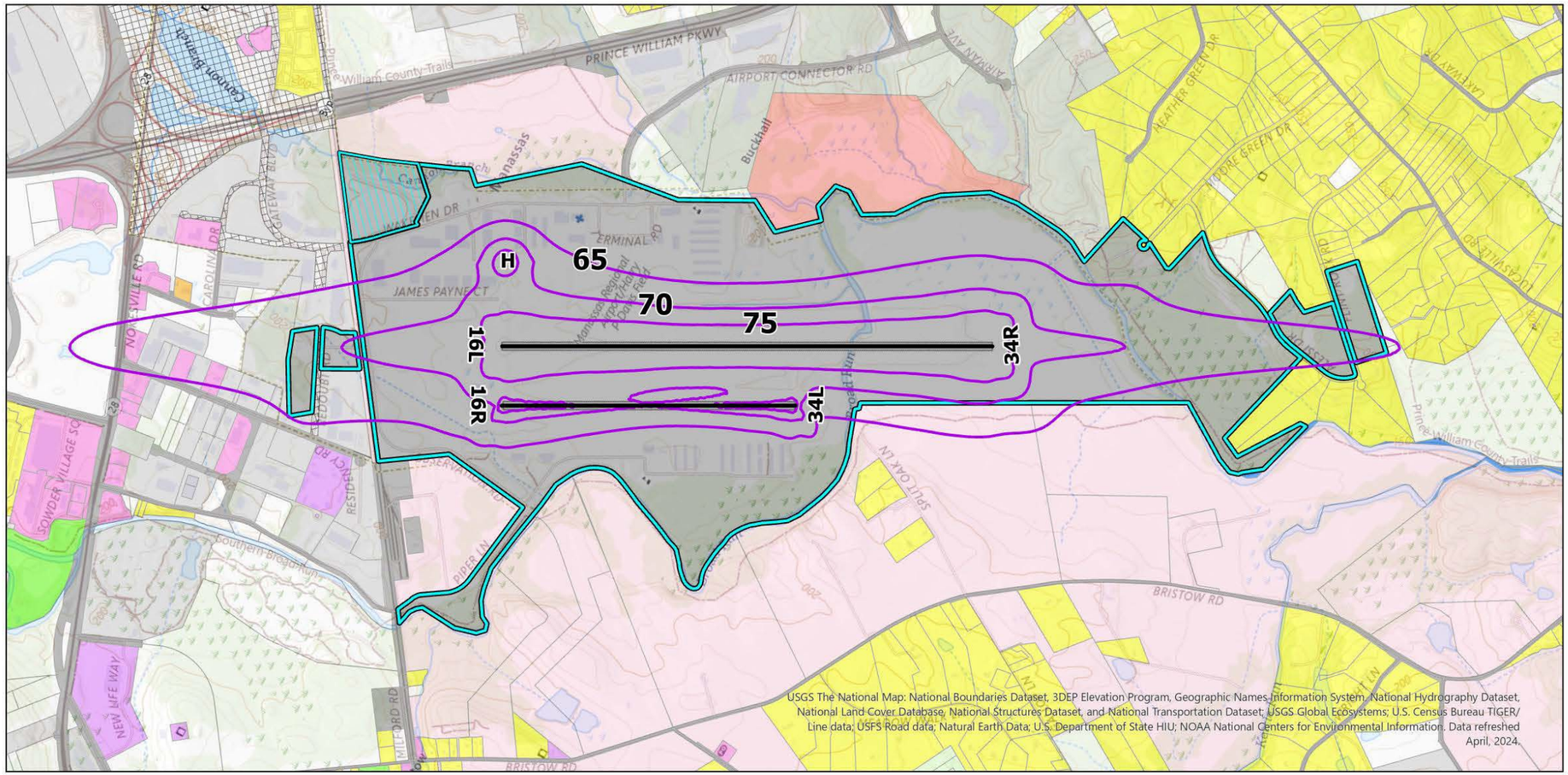


**Figure 9b. 2041 Alternative #2 DNL 65-75 dB Contours**


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.

