



Westfield-Barnes Regional Airport

Title 14 Code of Federal Regulations (CFR) Part 150

Noise Compatibility Program Report

Appendices

A Um2023

Prepared for:

The City of Westfield

By.

The Jones Payne Group Inc.
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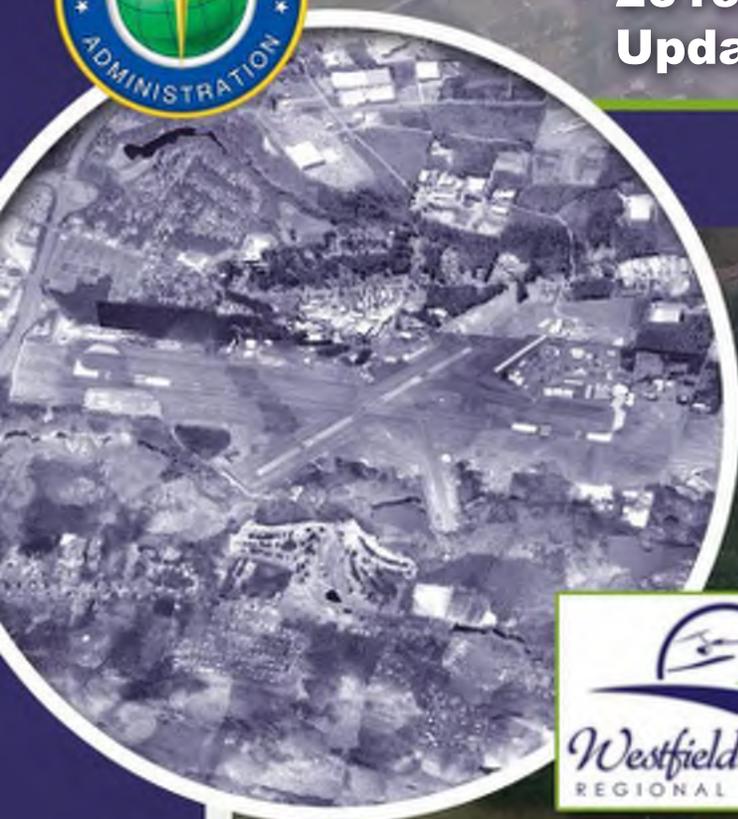
Appendix A Westfield-Barnes Regional Airport 2019/2024 Noise Exposure Map Update



Westfield-Barnes Regional Airport 2019/2024 Noise Exposure Map Update



FINAL - May 2019



Prepared for:
**The Westfield-Barnes
Regional Airport**



Prepared by:
Wyle Laboratories, Inc.



Westfield-Barnes Regional Airport 2019/2024 Noise Exposure Map Update

FINAL

Wyle Report WR 19-01
Job No. 100244.AI54.0001

May 2019

Prepared for:

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The logo for Wyle Laboratories, Inc. consists of the word "wyle" in a bold, lowercase, sans-serif font.

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CERTIFICATION

This is to certify the following:

- (1) That the revised Noise Exposure Maps, and associated documentation for the Westfield-Barnes Regional Airport submitted in this volume to the Federal Aviation Administration under Federal Aviation Regulations Part 150, Subpart B, Section 150.21, are true and complete under penalty of 18 U.S.C. Part 1001; and
- (2) All interested parties have been afforded opportunity to submit their views, data, and comments concerning the correctness and adequacy of the revised existing and forecast conditions noise exposure map, and of the descriptions of forecast aircraft operations.

By: 
Eric J. Billowitz, Airport Manager

Airport Name: Westfield-Barnes Regional Airport
Airport Owner/
Operator: City of Westfield
Westfield Barnes Airport Commission
Address: 110 Airport Road
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Noise Exposure Map Checklist

Program Requirement	Yes	No	Supporting Pages or Review Comments
I. Submitting And Identifying The NEM:			
A. Submission is properly identified:			
1. 14 C.F.R. Part 150 NEM?	✓		
2. NEM and NCP together?		✓	NEM update only
3. Revision to NEMs FAA previously determined to be in compliance with Part 150?	✓		August 2009 ROA and December 2015 ROA
B. Airport and Airport Operator's name are identified?	✓		page iii
C. NCP is transmitted by airport operator's dated cover letter, describing it as a Part 150 submittal and requesting appropriate FAA determination?		✓	NEM update only
II. Consultation: [150.21(b), A150.105(a)]			
A. Is there a narrative description of the consultation accomplished, including opportunities for public review and comment during map development?	✓		Chapter 5
B. Identification of consulted parties:			
1. Are the consulted parties identified?	✓		Chapter 5
2. Do they include all those required by 150.21(b) and A150.105(a)?	✓		
3. Agencies in 2, above, correspond to those indicated on the NEM?	✓		
C. Does the documentation include the airport operator's certification, and evidence to support it, that interested persons have been afforded adequate opportunity to submit their views, data, and comments during map development and in accordance with 150.21(b)?	✓		page iii
D. Does the document indicate whether written comments were received during consultation and, if there were comments that they are on file with the FAA regional airports division manager?	✓		Chapter 5. Comments included in Appendix C.
III. General Requirements: [150.21]			
A. Are there two maps, each clearly labeled on the face with year (existing condition year and one that is at least 5 years into the future)?	✓		
B. Map currency:			
1. Does the year on the face of the existing condition map graphic match the year on the airport operator's NEM submittal letter?	✓		Figures 3-9 and 4-1
2. Is the forecast year map based on reasonable forecasts and other planning assumptions and is it for at least the fifth calendar year after the year of submission?	✓		TAF-based
3. If the answer to 1 and 2 above is no, the airport operator must verify in writing that data in the documentation are representative of existing condition and at least 5 years' forecast conditions as of the date of submission?		n/a	
C. If the NEM and NCP are submitted together:			
1. Has the airport operator indicated whether the forecast year map is based on either forecast conditions without the program or forecast conditions if the program is implemented?		n/a	NEM update only
2. If the forecast year map is based on program implementation:			
a. Are the specific program measures that are reflected on the map identified?		n/a	NEM update only
b. Does the documentation specifically describe how these measures affect land use compatibilities depicted on the map?		n/a	NEM update only
3. If the forecast year NEM does not model program implementation, the airport operator must either submit a revised forecast NEM showing program implementation conditions [B150.3(b), 150.35(f)] or the sponsor must demonstrate the adopted forecast year NEM with approved NCP measures would not change by plus/minus 1.5 DNL? (150.21(d))		n/a	NEM update only

Noise Exposure Map Checklist – continued

Program Requirement	Yes	No	Supporting Pages or Review Comments
IV. Map Scale, Graphics, And Data Requirements: A150.101, A150.103, A150.105, 150.21(a)]			
A. Are the maps of sufficient scale to be clear and readable (they must not be less than 1" to 2,000'), and is the scale indicated on the maps? <i>(Note (1) if the submittal uses separate graphics to depict flight tracks and/or noise monitoring sites, these must be of the same scale, because they are part of the documentation required for NEMs.)</i> <i>(Note (2) supplemental graphics that are not required by the regulation do not need to be at the 1" to 2,000' scale)</i>	✓		
B. Is the quality of the graphics such that required information is clear and readable? <i>(Refer to C. through G., below, for specific graphic depictions that must be clear and readable)</i>	✓		
C. Depiction of the airport and its environs:			
1. Is the following graphically depicted to scale on both the existing condition and forecast year maps?			
a. Airport boundaries	✓		
b. Runway configurations with runway end numbers	✓		Figure 2-2 and/or 3-8
2. Does the depiction of the off-airport data include?			
a. A land use base map depicting streets and other identifiable geographic features	✓		
b. The area within the DNL 65 dB (or beyond, at local discretion)	✓		
c. Clear delineation of geographic boundaries and the names of all jurisdictions with planning and land use control authority within the DNL 65 dB (or beyond, at local discretion)	✓		Ctiy of Westfield, Hampden County and Hampshrie County.
D. 1. Continuous contours for at least the DNL 65, 70, and 75 dB?	✓		"Islands" of off-airport 65, 70 and 75 dB DNL exposure.
2. Has the local land use jurisdiction(s) adopted a lower local standard and if so, has the sponsor depicted this on the NEMs?		✓	
3. Based on current airport and operational data for the existing condition year NEM, and forecast data representative of the selected year for the forecast NEM?	✓		
E. Flight tracks for the existing condition and forecast year timeframes (these may be on supplemental graphics which must use the same land use base map and scale as the existing condition and forecast year NEM), which are numbered to correspond to accompanying narrative?	✓		Figures 3-2 through 3-7
F. Locations of any noise monitoring sites (these may be on supplemental graphics which must use the same land use base map and scale as the official NEMs)	n/a		
G. Noncompatible land use identification:			
1. Are noncompatible land uses within at least the DNL 65 dB noise contour depicted on the map graphics?	✓		
2. Are noise sensitive public buildings and historic properties identified? <i>(Note: If none are within the depicted NEM noise contours, this should be stated in the accompanying narrative text.)</i>	✓		None within contours, stated in narrative.
3. Are the noncompatible uses and noise sensitive public buildings readily identifiable and explained on the map legend?	✓		
4. Are compatible land uses, which would normally be considered noncompatible, explained in the accompanying narrative?		n/a	

Noise Exposure Map Checklist – concluded

Program Requirement	Yes	No	Supporting Pages or Review Comments
V. Narrative Support Of Map Data: [150.21(a), A150.1, A150.101,A150.103]			
A. 1. Are the technical data and data sources on which the NEMs are based adequately described in the narrative?	✓		Chapters 3 and 4.
2. Are the underlying technical data and planning assumptions reasonable?	✓		
B. Calculation of Noise Contours:			
1. Is the methodology indicated?	✓		Section 3.2
a. Is it FAA approved?	✓		See 2009 Part 150 Study Update re NMAP
b. Was the same model used for both maps? (<i>Note: The same model also must be used for NCP submittals associated with NEM determinations already issued by FAA where the NCP is submitted later, unless the airport sponsor submits a combined NEM/NCP submittal as a replacement, in which case the model used must be the most recent version at the time the update was started.</i>)	✓		
c. Has AEE approval been obtained for use of a model other than those that have previous blanket FAA approval?	✓		See 2009 Part 150 Study Update re NMAP
2. Correct use of noise models:			
a. Does the documentation indicate, or is there evidence, the airport operator (or its consultant) has adjusted or calibrated FAA-approved noise models or substituted one aircraft type for another that was not included on the FAA's pre-approved list of aircraft substitutions?	n/a		No adjustments or calibrations needed/performed.
b. If so, does this have written approval from AEE, and is that written approval included in the submitted document?	n/a		
3. If noise monitoring was used, does the narrative indicate that Part 150 guidelines were followed?	n/a		Noise monitoring was not used.
4. For noise contours below DNL 65 dB, does the supporting documentation include an explanation of local reasons? (<i>Note: A narrative explanation, including evidence the local jurisdiction(s) have adopted a noise level less than DNL 65 dB as sensitive for the local community(ies), and including a table or other depiction of the differences from the Federal table, is highly desirable but not specifically required by the rule. However, if the airport sponsor submits NCP measures within the locally significant noise contour, an explanation must be included if it wants the FAA to consider the measure(s) for approval for purposes of eligibility for Federal aid.</i>)	n/a		65 dB DNL is the lowest contour shown; DNL gradient is shown to 45 dB for purposes of educating the reader, not for the analytical purposes.

Nomenclature

ID	Definition
°F	degrees Fahrenheit
AAD	Annual Average Daily
AEDT	Aviation Environmental Design Tool
AFE	Above Field Elevation
AGL	Above Ground Level
AIP	Airport Improvement Program
ALS	Approach Lighting System
ANSI	American National Standards Institute
ARP	Airfield Reference Point
ATADS	Air Traffic Activity Display System
ATAR	Air Traffic Activity Report
ATC	Air Traffic Control
ATCAA	Air Traffic Control Assigned Airspace
ATCT	Air Traffic Control Tower
BAF or KBAF	ICAO identifier for the airport
CY	Calendar Year
dB	Decibel (A-weighted unless specified otherwise)
dBA	A-Weighted Decibels
dB(A)	A-Weighted Decibels
DME	Distance Measuring Equipment
DNL	Day-Night Average Sound Level
DOD	Department of Defense
EAO	Equivalent Annual Operations
EDE	Equivalent Daily Events
FAA	Federal Aviation Administration (US)
FBO	Fixed Base Operator
FICAN	Federal Interagency Committee on Aviation Noise
FICON	Federal Interagency Committee on Noise
ft	Feet
FY	Fiscal Year
GA	General Aviation
GIS	Geographic Information Systems
GPS	Global Positioning System
HA	Highly Annoyed
Hz	Hertz
IAP	Instrument Approach Procedure
ICAO	International Civil Airport Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
in Hg or inHg	inches of mercury
INM	Integrated Noise Model (US FAA)
ISO	International Organization for Standardization
kts	Knots
L	Sound Level
LAeq	Equivalent Sound Level, A-weighted
Ldn	Day-Night Average Sound Level

Nomenclature (concluded)

ID	Definition
Leq	Equivalent Sound Level
Leq(24)	Equivalent Sound Level over 24 hours
Leq(h)	Hourly Equivalent Sound Level
Lmax	Maximum Sound Level
m	meter (distance unit)
mmHg	millimeters of mercury
MALSR	Medium Intensity Approach Lighting System
MSL	Mean Sea Level
NA	Number of Events At or Above a Selected Threshold
NAS	National Airspace System
NAV	Navigational Route
NCP	Noise Compatibility Plan
NDB	Non-directional Beacon
NEM	Noise Exposure Map
NIPTS	Noise-induced Permanent Threshold Shift
NLR	Noise Level Reduction
PAPI	Precision Approach Path Indicator
POI	Point of Interest
RH	Relative Humidity
ROA	Record of Approval
SEL	Sound Exposure Level
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
TA	Time Above
T&G	Touch-and-Go
TACAN	Tactical Area Navigation
TAF	Terminal Area Forecast
TRACON	Terminal Radar Approach Control
U.S. or US	United States
VFR	Visual Flight Rules
VOR	Very-High Frequency Omni-directional Range
VORTAC	VOR co-located with a TACAN
WR	Wyle Report

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1 Introduction

This document presents the Noise Exposure Map (NEM) Update conducted by Westfield-Barnes Regional Airport to comply with a mandate by the Federal Aviation Administration (FAA) that civilian aircraft operations at Westfield-Barnes be modeled using the Aviation Environmental Design Tool (AEDT). AEDT is the FAA's software system that dynamically models aircraft performance in space and time to produce estimates of fuel burn, emissions, and noise. Previously, in the 2015 NEM Update for Westfield-Barnes, civil aircraft noise and military aircraft noise was estimated using Noisemap. The current update of the 2019 and 2024 NEMs now combine military aircraft noise, estimated with Noisemap Version 7.3, with civil aircraft noise estimated with AEDT Version 2c. In summary, no significant change in airport operations are expected to occur through 2024, therefore modeled operations remain identical to those used in the 2015/2020 NEM update, and estimating civil aircraft noise with AEDT produced no significant change to the NEMs.