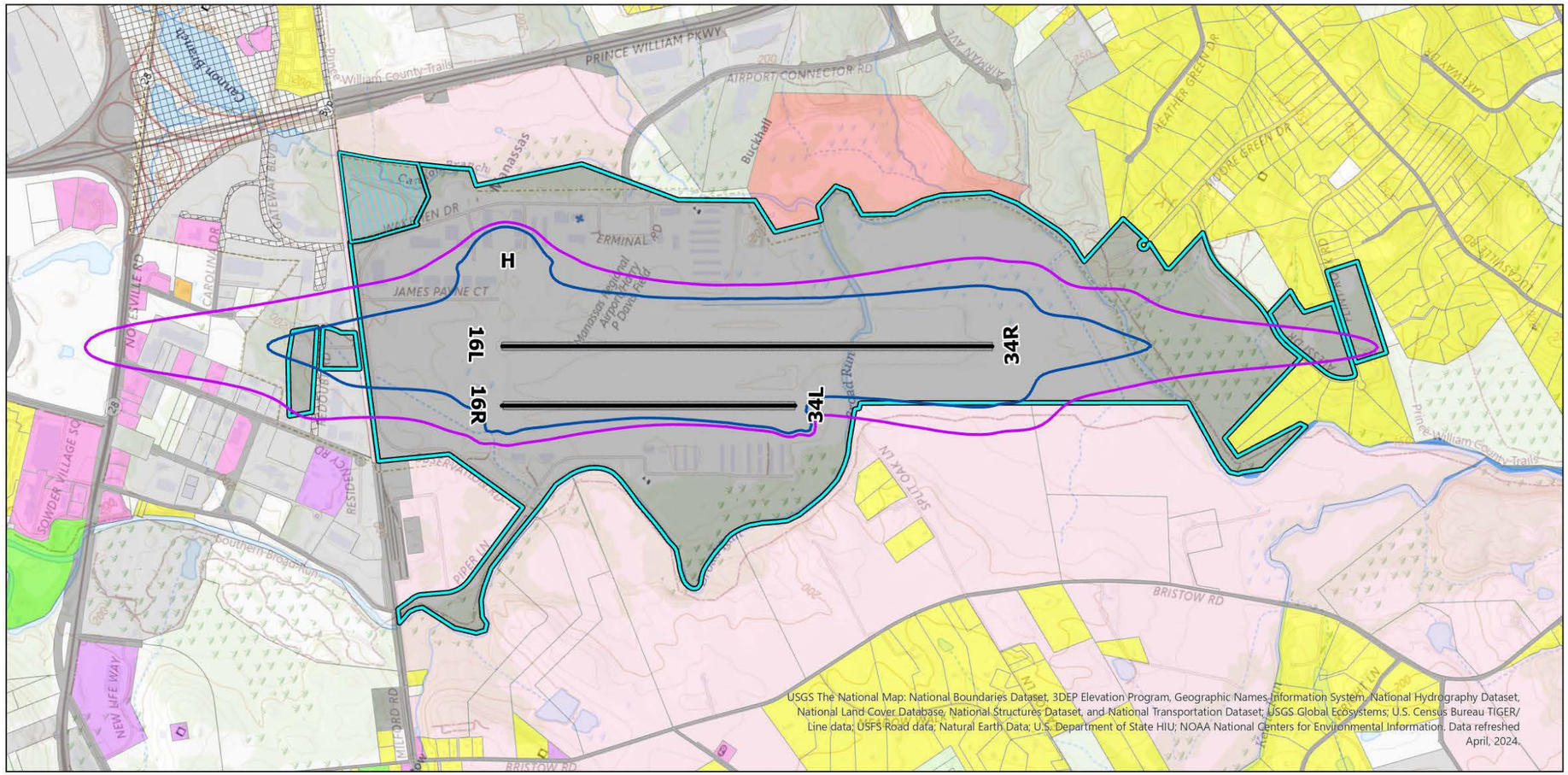
[6] European Union Aviation Safety Agency (EASA): Noise Type Certificate Data Sheets for Noise (TCDSN), https://www.easa.europa.eu/en/document-library/type-certificates/tcdsn