Chapter 1 is divided into 5 subsections – overview/history (1.1), a subsection describing the Noise Exposure Map (1.2), background on land use compatibility (1.3), roles and responsibilities of the principal project stakeholders (1.4) and an outline of the remaining chapters of the document (1.5).

1.1 Overview and History

As part of its ongoing commitment to the community, Westfield-Barnes Regional Airport is voluntarily conducting an update to its NEMs. The Update, funded by the FAA and regulated under Chapter 14, Part 150 of the Code of Federal Regulations, estimates and evaluates aircraft noise from aircraft operations from Westfield-Barnes Regional Airport. The study is herein referred to as the “NEM Update”.

A full study under Part 150 consists of two key components:

- 1) Noise Exposure Map (NEM); and
- 2) Noise Compatibility Program (NCP).

The NEM shows where noise would occur at least 5 years after the date of submission of the map. The NCP consists of updated measures proposed to reduce noise exposure in the community to minimize land use considered incompatible with aircraft operations. This document presents only the NEM component of the Part 150 Study Update.

Westfield-Barnes four-letter airport identifier given by the International Civil Aviation Organization (ICAO) is KBAF, shortened to BAF for brevity. “BAF” is used interchangeably with “Westfield-Barnes” throughout the document.

BAF's previous (full) Part 150 Study Update was submitted in 2009 and approved by the FAA on August 3, 2009. In 2015, BAF hired Wyle Laboratories, Inc. to update the NEMs and these were submitted to the FAA in the fall of 2015. In 2018, BAF hired Wyle Laboratories to update the NEMs again, for the purpose of modeling the noise from civilian aircraft using AEDT; these updated NEMs are expected to be submitted to the FAA in the spring of 2019.

1.2 Noise Exposure Map

Noise represents one of the most contentious environmental issues associated with aircraft operations. Although many other sources of noise are present in communities, aircraft noise is readily identified by individuals as a source of annoyance. An assessment of aircraft noise requires a general understanding of how sound affects people and the natural environment and how it is measured. Appendix A provides a detailed discussion of noise and its effects on people and the environment.

NEMs are scaled, geographic depiction of an airport, its aircraft noise contours, and surrounding area, including the accompanying documentation setting forth the required descriptions of forecast aircraft operations at that airport during the fifth calendar year (or later) beginning after submission of the map, together with the ways, if any, those operations will affect the map, including noise contours and the forecast land uses. The 2019 NEM Update was submitted in 2019, when BAF elected to show a five-year forecast, therefore, its NEM is for the year 2024. The noise contours for 2024 are based upon a forecast derived from operations estimated for 2019; thus noise contours for 2019 are presented first. The current NEM Update which was completed in 2019, utilizes the same airport operations that were used in 2015 and updates the modeling of civilian aircraft with AEDT, also shows the 2019 and forecast 2024 noise contours.

Aircraft noise is presented in terms of Day-Night Average Sound Level (DNL), mandated by the FAA. DNL is fully described in Appendix A.

Required elements of the NEM are:

- Runways, flight tracks, airport boundaries;
- Aircraft DNL contours of 65, 70, and 75 dB over a land use map of a sufficient scale and quality to discern streets and other identifiable geographic features;
- Non-compatible land uses exposed to DNL greater than or equal to 65 dB (only if compatible from self-noise);
- Locations of:
 - noise sensitive public buildings (e.g., schools, hospitals, and health care facilities),
 - properties on or eligible for inclusion in the National Register of Historic Places, and
 - any aircraft noise monitoring sites utilized for data acquisition and refinement procedures.
- Estimates of the number of people residing within DNL contours.

1.3 Land Use Compatibility

Suggested land use compatibility guidelines for evaluating land use in areas surrounding public-use airports were developed by the FAA when the Part 150 regulations were promulgated. These guidelines, reproduced in Table 1-1, outline the recommended compatibility for common land uses in the vicinity of airports. Based on these federal guidelines, all land uses, including residential and noise-sensitive developments, are considered compatible at DNL less than 65 decibels (dB). At levels greater than or equal to 65 dB DNL, different land uses are either permitted outright, permitted with recommended sound attenuation materials incorporated into the construction, or not recommended.

The Federal government does not have jurisdiction in local land use decisions; thus, the land-use compatibility guidelines are recommendations for use by local planning jurisdictions, and form the basis for defining areas that may be eligible for federal funding assistance through the Airport Improvement Program (AIP). However, this does not preclude local jurisdictions from implementing local noise standards that are more stringent than those recommended by federal guidance.

The designations contained in Table 1-1 do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining acceptable and permissible land uses rests with local authorities.

1.4 Project Roles and Responsibilities

As the “airport operator”, the City has overall authority for all Part 150 related actions at BAF.

The City retained Wyle Laboratories, Inc. to conduct the technical work required to fulfill Part 150 analysis and documentation requirements. No advisory committees were established.

Table 1-1. Land Use Compatibility with Yearly Day-Night Average Sound Levels

Land Use	Band of DNL (dB)					
	Less than 65	65 - 70	70 - 75	75 - 80	80 - 85	Greater than or equal to 85
<u>Residential</u>						
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
<u>Public Use</u>						
Schools	Y	N ¹	N ¹	N	N	N
Hospitals and Nursing Homes	Y	25	30	N	N	N
Churches, Auditoriums, and Concert Halls	Y	25	30	N	N	N
Government Services	Y	Y	25	30	N	N
Transportation	Y	Y	Y ²	Y ³	Y ⁴	Y ⁴
Parking	Y	Y	Y ²	Y ³	Y ⁴	N
<u>Commercial Use</u>						
Offices, business and Professional	Y	Y	25	30	N	N
Wholesale and retail building materials, hardware, and farm equipment	Y	Y	Y ²	Y ³	Y ⁴	N
Retail trade - General	Y	Y	25	30	N	N
Utilities	Y	Y	Y ²	Y ³	Y ⁴	N
Communication	Y	Y	25	30	N	N
<u>Manufacturing and Production</u>						
Manufacturing, general	Y	Y	Y ²	Y ³	Y ⁴	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y ⁶	Y ⁷	Y ⁸	Y ⁸	Y ⁸
Livestock farming and breeding	Y	Y ⁶	Y ⁷	N	N	N
Mining and Fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
<u>Recreational</u>						
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

Key:

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

Notes:

- 1** - Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB 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 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
- 2** - Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- 3** - Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
- 4** - Measures to achieve NLR 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.
- 5** - Land use compatible provided special sound reinforcement systems are installed.
- 6** - Residential buildings require an NLR of 25.
- 7** - Residential buildings require an NLR of 30.
- 8** - Residential buildings not permitted.

Source: FAR Part 150 Airport Noise Compatibility Planning, Appendix A, Table 1.

1.5 Document Outline

Chapter 1 is an introduction to the document. Chapter 2 describes the airport facility and general activity. Chapters 3 and 4 address the current and forecast noise exposure, respectively, presenting the NEM in Chapter 4. Chapter 5 describes the how the public was involved in this process.

2 Airport Facility and Activity

Chapter 2 contains 4 subsections describing the airport and its vicinity (2.1), users and tenants (2.2), operating procedures (2.3) and general activity (2.4).

2.1 Airport Vicinity and History

Figure 2-1 depicts the regional setting of BAF. Westfield-Barnes Airport is located in the City of Westfield, Hampden County, Massachusetts. Westfield is located in the southwestern quadrant of the state, near the Connecticut border, and encompasses approximately 47 square miles. With a population of over 43,000, the City of Westfield is bordered by Southwick and Granville to the south, Russell and Montgomery to the west, Southampton and Holyoke to the north, and West Springfield and Agawam to the east. Hartford, Connecticut is approximately 40 miles away, while Boston is slightly less than 100 miles from the airport.

As depicted in Figure 2-2, the airport is situated to the north of Interstate 90 and the central business district of the City of Westfield. The nearest airfield, Westover Air Reserve Base, is located approximately eight miles from BAF.

Existing land use was determined by using the assessors' use codes found in the Level 3 Assessors' Parcels, received from the Massachusetts' Office of Geographic Information (MassGIS; MassGIS 2015), as a proxy for existing land use. For the NEM Update, similar use codes were consolidated into the six generalized land use categories listed below. The initial assignment of assessors' use codes to the generalized categories is shown in Appendix B. Some parcels' generalized land use categories were changed from the classifications in the table in Appendix B after validating the dataset against imagery.

- **Residential** -- all types of residential activity, such as single and multi-family residences and mobile homes.
- **Commercial** -- offices, retail, restaurants, and other types of commercial establishments.
- **Industrial** -- manufacturing, warehousing, and other similar uses.
- **Public/Quasi-Public** -- publicly owned lands and/or land to which the public has access, including public buildings, schools, churches, cemeteries, and hospitals.
- **Recreational** -- land areas designated for recreational activity, such as parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.
- **Open/Agriculture** -- undeveloped land areas, agricultural areas, grazing lands, and other open land.

Various noise-sensitive facilities exist within the airport environs and are listed in Table 2-1. Noise-sensitive facilities include not only residential land uses, but also places of worship, educational facilities such as schools and daycares, and nursing homes. Cemeteries were determined from an online dataset (ESRI 2015a) and inspection on Google Maps. The one nursing home was found from a March 2007 dataset downloaded from the MassGIS website (MassGIS). Places of worship were determined from Google Maps. Schools were determined from local knowledge and a February 2012 MassGIS dataset (MassGIS 2015).

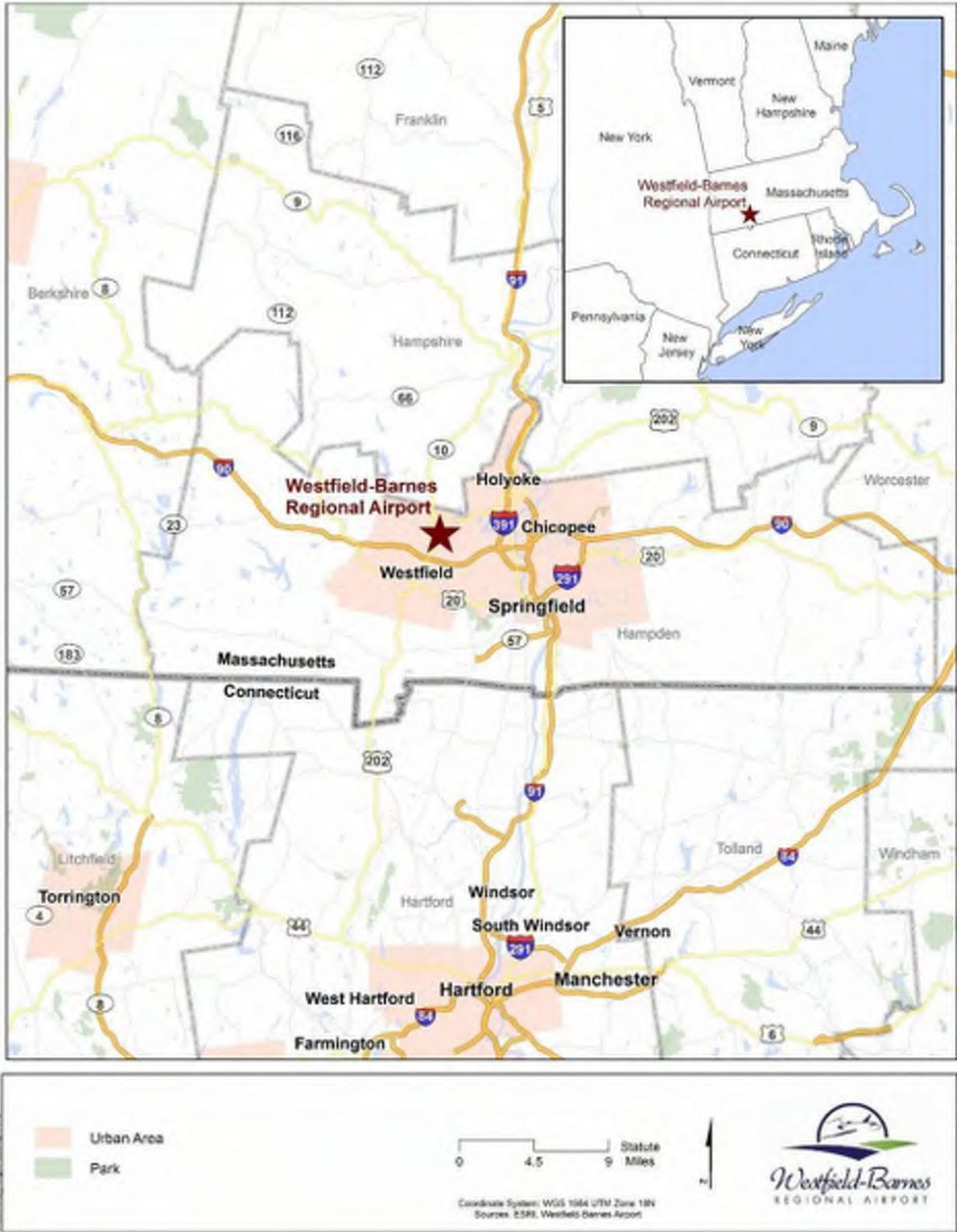


Figure 2-1. Regional Setting

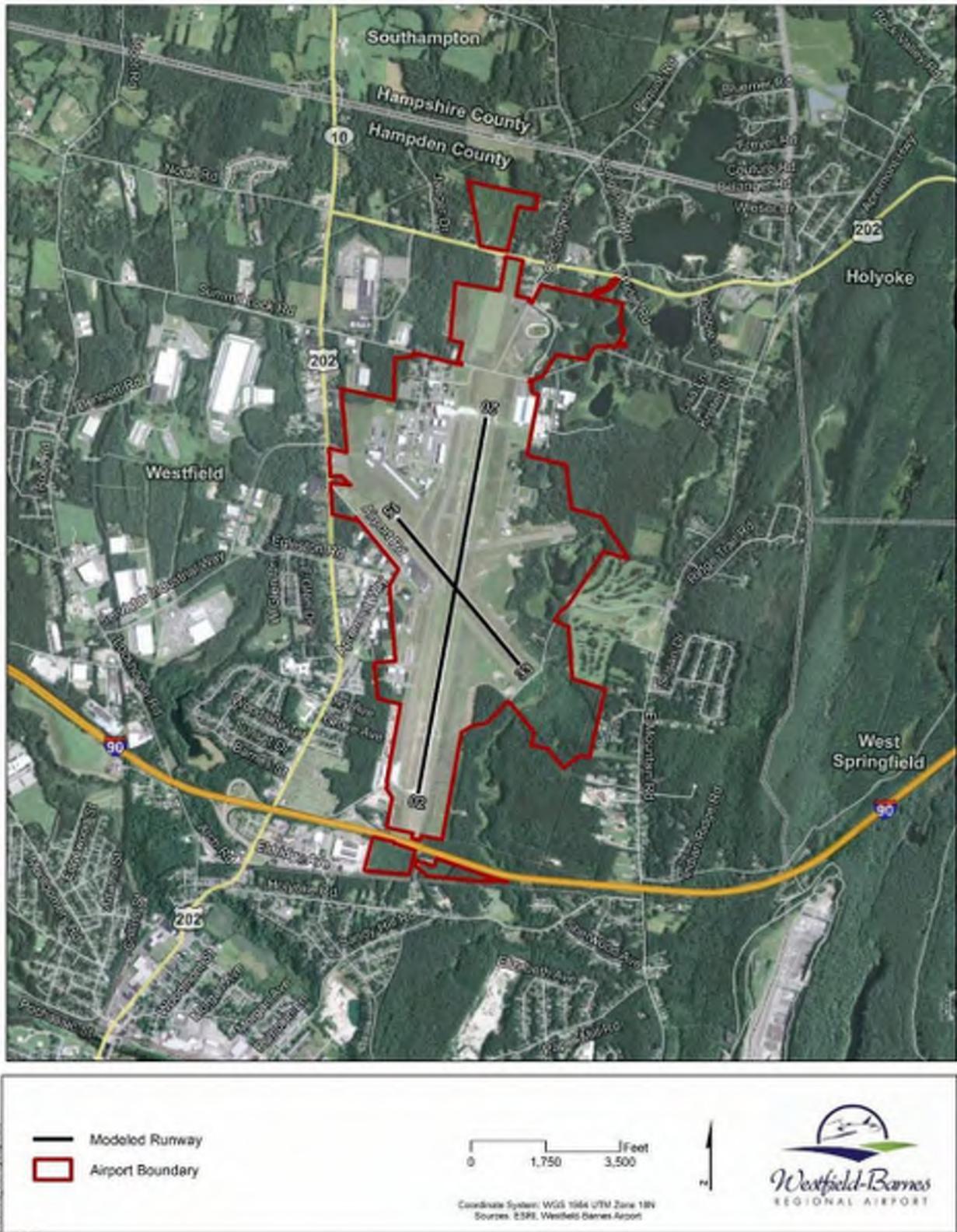


Figure 2-2. Vicinity of BAF

Table 2-1 Noise-sensitive Facilities in the Study Area

ID	Type	Name
C01	Cemetery	St John Lutheran Cemetery
C02		Saint Marys Cemetery
C03		Saint Josephs Cemetery
N01	Nursing Home	Westfield Meadows
P01	Place Of Worship	Word of Grace Church
P02		Russian Evangelical Baptist Church
P03		Our Lady of Blessed Sacrament
P04		Westfield Assembly of God Church
P05		Full Gospel Church
S01	School	White Oak School
S02		North Middle School
S03		Southampton Rd Elementary School
S04		Moseley School
S05		The Kids Place
S06		Creative Kids

2.2 Airport Users and Tenants

This section discusses the airport facilities, airport users, and procedures in place at Westfield-Barnes Airport. Subsection 2.2.1 provides details regarding the airport facilities, subsection 2.2.2 describes the airport tenants, subsection 2.2.3 describes the airport operating procedures, and subsection 2.2.4 discusses aviation activity.

2.2.1 Airport Facilities

Airspace

The airspace surrounding BAF is shown in Figure 2-3. All airspace within the U.S. National Airspace System (NAS) is classified into a number of classes (A, B, C, D, E and G) based on availability of air traffic control services and/or restrictions of ownership (civilian vs. military). Westfield-Barnes Airport is considered a Class D airport, which is positively controlled by an Air Traffic Control Tower (ATCT) that operates from 7:00 a.m. to 10:00 p.m. daily. BAF’s Class D airspace extends to 2,500 feet (ft) Above Ground Level (AGL) and has a diameter of 5 statute miles (or approximately 4.3 nautical miles). Class D airspace rules require aircraft to maintain positive radio contact with the ATCT at the airport when operating within the airspace. The airspace surrounding the airport shifts to uncontrolled airspace designated as Class G airspace when the tower is not in operation. The BAF Class D airspace is bordered to the south by Bradley International Class C airspace, and also to the east by Westover Air Reserve Base/Metropolitan Airport’s Class D airspace.

Air Traffic Control Tower

The airport’s Air Traffic Control Tower is an FAA facility which is staffed daily between the hours of 7:00 a.m. and 10:00 p.m. The air traffic control tower, located on an airfield, is responsible for the movement of aircraft on and around the immediate airport. The BAF air traffic control tower is operated by a private contractor that adheres to all rules and regulations set forth by the Federal government.

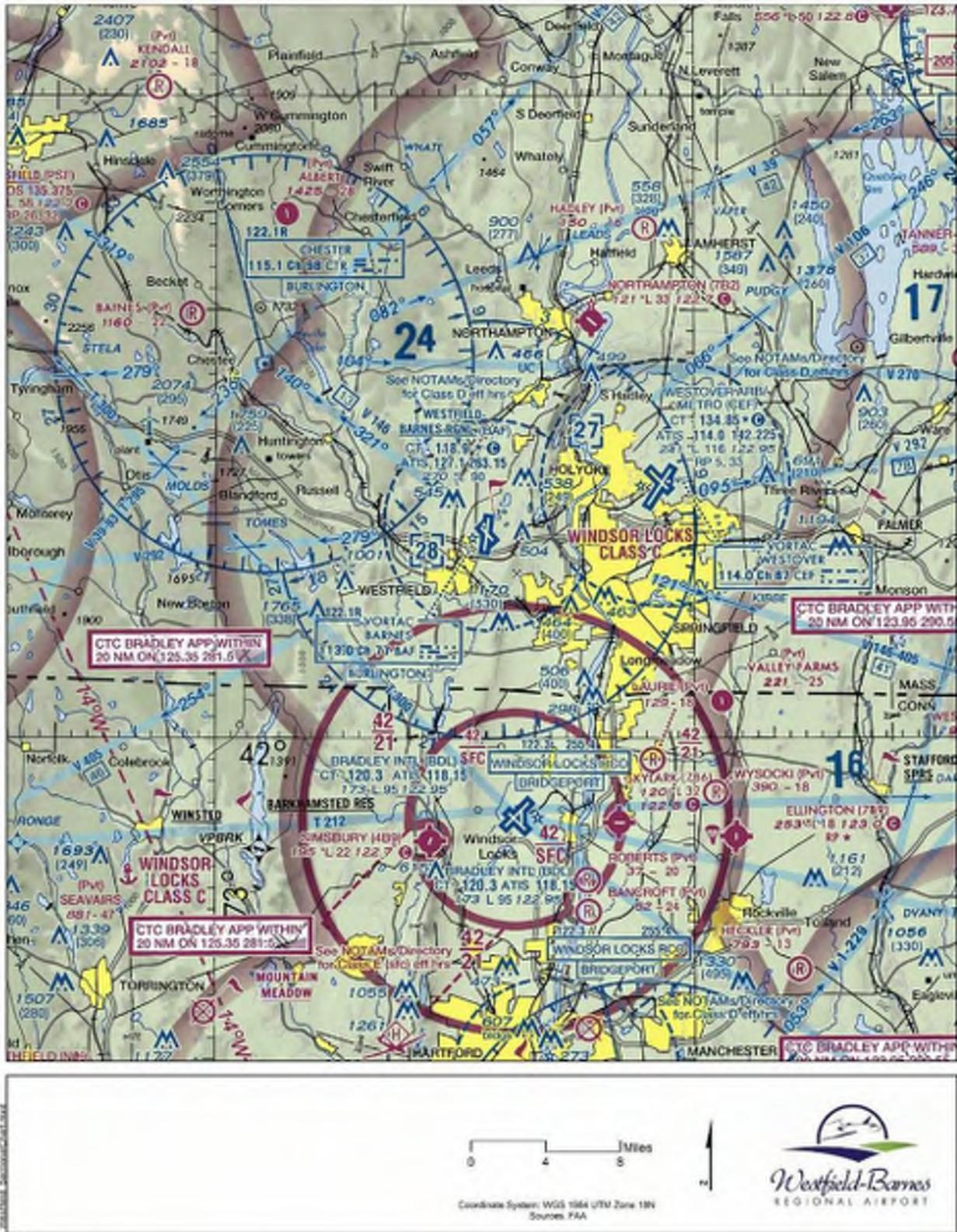


Figure 2-3. Airspace Associated with BAF

Runways

The ability of aircraft to utilize specific runways is based primarily on wind direction, but also on such factors as runway capabilities (i.e., length, approach aids, etc.), and ATC flow management requirements. BAF maintains two runways, Runway 02/20 and Runway 15/33. Runway 02/20, which serves as the primary runway at the airport, is 9,000 feet long and 150 feet wide. The crosswind runway, Runway 15/33, is 5,000 feet long and has a width of 100 feet. The Runway 33 end has a displaced threshold of 225 feet.

Navigation Aids/Lighting Systems

A navigation aid is generally described as any facility with its primary purpose to provide flight guidance to the aircraft, either during flight (cruise), approach or departure. This includes facilities associated with radio direction finding, lighting systems, weather dissemination, and signaling. BAF, in conjunction with the FAA, maintains a number of systems to aid aircraft flying in visual and instrument flight rules, as well as aircraft movement on the ground.

Non-directional Radio Beacon

A Non-directional Radio Beacon, or NDB, is a low to medium frequency radio beacon which transmits non-directional signals from a fixed point on the ground. With the proper navigation equipment, an aircraft can tune in to the specific band of frequency once close enough to the NDB to receive directional information. There are three NDB's in the vicinity of BAF.

VORTAC

A Very-High Frequency Omni-directional Range, or VOR, improves upon an NDB as it provides omni-directional information to a properly equipped aircraft. A VOR can be collocated with distance measuring equipment, or DME. While the VOR provides a radial from which a pilot can determine a heading as the aircraft is flown toward or away from the VOR, the DME provides a means of measuring the distance between the VOR and the aircraft. Military aircraft use a similar system, known as Tactical Air Navigation (TACAN), which provides distance measuring equipment. Often times a VOR is collocated with a TACAN, in which case it is referenced as a VORTAC. A VORTAC provides three individual services, including VOR azimuth, TACAN azimuth and TACAN distance (DME), and can be utilized by both civilian and military aircraft. The VORTAC at BAF is located on the airfield.

Instrument Landing System

An Instrument Landing System (ILS) assists in a precision instrument approach procedure by providing both vertical and horizontal guidance to an aircraft. An ILS consists of a localizer transmitter, a glideslope indicator, an outer marker, and an approach lighting system. An aircraft must be equipped with proper equipment to utilize the ILS. ILS approaches are rated by category, from I to III. The varied categories reference the capabilities of the ground equipment, with CAT I being the least accurate. Runway 20 is equipped with a CAT I ILS, which allows qualified aircraft to utilize the runway for approach in bad weather.

Approach Lighting Systems

Approach lighting systems are designed to transition an aircraft from instrument flight rules to visual flight rules upon landing. Runway 20 is equipped with a precision approach system, and as such it requires a lighting system which can provide visual information on runway alignment, height, role guidance, and horizontal references for

Category I ILS approaches. It is equipped with a medium intensity approach lighting system (MALSR) with runway alignment indicator lights, consisting of a series of light bars extending from the centerline of the runway.

Non-precision visual approach guidance systems, used by aircraft operating under Visual Flight Rules (VFR), include a PAPI system on Runway 33, Runway 02, and Runway 20. A PAPI, or Precision Approach Path Indicator, consists of a series of four lights typically located on the left side of a runway end. The system operates as a series of red and white lights, with two of each being a visible indicator of the proper angle of approach. From the pilot's perspective, three to four red lights indicate a low approach, and three to four white lights indicate a high approach.

2.2.2 Airport Tenants

BAF is classified by the Massachusetts Airport System Plan as a general aviation (GA) airport and is a part of the FAA's National Plan of Integrated Airport Systems (NPIAS), which qualifies BAF to receive federal grants. BAF primarily serves small single and twin engine aircraft and corporate jets. GA airports typically do not include scheduled passenger service, but may host charter (air taxi) flights, which are present at BAF. The airport also hosts the 104th Fighter Wing of the Massachusetts Air National Guard and a division of the Army National Guard. The airport's main tenants are described in the following subsections.

104th Fighter Wing, MAANG

The 104th Fighter Wing (104 FW) of the Massachusetts Air National Guard (MAANG) is a primary tenant at BAF. The 104 FW's mission is to provide highly trained personnel and mission-ready equipment for the defense of the U.S. and the Commonwealth of Massachusetts. The 104 FW has maintained a presence at Westfield-Barnes Airport since 1946, and operated the A-10A Thunderbolt II aircraft between 1979 and 2008. Through 2007, the 104 FW provided combat ready A-10 aircraft in support of both wartime and peacetime efforts. In 2008, the 104 FW's mission changed from A-10 to F-15 Eagle aircraft. Since 2009, the 104 FW has operated up to 18 F-15C aircraft out of BAF.