[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 |

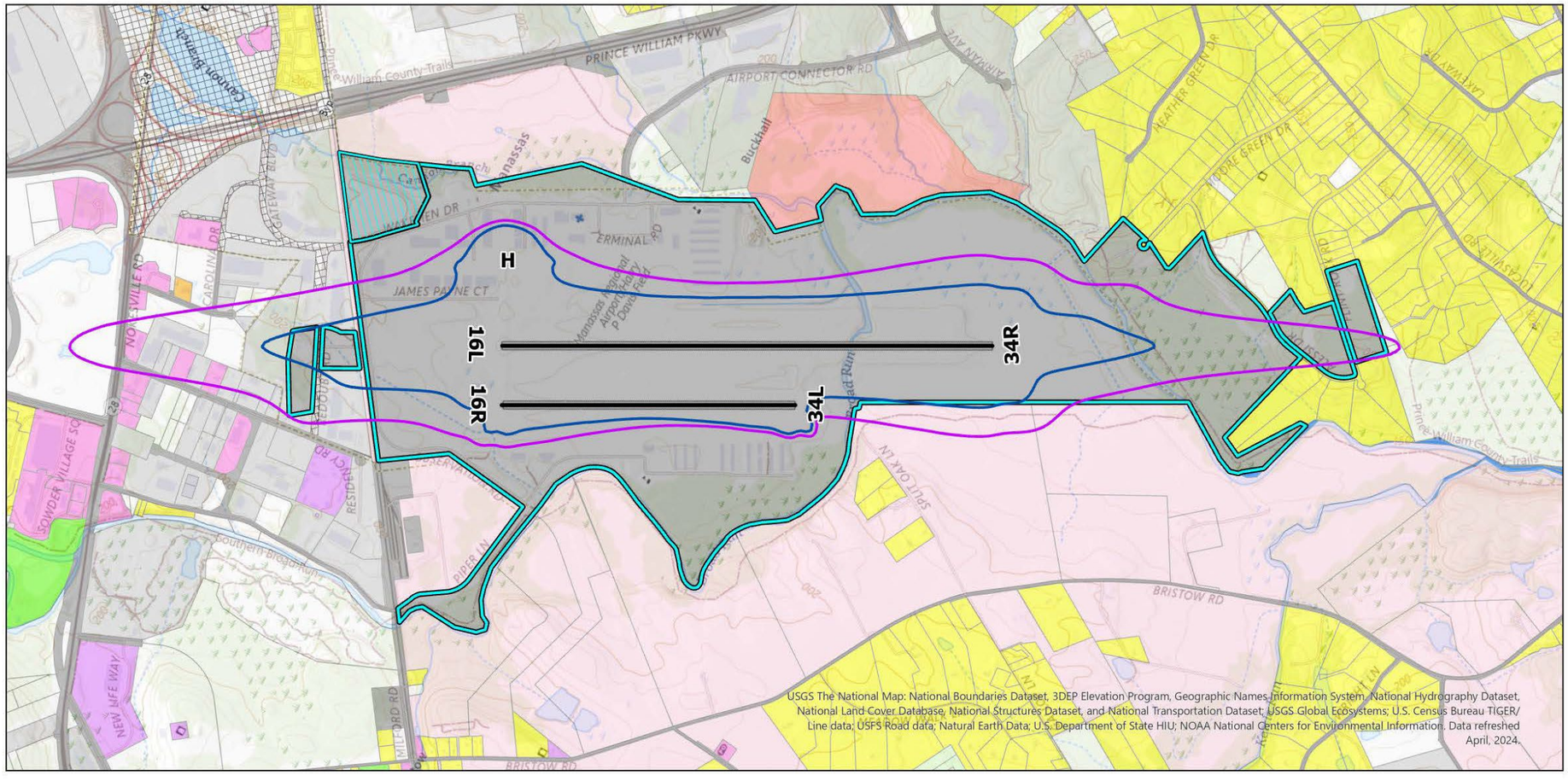
Notes: The Airbus aircraft noise stages are certified by the European Union Aviation Safety Agency (EASA). The Boeing aircraft noise stages are certified by the FAA.
Sources:
[a] FAA AEDT, https://aedt.faa.gov/
[b] European Union Aviation Safety Agency (EASA): Noise Type Certificate Data Sheets for Noise (TCDSN)

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




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

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




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