Army National Guard/Army Aviation Support Facility 2

Army Aviation Support Facility (AASF) 2, located at Barnes Air National Guard Base, is one of two statewide facilities which provide maintenance support for Army National Guard aircraft. The AASFs provide training and standardization for aviators, crewmembers, mechanics and ground support personnel. Operations at BAF support the 226th Division Aviation Support Battalion (DASB), Detachment 1, C Company 3-126th GSAB (Air Ambulance) and the Reconnaissance and Aerial Interdiction Detachment (RAID). In 2009, AASF 2 normally maintained six (6) UH-60 Black Hawk helicopters and three (3) OH-58 Kiowa RAID helicopters. Since 2009, the AASF 2 transitioned their OH-58 helicopters to two (2) UH-72 Lakota helicopters, although various missions may reduce the number of rotorcraft operations at the airport at certain times.

General Dynamics Aviation Services Facility

The General Dynamics Aviation's Services facility, located along the northeast quadrant of the airport, is comprised of over 100,000 square feet of hangar space, in addition to office space. The facility offers airframe support to corporate aircraft, including aircraft types such as Falcon, Gulfstream GIV and GV, Hawker, and Challenger jets.

Fixed-Based Operators (FBO)

- Rectrix serves as a fixed-base operator (FBO) at the airport and provides services including refueling, repair, de-icing, and pilot services on the airfield.

- Ross Aviation/Rectrix offers FBO, fuel and deicing services, maintenance for GA aircraft, hangar space, weather services, and additional pilot support.
- Westfield Flight Academy is an FAA-approved Part 61 and Part 141 flight school located at the airport, which offers flight training services including Private Pilot Ground School, Private Pilot Flight Training, Instrument Rating, Commercial, and Multi-engine training.

Additional tenants include Aero Design, Westfield Aviation LLC, Whip City and Air1 Aircraft Services LLC, Joe Keenan, All Star Car Rental, Atty. Bruce Green and KBRwyle.

2.3 Operating Procedures

The following three subsections address general, instrument and noise abatement operating procedures at BAF.

General Operating Procedures

An aircraft that departs from an airport can either be flying towards a destination or performing local operations with the intent of return to the departure airport. Aircraft can either operate in VFR or in Instrument Flight Rules (IFR). Understanding how aircraft operate within an airport environ is essential to evaluate methods for reducing the noise impacts of the aircraft.

An aircraft departing BAF under IFR will first be in contact with the local ATCT. The tower will provide departure instructions, including which runway to use, a departure heading, and maintenance of proper separation between aircraft. If the pilot has a destination outside of the jurisdiction of the local ATCT (approximately one to five miles from the airport), the pilot will then initiate contact with the Terminal Radar Approach Control (TRACON). The TRACON will assist the pilot in maintaining horizontal and vertical separation from other aircraft within its jurisdiction. Upon reaching a distance of approximately 20 miles from the airport, the pilot will initiate contact with another control center, known as an Air Route Traffic Control Center (ARTCC). As the aircraft reaches its destination, the pilot will maintain contact with the ARTCC. As it descends, the local TRACON will align the aircraft with the proper runway for arrival and then transfer the aircraft to the destination airport ATCT, who will maintain the proper separation and provide ground taxiway instructions. For air traffic in and around BAF, these facilities are the BAF ATCT, Bradley TRACON, and Boston ARTCC.

Aircraft operating in VFR conditions use the “see and avoid” rule, while communicating with the ATCT. VFR uses ground-based navigation aids to assist with navigation. Aircraft flying training patterns, often referred to as touch-and-go operations, will depart a runway and fly a circular pattern, ending with an actual touchdown on the runway following a set number of repetitions.

BAF Instrument Procedures

BAF is a Class D airport with an active ATCT and approaches communicating with the Bradley Approach (TRACON). An instrument approach is a series of predetermined maneuvers of an aircraft under instrument flight rules from the initial approach to touchdown, or to a point in space from which a landing may be made using visual flight rules. Approach procedures include both Standard Terminal Arrival Routes (STARs) and Instrument Approach Procedures. Arriving aircraft, and local aircraft practicing instrument approaches, have a number of different approaches that can be utilized. There are two (2) STAR procedures, identified as DEER PARK THREE and STELA ONE. Each of the STARs provides detail for aircraft operating within the Bradley TRACON airspace, and can be utilized for arrivals to BAF as well as Hartford, Westover AFB, and others.

There are seven published Instrument Approach Procedures (IAP) to BAF: two military TACAN approaches, two GPS approaches, one ILS approach, and two VOR approaches. Each of the IAPs specifies an approach to a specific runway (either Runway 02 or Runway 20) at the airport.

Similarly, a series of instrument departure procedures have been developed for use by aircraft departing BAF. There are generally two types of departure procedures: those which communicate air traffic clearances (Standard Instrument Departures), and those which assist pilots in the avoidance of obstructions. The COASTAL FIVE DEPARTURE specifies that aircraft fly to a specified VOR, then provides instructions prior to the TRACON clearing the aircraft to its preferred flight level.

Noise Abatement Procedures

The airport currently maintains noise abatement departure procedures for both fixed wing aircraft and helicopter operations. These noise abatement procedures address both aircraft and helicopter operations to and from various runways. While they are designed to reduce the impact of noise on surrounding property, directions from the ATCT, or the safety of the aircraft as judged by the pilot, can often dictate variations from these patterns.

For departing aircraft, the traffic pattern altitude, or the altitude that aircraft fly for touch-and-go operations in a fixed pattern around the airport, is at 1,300 ft Mean Sea Level (MSL), or approximately 1,000 ft AGL. When departing Runway 02, turbojet aircraft are prohibited from utilizing intersection departures, or departures beginning at taxiway access points other than the runway end. This policy allows for an increased altitude over noise-sensitive development surrounding the airfield. Departures from Runway 02 flying under VFR are directed to turn left to a 360-degree heading upon crossing the airport boundary. From Runway 20, intersection departures are prohibited by turbojet aircraft, and VFR departures are directed to turn left to a 180-degree heading upon crossing the airport boundary. Runway 33 also prohibits intersection departures. On approach, any traffic utilizing a right pattern must enter its final approach east of the ridge line.

Helicopter operations are also subject to recommended noise abatement procedures. Helicopter operations over residential areas below 1,300 ft MSL should be avoided at all times unless directed by ATC. Helicopter traffic pattern altitude (military and civilian) is 1,300 ft MSL. The preferred helicopter traffic pattern is a right traffic pattern to Runway 02.

For helicopter arrivals to Runway 02, a helicopter should enter the downwind leg of its approach at a height of 1,300 ft MSL and remain two miles east of airport runway intersection. Two miles south of the approach end of Runway 02, the aircraft should turn to its base leg and should remain at 1,300 ft MSL until crossing the approach end of Runway 02. For arrivals to Runways 15 and 33, the traffic pattern must remain within ½ mile of the runway intersection at all times, and at an altitude of 1,300 ft MSL. No straight in arrivals to Runway 33 are available, unless directed by ATC.

For helicopter departures from Runway 02, instructions are to expedite the climb to 1,300 ft MSL along the runway heading, and turning within ½ mile of the departure end of Runway 02, which keeps aircraft south of Route 202 along the airport boundary. From Runway 15, no straight out departures are permitted, unless directed by ATC. Departures should fly the runway heading and increase altitude as quickly as possible, turning to the crosswind portion of the flight pattern within ½ mile of the runway intersection, then remain west of the East Mountain ridgeline at all times.

2.4 Airport Activity

Airport operations (including arrivals, departures, and local training) were evaluated as part of the study process in 2015. Operations can be categorized as either local or itinerant. Local operations consist of aircraft which arrive and depart from the airport with the intention of operating within the local traffic pattern or those

traveling a short distance with intent of returning to the airport of origin. Itinerant operations are all aircraft operations other than local operations, and include those aircraft departing to or arriving from another airport. Aircraft operations can also be categorized in other ways, such as by type (air carrier, regional/commuter, air taxi, general aviation, or military). Aircraft operations at the airport consist mainly of general aviation and military traffic with a small percentage of air taxi and charter operations.

Table 2-2 depicts historical annual aircraft flight operations at BAF between 1990 and 2014, as archived in the FAA’s Air Traffic Activity System (ATADS). It is important to note that traffic counts can come from a variety of sources, and are often subject to fluctuations based on the times the ATCT is open, the method of counting aircraft, and the reporting habits of individual tenants. Historically, aircraft operations at BAF have fluctuated based on numerous factors. The largest drop in total operations came between 1992 and 1993, when both military itinerant and all general aviation operations declined significantly. From 1993, total operations have steadily declined, due in part to the national decline in general aviation activity. For the present study, BAF expects no significant change in aircraft operations from the levels reported for 2015; 2015 modeled operations were therefore used to represent the operations in 2019 and 2024.

Table 2-2. Historical Aviation Activity

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
1990	11	81	112,863	16,999	129,954
1991	-	167	108,581	13,164	121,912
1992	2	559	108,346	13,828	122,735
1993	-	208	62,958	3,930	67,096
1994	-	219	55,304	3,753	59,276
1995	-	128	58,168	4,701	62,997
1996	-	180	57,419	6,066	63,665
1997	4	330	76,352	7,391	84,077
1998	32	444	61,884	6,561	68,921
1999	5	608	61,136	7,866	69,615
2000	13	758	57,831	7,678	66,280
2001	2	641	54,738	8,538	63,919
2002	-	679	50,858	7,519	59,056
2003	53	713	46,994	6,878	54,638
2004	-	731	50,193	9,452	60,376
2005	24	658	51,867	8,292	60,841
2006	-	588	59,233	8,341	68,162
2007	2	536	56,075	6,497	63,110
2008	8	727	53,618	4,788	59,141
2009	6	740	52,408	6,412	59,566
2010	9	623	54,122	7,230	61,984
2011	5	712	45,751	5,232	51,700
2012	8	663	44,691	6,305	51,667
2013	5	744	37,839	5,553	44,141
2014	22	770	33,628	7,904	42,324

Source: FAA 2015b

Figure 2-4 details the trends in BAF's flight operations from 2009 through 2014. Overall, military operations have shown a tendency to remain relatively constant over time, as the role of the MAANG and ANG units do not frequently change, while trends in general aviation and charter operations often fluctuate with much greater frequency. Evidenced by Table 2-3 and Figure 2-4, total flight operations have steadily declined from 2009, primarily due to the decline in general aviation activity. While operation levels tend to fluctuate, operations compiled in 2015 are expected to remain constant through 2024 and therefore were used as the basis for the 2019 and 2024 NEMs developed in this study.

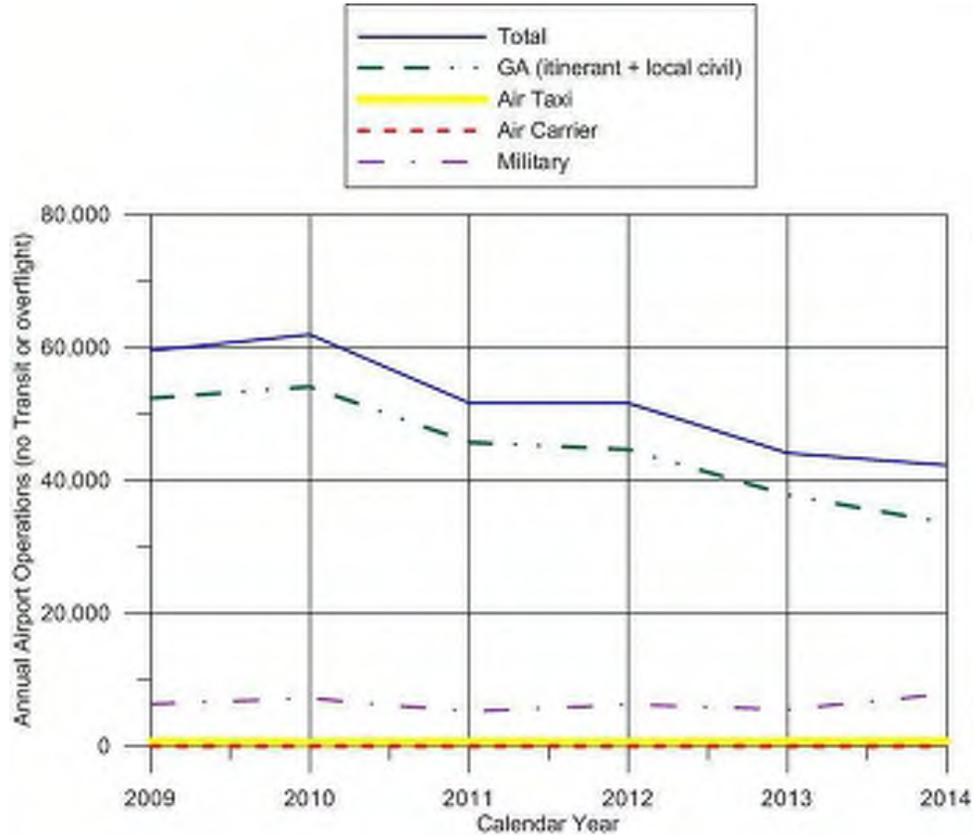


Figure 2-4. Trends in Airport Operations

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3 Noise Exposure for 2019

This section documents the existing (CY2019) noise exposure at BAF. Section 3.1 briefly describes the data collection and validation effort. Section 3.2 provides an overview of the noise study methodology, including the noise metrics and computerized noise models. Section 3.3 details the input data and Section 3.4 presents the resultant noise exposure.

3.1 Data Collection and Validation

Data pertaining to aircraft activity at BAF was collected from numerous sources in order to most accurately model existing noise exposure at the airport. These sources included air traffic statistics obtained from the local ATCT, interviews with and data collection from the Airport Manager, air traffic statistics as reported to the FAA, and airport tenant interviews, including coordination with the MAANG. Collectively, the data obtained provided the best available information including the aircraft fleet mix, time of day of operations, runway use characteristics, and aircraft operating characteristics. The data was collected, analyzed, and input into the noise models.

The derivation of aircraft operations was approved by BAF staff.

3.2 Methodology

This section elaborates the noise metrics, computer models, and modeling parameters implemented in the noise analyses of this report. Section 3.2.1 describes noise metrics used for planning purposes. Section 3.2.2 describes general characteristics of the noise models, along with specific parameters of the noise models, such as weather and topography data used in the analyses.

3.2.1 Noise Metrics

Via FAA regulations, cumulative aircraft noise exposure is described and presented in terms of DNL. As described previously and in Appendix A, DNL is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events, i.e., those occurring between 10:00 p.m. and 7:00 a.m. Within DNL, individual flight and run-up event noise exposures are estimated in terms of Sound Exposure Level (SEL) and L_{max} , respectively. SEL is an integrated metric normalizing the acoustic energy of a single flyover event to one second. SEL and L_{max} are expressed in A-weighted decibels (dB or dBA). Appendix A contains further detail about DNL, other noise metrics and sound.

3.2.2 Noise Models and Modeling Parameters

Noise modeling is most accurate and useful for comparing "before-and-after" noise levels that would result from alternative scenarios when calculations are made in a consistent manner. The program allows noise exposure prediction of such proposed actions without actual implementation and/or noise monitoring of those actions.

Table 3-1 summarizes the noise models and their parameters relative to this work. The 2009 Part 150 Study Update had coordinated the use of DOD's NOISEMAP suite of computer-based programs for the modeling of civilian and military operations for that study (BAF 2009). Consistent with the 2009 Part 150 Study Update, the 2015 NEM update study utilized NOISEMAP, however, the 2009 Part 150 Study Update used Version 7.2 whereas the NEM Update utilizes Version 7.3 (Czech 2014; Wasmer and Maunsell 2013a; Wasmer and Maunsell 2013b). Version 7.3 is similar to Version 7.2 but can output more noise metrics than 7.2 and has an updated noise database (Czech et al, 2014). The current analysis utilizes NOISEMAP Version 7.3 only for the modeling

of military operations and AEDT Version 2c for the modeling of civilian operations. All other modeling inputs used in the 2015 study remain constant in the current analysis.

Table 3-1. Noise Modeling Parameters

Software	Analysis	Version
AEDT	Civilian Aircraft	2C
NOISEMAP	Military Aircraft	7.3
Parameter	Definition	
Receiver Grid Spacing	250 ft in x and y	
Metric	DNL (dBA)	
Basis	Annual Average Daily Operations (AAD)	
Topography		
Elevation Data Source	1/3 arc-second NED	
Elevation (ELV) and Impedance (IMP) Grid spacing	250 ft* in x and y	
Flow Resistivity of Ground (soft)	200 kPa-s/m ²	
Flow Resistivity of Water (hard)	1,000,000 kPa-s/m ²	
Modeled Weather (March; source: USAF 2014)		
Temperature	61 deg F	
Relative Humidity	61%	
Barometric Pressure	29.92 inHg	

* 500 ft resolution was not sufficient for the DNL contours.

Operations were assessed for annual average daily operations, i.e., annual operations divided by 365 days.

Noise exposure is presented in terms of contours, i.e., lines of equal value, of DNL. DNL contours of 65 to 75 dB are presented in 5-dB increments. Aircraft DNL is also depicted in terms of colored gradual shading with ‘cool’ (blue) color representing the ambient noise level of 45 dB and the ‘hot’ (red) color representing DNL greater than or equal to 85 dB.

NOISEMAP’s ability to account for the effects of sound propagation over ground includes two different ground impedance conditions: “soft ground”, e.g., grass-covered ground, with a flow resistivity of 200 kPa-s/m² or “hard ground”, e.g., asphalt-covered ground or water areas, with a flow resistivity of 1,000,000 kPa-s/m². This study considered all areas in and around BAF as soft ground for modeling purposes. The same ‘soft ground’ impedance condition was used in the AEDT modeling.

NOISEMAP can account for the effects of sound propagation over ground with regard to the intervening ground elevation(s) between the source (aircraft) and receiver. For example, not only does it account for the height of the receiver (like the FAA’s AEDT) but it also accounts for the effect of intervening hills or knolls (shielding) and valleys or depressions on sound propagation. The modeling for this project does not include the effect of shielding of on- or off-airport buildings.

It is important to note that the 2009 Part 150 Study Update for BAF did not take advantage of NOISEMAP’s capabilities in impedance or ground elevation effects.

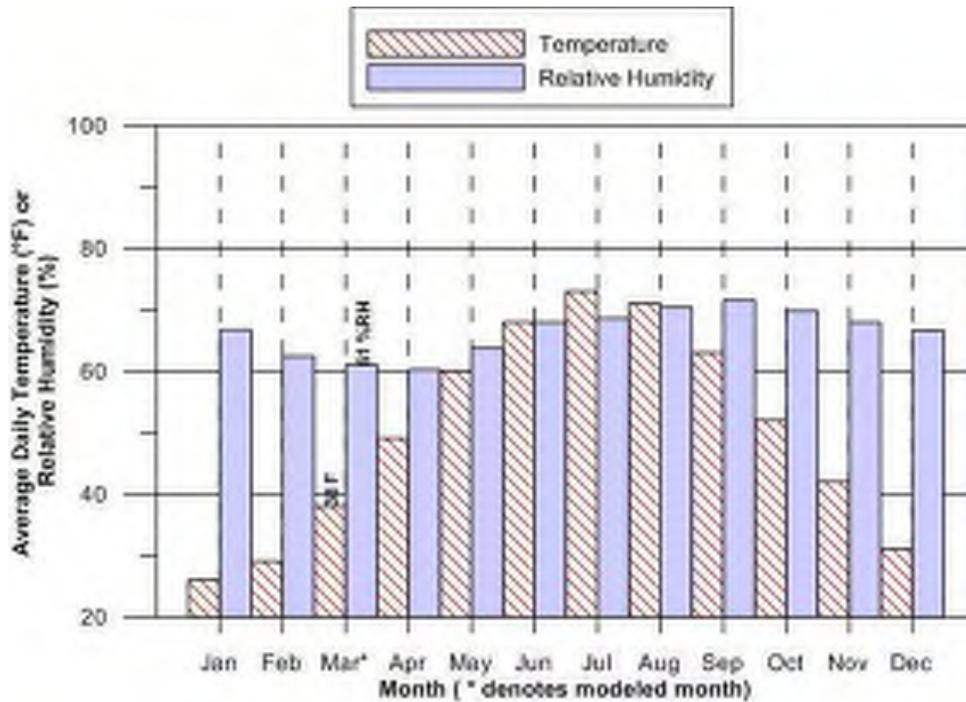
This analysis utilized average monthly weather conditions at the airport. The weather data was obtained for the period of January 4, 1974 through May 31, 2014 (US Air Force 2014). Table 3-2 and Figure 3-1 show the weather data for BAF. Based on this data, the NOISEMAP suite's procedure selected the month of March, with an average daily temperature of 38° Fahrenheit (F) and Relative Humidity (RH) of 61%, for the modeling (row shown in yellow highlight in the table). Modeling in AEDT used the default weather information for BAF.

Table 3-2. BAF Daily Average Weather Data for 1974-2014

Month	Average Daily		
	Temperature (deg F)	Relative Humidity (%)	Pressure (inHg)
Jan	26	66.75	29.71
Feb	29	62.45	29.70
Mar	38	61.00	29.69
Apr	49	60.25	29.64
May	60	63.75	29.67
Jun	68	67.95	29.64
Jul	73	68.60	29.66
Aug	71	70.40	29.71
Sep	63	71.55	29.75
Oct	52	69.80	29.75
Nov	42	67.95	29.75
Dec	31	66.60	29.72

Source: US Air Force 2014

(yellow highlight = modeled weather condition)



Source: 14WS, 1974-2014

Figure 3-1. Historical Weather Data and Modeled Condition

Population counts of people residing within specific DNL contour bands are based on refined 2010 Census block-level data. Existing land use data was used to refine the 2010 Census data by clipping the Census blocks to the residential land use parcels. The clipped census blocks were then validated against aerial imagery. By

clipping the census blocks to the areas of residential land use, the associated population counts more accurately represent areas where people reside.

The population counts were computed using a geometric proportion method. This method assumes a uniform population distribution across each census block. The total population inside a noise contour is assigned based on the portion of the census block that partially or wholly falls within the contour boundary. If a contour contains a portion of a block, then only the geographically based proportion of that block's population within that contour is summed. If a census block is contained completely by the noise contour, then 100 percent of the block's population is included in the estimates.

Computation of areas contained within each DNL contour band excluded the airport property.

The non-compatible property counts are based Level 3 Assessors' Parcels (MassGIS 2015) and aerial imagery (ESRI 2015b). A non-compatible property was counted if any portion of the parcel fell within the DNL contour band. If a parcel fell within two DNL contour bands, it was assigned to the higher level. All mobile homes were excluded from the counts because these properties cannot be sound insulated.

3.3 Input Data

NOISEMAP and AEDT require the following types of inputs:

- Airport layout (reference point, runways, helipad, etc.),
- Aircraft operations by operation type (including period of day considerations),
- Runway utilization rates,
- Flight tracks including utilization rate,
- Aircraft profiles used on each of the flight tracks, and
- Aircraft noise and performance characteristics.

Airport layout was discussed in Chapter 2. The following subsections describe the rest of the list for the 2015 scenario. Section 3.3.1 discusses the development of flight operations. Sections 3.3.2 through 3.3.5 pertain to runway utilization, flight tracks and their utilization, aircraft noise and performance data and run-up operations, respectively.

3.3.1 Flight Operations

The annual flight operations for CY2019 were based on the ATADS data for CY2014 in terms of aircraft category, i.e., air carrier, air taxi, GA and military. Air Taxi was combined with general aviation because makes of aircraft such as the Gulfstream could serve both categories. It was estimated by BAF that CY2019 total operations would be identical to those of CY2014. Total military operations were resolved by type of aircraft, operation type and temporal period (DNL day and night) with input from the based units (MAANG and AASF 2) and the ATCT for transient operations and airport fuel logs (Richardson 2015a; Barnes 2015a; Richardson 2015b; Richardson 2015c; Tompkins 2015). Civilian operations were resolved by type of aircraft, operation type and temporal period with input from ATCT and Gulfstream (Lustenberger 2015; Savoy 2015).

2019 Flight Operations

Table 3-3 shows the resulting 2019 baseline annual flight operations for all aircraft types. Total flight operations are dominated by the Air Taxi and GA category combination with 34,204 annual operations. Air Taxi and GA jet operations are modeled by the Gulfstream GIV and Lear35 aircraft types. The GA propeller operations are modeled by the Cessna 441 Conquest II (twin propeller) and a generic single-engine fixed-pitch propeller aircraft called GASEPF which represents Cessna 172 Skyhawk-like aircraft. GASEPF comprises 75% of the total flight operations. The based F-15C aircraft (modeled with the F-15E with a Pratt and Whitney (PW) 220 engine) comprises only 10% of the total flight operations.

Table 3-3. Annual Flight Operations for 2019

Category	Sub-category	Representing Aircraft Types	Modeled Aircraft ID (if different)	Departure			Non-Overhead Arrival			Overhead Arrival			VFR Closed Pattern (1)			IFR Closed Pattern (1)			TOTAL			
				Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	
Military Based	ANG	F-15C (PW 220)	F-15E (PW220)	1,588	8	1,596	232	8	240	1,356	-	1,356	1,226	-	1,226	-	-	-	-	4,402	16	4,418
	Army	UH-72	OH-58D	450	30	480	450	30	480	-	-	-	130	-	130	-	-	-	-	1,030	60	1,090
		HH-60M	UH-60A	520	30	550	520	30	550	-	-	-	140	-	140	-	-	-	-	1,180	60	1,240
Military Transient	Heavy Cargo	C-5, C-17	C-5M	4	-	4	4	-	4	-	-	-	-	-	-	-	-	-	-	8	-	8
	Tanker	KC-135	KC-135R	4	-	4	4	-	4	-	-	-	-	-	-	-	-	-	-	8	-	8
	4-engine Turboprop	C-130	C-130J	58	2	60	58	2	60	-	-	-	789	-	789	263	-	263	1,168	4	1,172	
	2-engine Turboprop	C-12	C-12	3	-	3	3	-	3	-	-	-	-	-	-	-	-	-	-	6	-	6
Civilian	Air Carrier	B737, RJ	737700	11	1	12	11	1	12	-	-	-	-	-	-	-	-	-	-	22	2	24
	Air Taxi and GA	G-450, G-550, CL60x, Learjet 35/36	GIV	637	34	671	637	33	670	-	-	-	34	-	34	-	-	-	-	1,308	67	1,375
	GA 2-engine turboprop or piston	Cessna 441, others	Cessna 441	19	-	19	19	-	19	-	-	-	-	-	-	-	-	-	-	38	-	38
	GA 1-engine turboprop or piston	Cessna 172, others	GASEPF	6,739	7	6,746	6,739	7	6,746	-	-	-	16,684	17	16,701	1,256	1	1,257	31,418	32	31,450	
Military Based				2,558	68	2,626	1,202	68	1,270	1,356	-	1,356	1,496	-	1,496	-	-	-	-	6,612	136	6,748
Military Transient				69	2	71	69	2	71	-	-	-	789	-	789	263	-	263	-	1,190	4	1,194
Air Carrier				11	1	12	11	1	12	-	-	-	-	-	-	-	-	-	-	22	2	24
Air Taxi + GA				8,032	75	8,107	8,032	73	8,105	-	-	-	16,718	17	16,735	1,256	1	1,257	34,038	166	34,204	
Total				10,670	146	10,816	9,314	144	9,458	1,356	-	1,356	19,003	17	19,020	1,519	1	1,520	41,862	308	42,170	

Notes:

1) Each circuit counted as 2 operations -- one arrival plus one departure.

2) F-15s in AB for 75% of departures (day and night)

Less than 1 percent of the total flight operations were estimated to occur in the 10 p.m. to 7 a.m. (i.e., DNL nighttime) time period. Approximately 44% of the nighttime operations are by Air Taxi/GA Jet aircraft. Approximately 39% of the nighttime operations are by AASF 2 aircraft. MAANG F-15 aircraft comprise only 5% of the nighttime operations.

3.3.2 Runway Utilization

The FAA ATCT manager at BAF provided the annual average daily runway utilization (Lustenberger 2015). Tables 3-4 and 3-5 present the modeled runway complex and individual runway use for arrivals, departures, and patterns. Table 3-4 shows that most aircraft use Runway 02/20. Among the civilian operators, the crosswind runway, Runway 15/33, is only used by Air Taxi and GA aircraft. Among the military aircraft, only the transient turboprop (e.g., C-130 Hercules and C-12) aircraft use the crosswind runway.

The runway use (Table 3-5) is dependent on aircraft type and type of operation. MAANG F-15 aircraft mostly utilize Runway 02 (90%) for departures but primarily utilize Runway 20 (90%) for all other types of operations. GASEPF usage of Runway 02/20 is more balanced at 40%/60%, respectively, but most (75%) use Runway 33 of the 15/33 combination. ATCT also confirmed that DNL daytime and nighttime runway utilizations are identical.

All helicopter operations were modeled to depart and arrive from/to a point near Runway 15/33. For the purposes of this analysis, this point is called a helicopter pad, although there is not an officially-designated pad there. Heading utilization rates are included for helicopter operations instead of runway utilization rates because all of the modeled helicopter operations originate and terminate at this single pad.

3.3.3 Flight Track Modeling

Flight track modeling for the NEM Update began with the modeled flight tracks from the previous Part 150 Update. Tracks were reviewed by ATCT, the MAANG, AASF 2 and Gulfstream and some previously modeled tracks were modified and/or deleted based upon comments from these entities.

Figures 3-2 through 3-7 present all of the modeled flight tracks at the scale required by the FAA. Appendix B contains maps of the tracks at more appropriate scales and groupings.

Appendix B also contains a table detailing the DNL daytime and nighttime utilization percentages of the modeled flight tracks for each modeled aircraft type. This information was provided by the above-listed entities, but primarily ATCT as they observe most of the operations on a daily basis.

Table 3-4. Annual Average Daily Runway Complex Utilization

Aircraft Category	Sub-Category	Modeled Aircraft ID	Runway Pair	Departures		Non-Overhead Arrivals		Overhead Arrivals		VFR Closed Patterns		IFR Closed Patterns	
				Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)
Military Based	ANG	F-15E	02 / 20	100%	100%	100%	100%	100%	0%	100%	0%	100%	0%
			15 / 33	-	-	-	-	-	-	-	-	-	-
	Army	OH-58D	pad (100%)	see rwy ute table									
		UH60A	pad (100%)	see rwy ute table									
Military Transient	Heavy Cargo/Tanker	C-5M, KC-135R	02 / 20	100%	0%	100%	0%						
			15 / 33	-	-	-	-						
	4-engine Turboprop	C-130J	02 / 20	100%	100%	100%	100%	100%	-	75%	0%	100%	0%
			15 / 33*	-	-	-	-	-	-	25%	0%	0%	0%
	2-engine Turboprop	C-12	02 / 20	90%	0%	90%	0%						
			15 / 33	10%	0%	10%	0%						
Civilian	Air Carrier	737700	02 / 20	100%	100%	100%	100%						
			15 / 33	-	-	-	-						
	Air Taxi and GA	GIV, Lear35	02 / 20	90%	90%	90%	90%			90%	0%	-	-
			15 / 33	10%	10%	10%	10%			10%	0%	-	-
	GA 2-engine turboprop or piston	Cessna 441	02 / 20	70%		70%				-	-	-	-
			15 / 33	30%		30%				-	-	-	-
	GA 1-engine turboprop or piston	GASEPF	02 / 20	55%	55%	55%	55%			55%	55%	55%	55%
			15 / 33	45%	45%	45%	45%			45%	45%	45%	45%

Source: Lustenberger 2015

* depart 33, overfly 02/20, land 33

Table 3-5. Annual Average Daily Runway Utilization within Each Complex

Aircraft Category	Sub-Category	Modeled Aircraft ID	Runway Pair	Runway ID (or heading for helos)	Departures		Non-Overhead Arrivals		Overhead Arrivals		VFR Closed Patterns		IFR Closed Patterns		
					Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	
Military Based	ANG	F-15E	02 / 20	02	90%	90%	10%	10%	10%		10%		10%		
				20	10%	10%	90%	90%	90%		90%		90%		
	Army	OH-58D and UH60A	n/a	20 deg								25%	25%		
				90 deg	50%	50%	30%	30%							
				150 deg	25%	25%	10%	10%			25%	25%			
				180 deg	25%	25%									
200 deg			30%	30%			25%	25%							
330 deg	0%	0%	30%	30%			25%	25%							
Military Transient	Heavy Cargo/Tanker	C-5M, KC-135R	02 / 20	02	60%		60%								
				20	40%		40%								
	4-engine Turboprop	C-130J	02 / 20	02	40%	40%	40%	40%	0%		40%		40%		
				20	60%	60%	60%	60%	0%		60%		60%		
			15 / 33*	15	0%		0%				5%				
	33	0%		0%				95%							
	2-engine Turboprop	C-12	02 / 20	02	50%		50%				50%				
				20	50%		50%			50%					
15 / 33			15	50%		50%			50%						
33	50%		50%			50%									
Civilian	Air Carrier	737700	02 / 20	02	60%	60%	60%	60%							
				20	40%	40%	40%	40%							
	Air Taxi and GA Jet	GIV, Lear35	02 / 20	02	35%	35%	35%	35%			35%				
				20	65%	65%	65%	65%			65%				
			15 / 33	15	10%	10%	10%	10%			10%				
	33	90%	90%	90%	90%			90%							
	GA 2-engine turboprop or piston	Cessna 441	02 / 20	02	40%		40%								
				20	60%		60%								
			15 / 33	15	20%		20%								
	33	80%		80%											
GA 1-engine turboprop or piston	GASEPF	02 / 20	02	40%	40%	40%	40%			40%	40%	40%	40%		
			20	60%	60%	60%	60%			60%	60%	60%	60%		
		15 / 33	15	25%	25%	25%	25%			25%	25%	25%	25%		
33	75%	75%	75%	75%			75%	75%	75%	75%					

Source: Lustenberger 2015

* depart 33, overfly 02/20, land 33

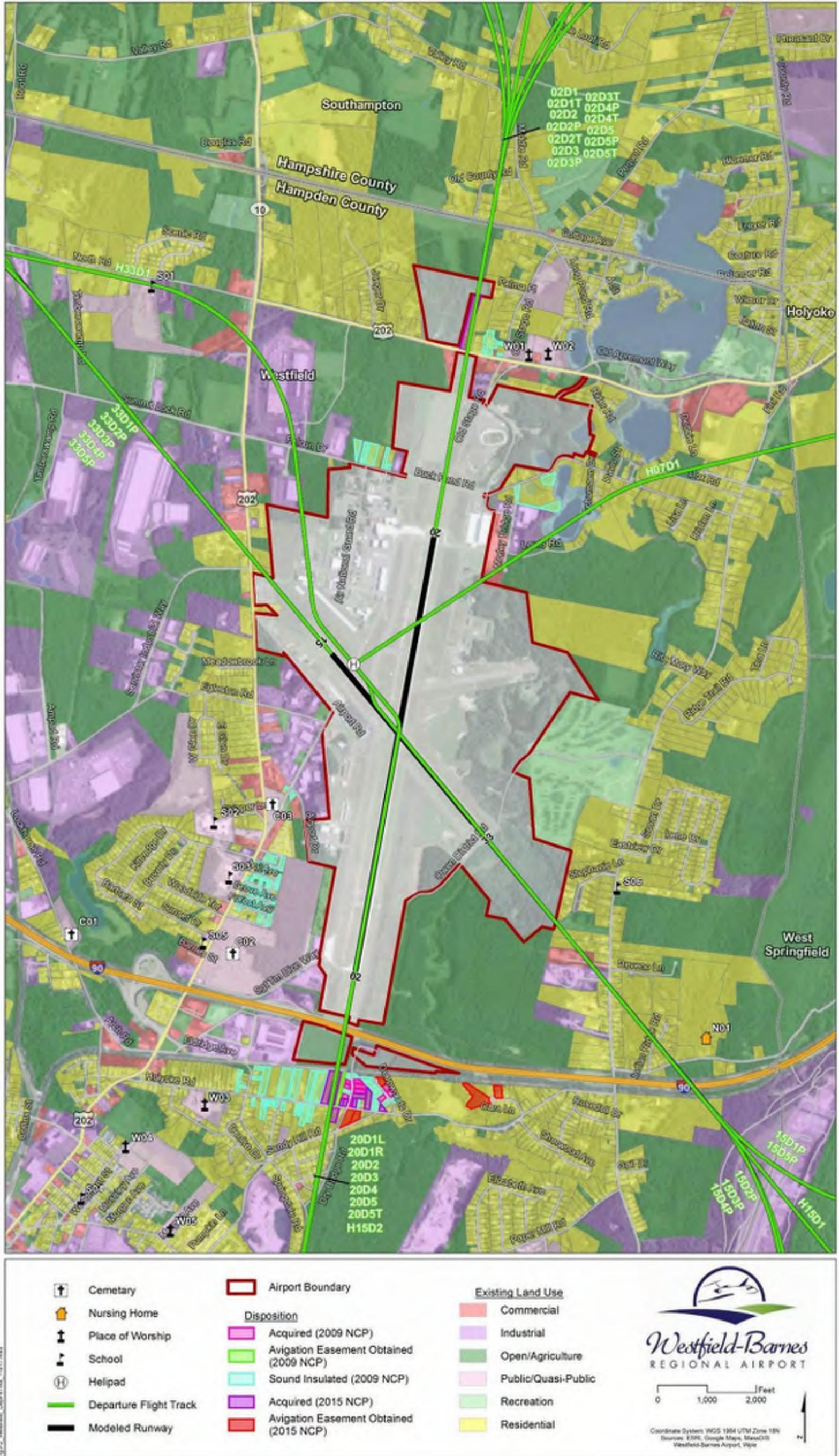


Figure 3-2. Modeled Average Daily Departure Flight Tracks



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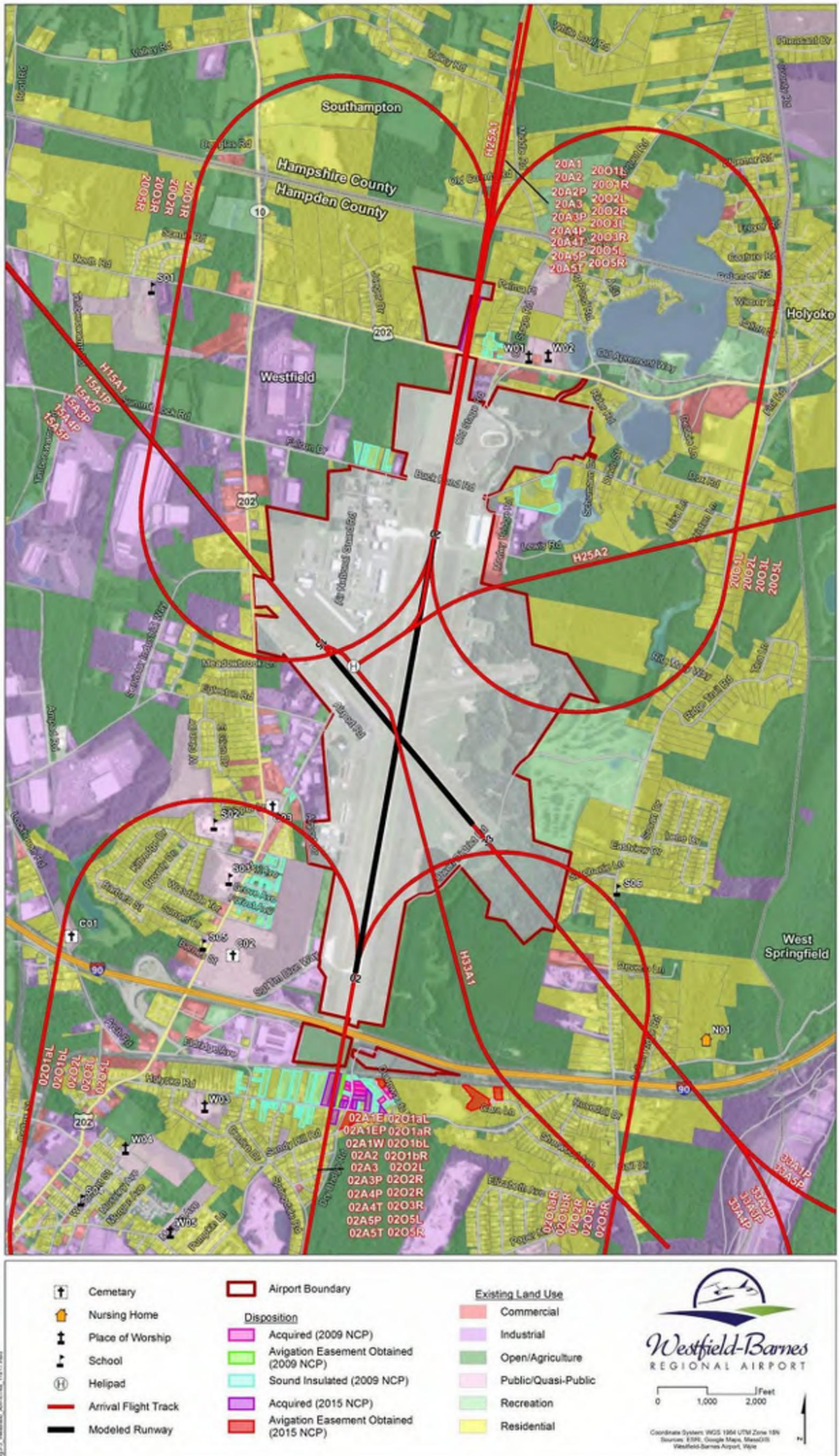


Figure 3-3. Modeled Average Daily Arrival Flight Tracks



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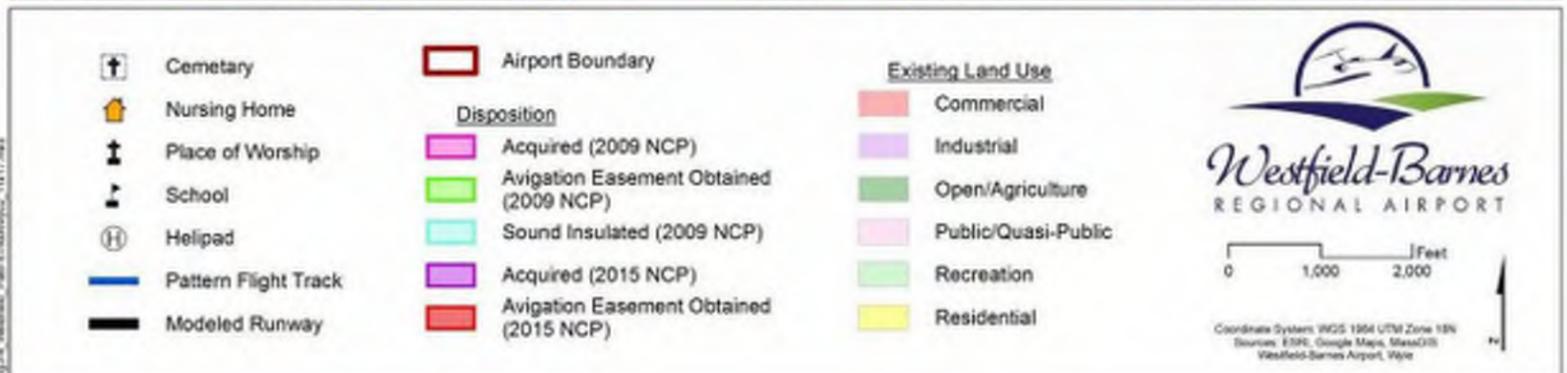
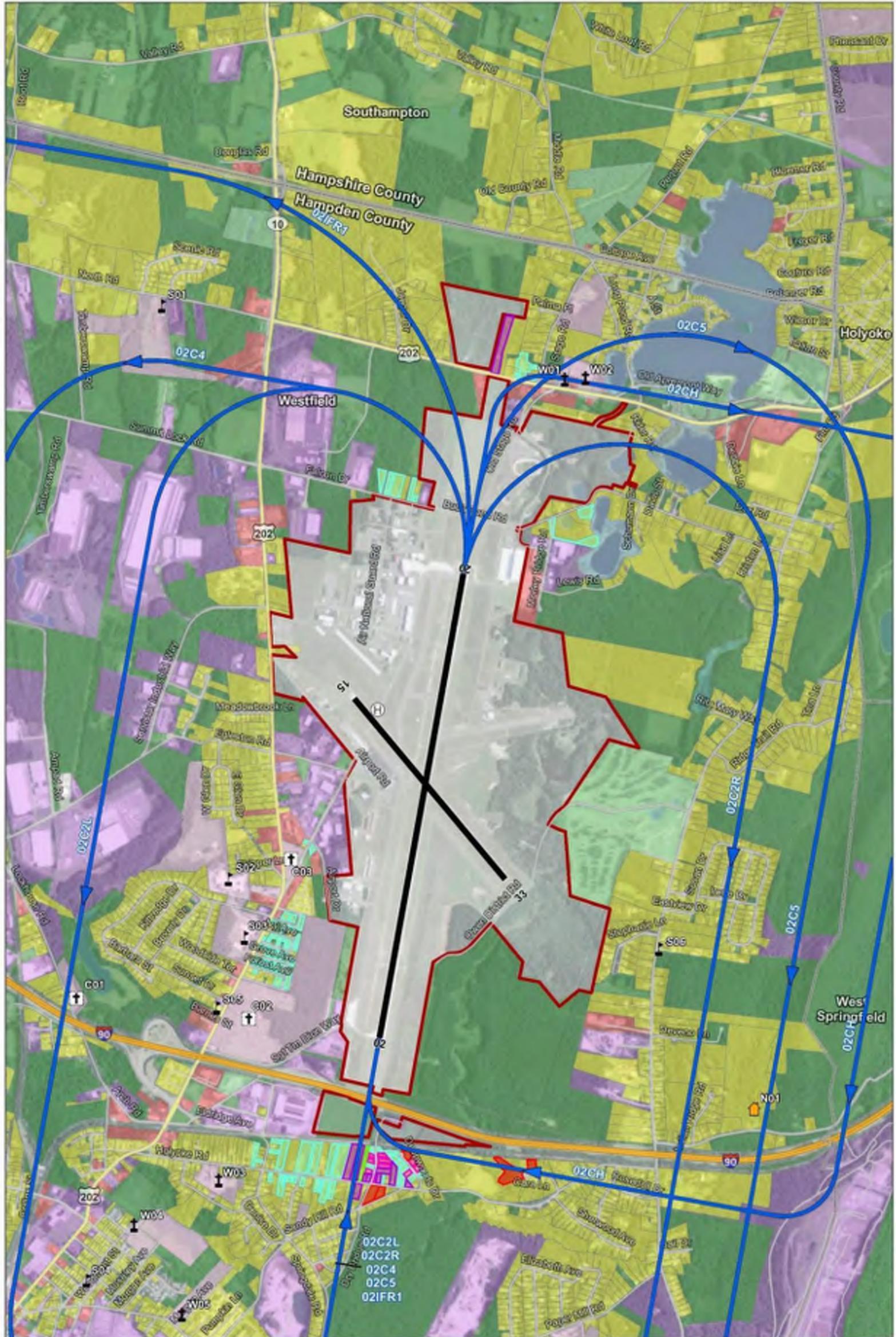


Figure 3-4. Modeled Average Daily Closed Pattern Flight Tracks on Runway 02



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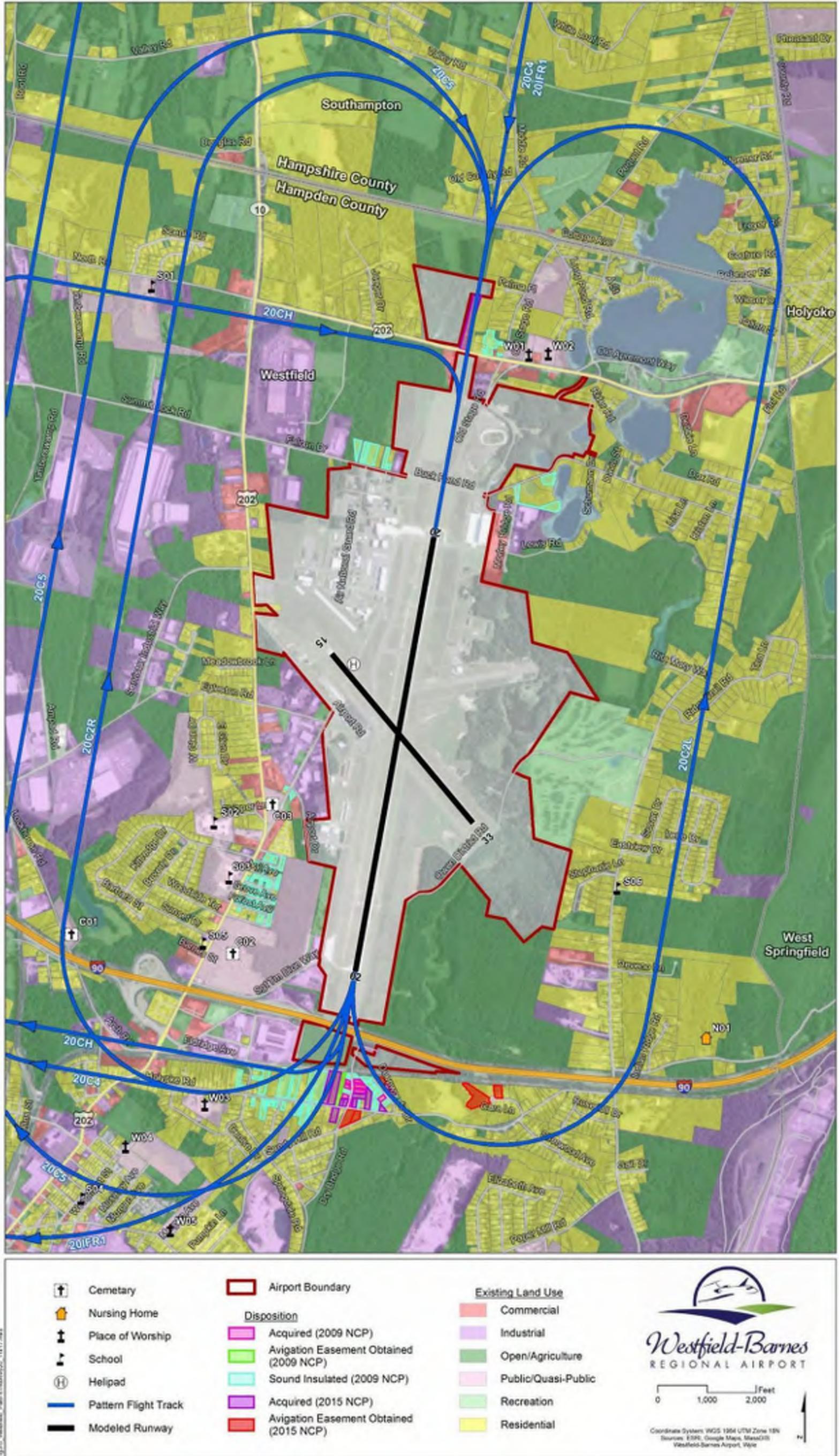


Figure 3-5. Modeled Average Daily Closed Pattern Flight Tracks on Runway 20



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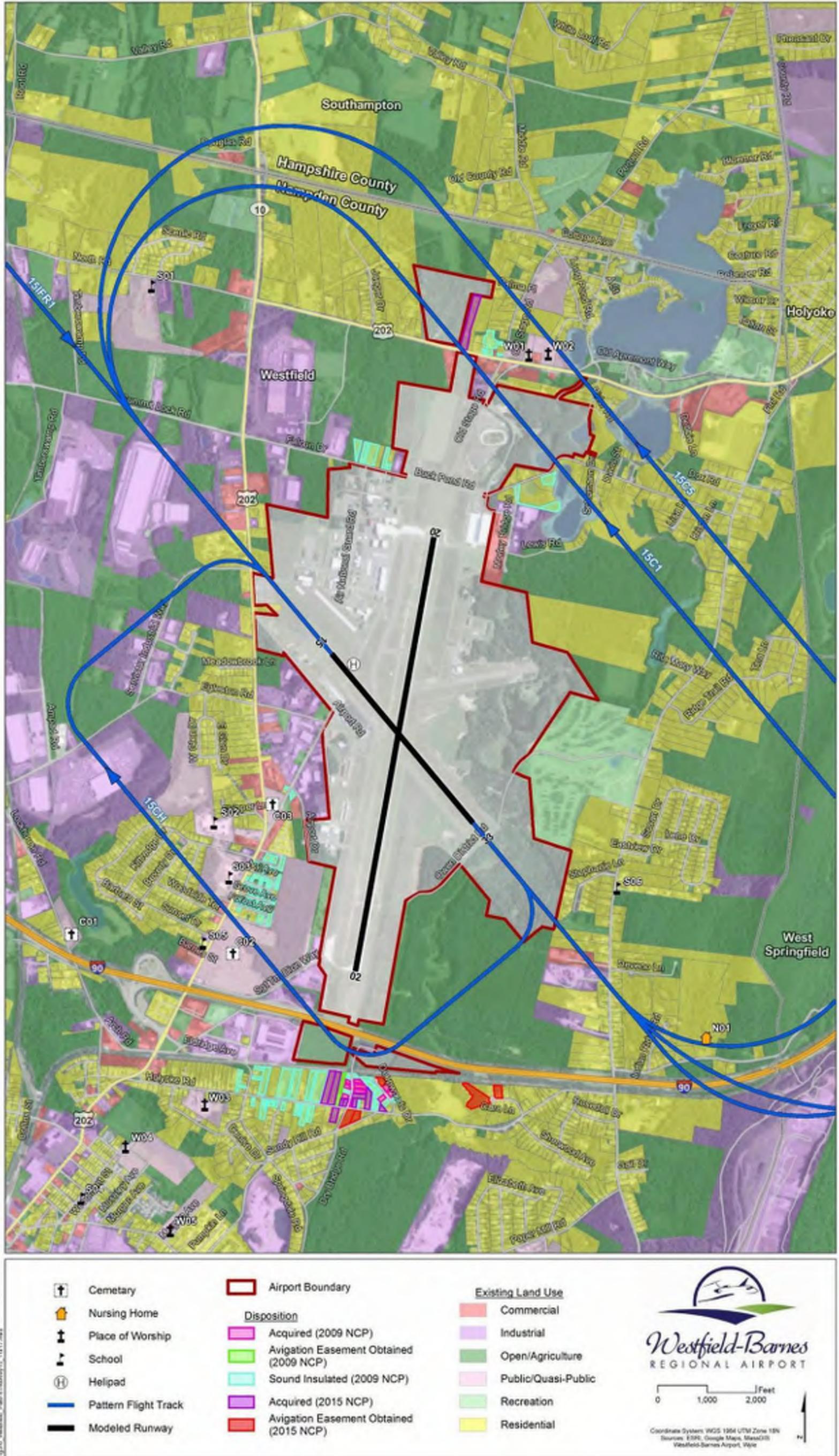


Figure 3-6. Modeled Average Daily Closed Pattern Flight Tracks on Runway 15



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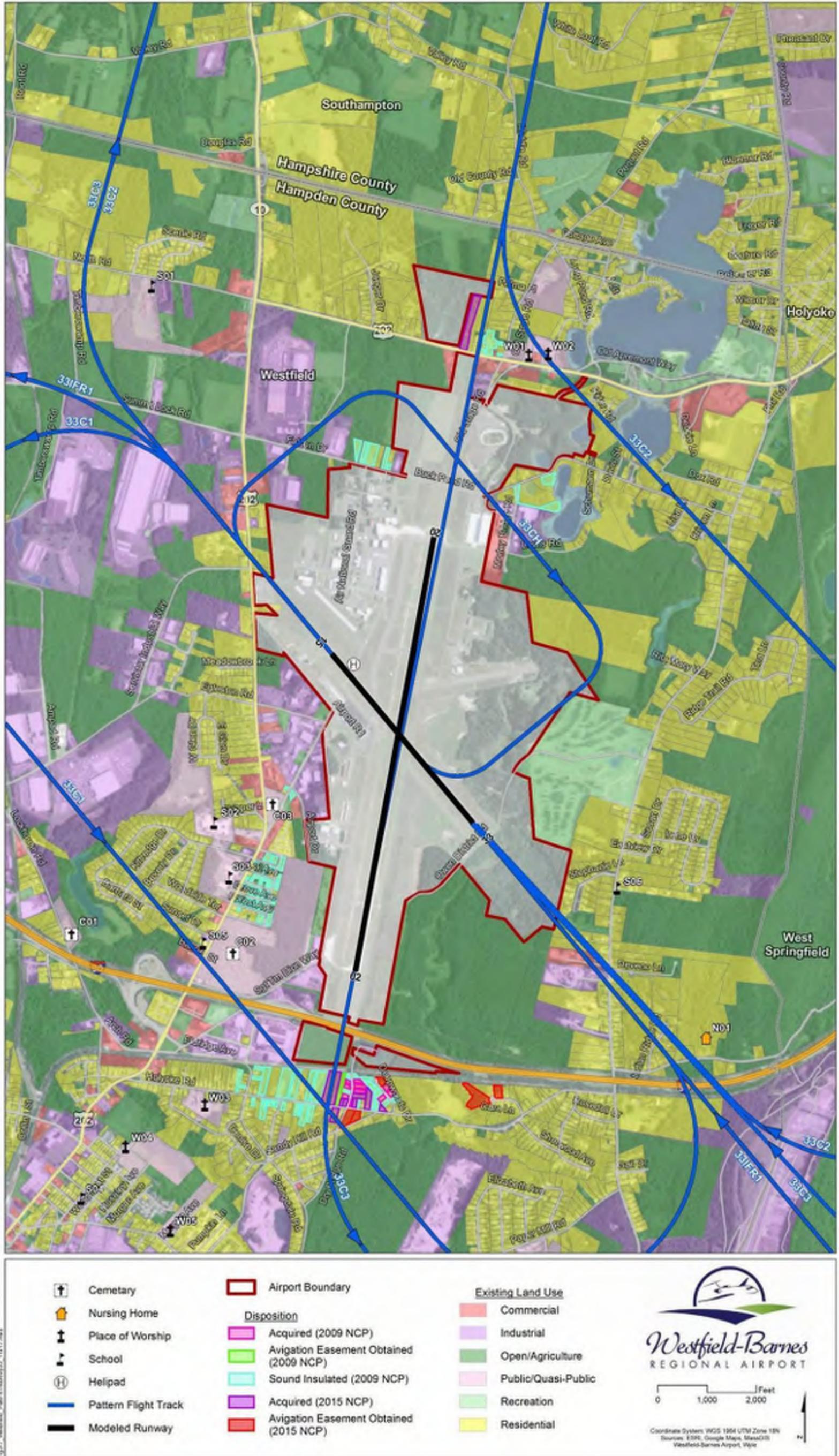


Figure 3-7. Modeled Average Daily Closed Pattern Flight Tracks on Runway 33



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3.3.4 Aircraft Noise and Performance Characteristics

Specific noise and performance data must be entered for each aircraft type operating at the airport. Noise data is included in NOISEMAP's database (called NOISEFILE) in the form of spectral sound pressure levels, single-event Sound Exposure Levels (SEL) and single-event maximum sound levels (L_{max}) at a defined point of aircraft's flyover. NOISEMAP's support programs generate tables of SEL and L_{max} for a range of distances (from 200 feet to 25,000 feet) from a particular aircraft with engines at a specific thrust level and airfield weather conditions derived from NOISEFILE, as input to the main NOISEMAP program (NMAP). The NOISEFILE database contains standardized noise data for over 200 aircraft types, most of which are military aircraft. AEDT uses a similar noise database and calculations for civilian aircraft, including the types relevant to BAF and listed in above-mentioned tables.

In the 2009 Part 150 Study Update, the F-15 aircraft were modeled with the F-15A with a F100-PW-100 engine. The MAANG now flies F-15C aircraft with PW220 engines. As the F-15C is not available in the NOISEFILE database, it was modeled in the 2015 and current NEM Updates with an F-15E with PW220 engines.

In the 2009 Part 150 Study Update, the AASF 2 flew the OH-58 helicopter. As mentioned in Chapter 2, they have since transitioned to the UH-72. The UH-72 is acoustically similar to the OH-58, thus UH-72 operations were modeled in the 2015 and current NEM Updates with the OH-58.

NOISEMAP and AEDT also require a flight profile for each flight track and type of operation. Flight profiles describe the altitude, speed and power setting along each of the flight tracks for each type of aircraft. Flight profiles began with those modeled in the 2009 Part 150 Study Update. They were reviewed/approved by based operators and ATCT.

Heavy Cargo aircraft were not modeled in the 2009 Part 150 Study Update. To account for the Heavy Cargo operations, they were modeled in the 2015 and current NEM Updates with the C-5M. Flight profiles were derived from recent C-5M modeling for Joint Base McGuire-Dix-Lakehurst, New Jersey for the US Air Force (Demers and Czech 2015).

Air carrier aircraft operations were not modeled in the 2009 Part 150 Study Update. To account for the air carrier operations, which primarily consist of Boeing 737 and Regional Jet-type of aircraft, they were modeled in the 2015 and current NEM Updates with the 737-700. Flight profiles were derived from modeling for Naval Air Station Whidbey Island, Washington, where the military equivalent of the 737, the P-8 Poseidon, is based (Kester and Czech 2012).

3.3.5 Run-up Operations

From interviews of airport staff and operators (Hepburn 2015; Mendoza 2015; Savoy 2015), maintenance run-up activity conducted at BAF was tabulated in 2015 and is shown for the current study in Table 3-6. The MAANG performs arming and de-arming run-ups associated with their sorties, in addition to engine maintenance and alert run-ups. BAF also has a facility in which engines or aircraft can be tested, called a "hush house" as it is acoustically treated to reduce the sound generated by the engines.

The MAANG utilizes the hush house as indicated in Table 3-6. Some runs are up to 10 hours in duration. The NOISEFILE database does not contain acoustic data for run-ups for the F-15C (or the F-15E) so MAANG run-ups were modeled with the older F-15 with the PW100 engines.

The AASF 2 performs health indicator tests, engine washes and ground power checks with their helicopters. NOISEFILE does not contain the acoustic data specific to the engines run by AASF 2 so they were modeled with the closest surrogates as were the power settings.

The only civilian run-up activity is conducted by Gulfstream as shown in the table. Some of the Gulfstream run-ups can last up to 90 minutes. AEDT was used to model civilian run-up noise for the GIV and GV types.

The modeled run-up locations listed in Table 3-6 are shown in Figure 3-8. Most run-ups are conducted north of Runway 15/33. MAANG de-arm run-ups are conducted south of Runway 15/33 near the hold-short area of Runway 02.

Table 3-6. Annual Run-up Operations for 2019

Aircraft Category	Aircraft	Engine Type	Test Name	Location ID	Magnetic Heading (deg)	Annual Events			Reported Power Setting	Modeled Power Setting (if different)	Duration at Power Setting (Minutes) Per Event	Number of Engines Running Simultaneously
						Events	% Day (7am-10pm)	% Night (10pm-7am)				
Military	F-15A	F100-PW-100	Arming runs	ARM	125	2,025	100%	0%	63% NC		5	2
			DeArming runs	DE-ARM	125	2,025	100%	0%	63% NC		5	2
			Maintenance	B3	125	351	100%	0%	63% NC		5	2
									63% NC		5	1
									80% NC		2.5	1
			Maintenance	B4	125	351	100%	0%	63% NC		2.5	1
									63% NC		2.5	1
									80% NC		2.5	1
			Alert	B4	125	58	100%	0%	80% NC		5	2
			F-15	F100-PW-100	Hush House	HH	125	16	100%	0%	Idle	
	11	100%						0%	Intermediate		79	1
	9	100%						0%	Mil		79	1
	5	100%						0%	AB		9	1
	Test Stand inside the Hush House	HH			125	15	100%	0%	Idle		10 hrs	1
									Intermediate		4.3 hrs	1
									Mil		3.9 hrs	1
									AB		34	1
	HH-60M	T700-GE-701D (modeled with UH-60A; T700-GE-700)	Health Indicator Test	ARNG	325	575	95%	5%	94% NG	OGE Load	5	2
			Engine Wash	ARNG	325	38	100%	0%	90% NG	OGE Load	15	2
	UH-72A	Turbomeca Arriel 1E2 (modeled with UH-1M; T53-L-13)	Ground Power Check	ARNG	325	15	100%	0%	95% N1	OGE Lite	2	2
Civilian	Gulfstream	(modeled with C-20, SPEYMK511-8)	G4 maintenance - 10800 sec check	G4	200	20	100%	0%	500 LBS		90	1
									2000 LBS		60	1
									11400 LBS		30	1
			G4 maintenance - 10800 sec check	TS	200	20	100%	0%	500 LBS		90	1
									2000 LBS		60	1
GV & G550 Power Run	TS	200	24	100%	0%	15385 LBS	(C-20 engine max is 11400 lbs)	10	2			

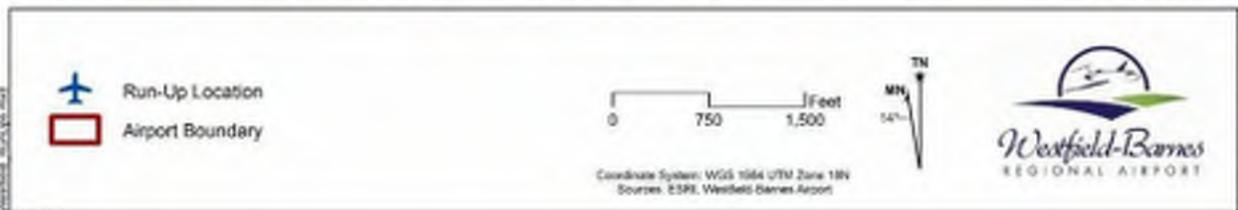


Figure 3-8. Modeled Run-Up Locations

3.4 Noise Exposure

Entering the above-described military operations data into NOISEMAP and civilian operations data into AEDT, and combining the noise results from each model, the resultant 65 dB through 85 dB DNL contours, in 5 dB increments, are shown in Figure 3-9 for CY2019 annual average daily aircraft operations. The 65 dB DNL contour extends off-airport by about one mile along the heading of Runway 02/20 to the north. To the south, the 65 dB DNL contour extends off-airport south of Penn Central Railroad by approximately 600 feet along the heading of Runway 02/20. The 65 dB DNL contour extends off-airport to the southeast approximately 3,600 feet. The 65 dB DNL contour extends approximately 1,500 feet west of the airport. South of Runway 15/33, the 65 dB DNL contour extends approximately 2,800 feet east from airport property. The primary area where the 70 dB DNL contour extends off-airport is south of Runway 15/33 where it extends to the east off-airport by approximately 2,000 feet. The 75 dB DNL contour extends from the airport boundary by no more than 400 feet. There is a relatively small area of land exposed to DNL between 75 dB and 80 dB located approximately 1,200 feet east of the airport boundary, south of Runway 15/33.

In accordance with Part 150 regulations, Figure 3-9 shows noise-sensitive public buildings, e.g., schools, hospitals, and health care facilities. There are no properties on or eligible for inclusion in the National Register of Historic Places in the map extent. As shown in Figure 3-9, no noise-sensitive public buildings are affected by 65 dB DNL or greater.

Figure 3-10 shows the DNL gradient from 45 dB in light cyan to 85+ dB in red along with DNL contours. The gradient figure shows most of BAF's higher aircraft noise is along the heading of Runway 02. The area of 45 dB DNL extends for miles from the airport, beyond the 65 dB DNL contour.

Using the land use compatibility matrix from Table 1-1, Table 3-7 shows 428 people are estimated to be exposed to DNL greater than or equal to 65 dB DNL. Thirteen of the 428 people are exposed to DNL between 70 dB and 75 dB DNL. No one is exposed to DNL greater than or equal to 75 dB. Using the land use compatibility matrix from Table 1-1, Table 3-8 shows 293 of the 890 acres exposed to DNL greater than or equal to 65 dB are incompatible with aircraft noise and are residential in their use.

Table 3-9 details the disposition of the newly or formerly non-compatible properties for the 2019 scenario. The current NCP addressed 39% (49 of 126) of the non-compatible properties within the 2014 NEM and 2019 cases. The 2019 case reveals an additional 202 properties may be incompatible with aircraft noise, three of which are exposed to DNL between 70 dB and 75 dB. None are exposed to DNL greater than or equal to 75 dB. The 2024 NEM shows no change in this information.

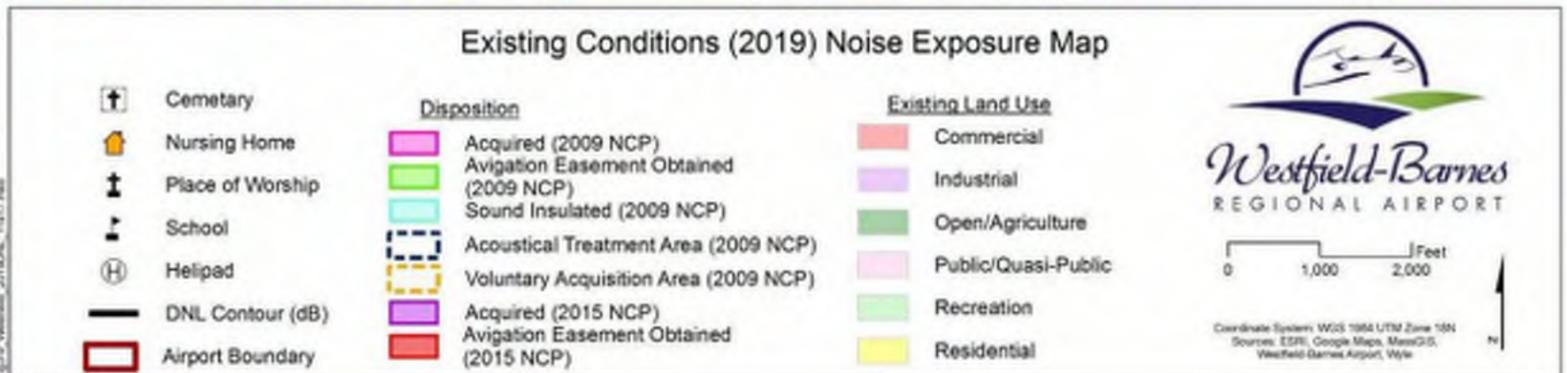
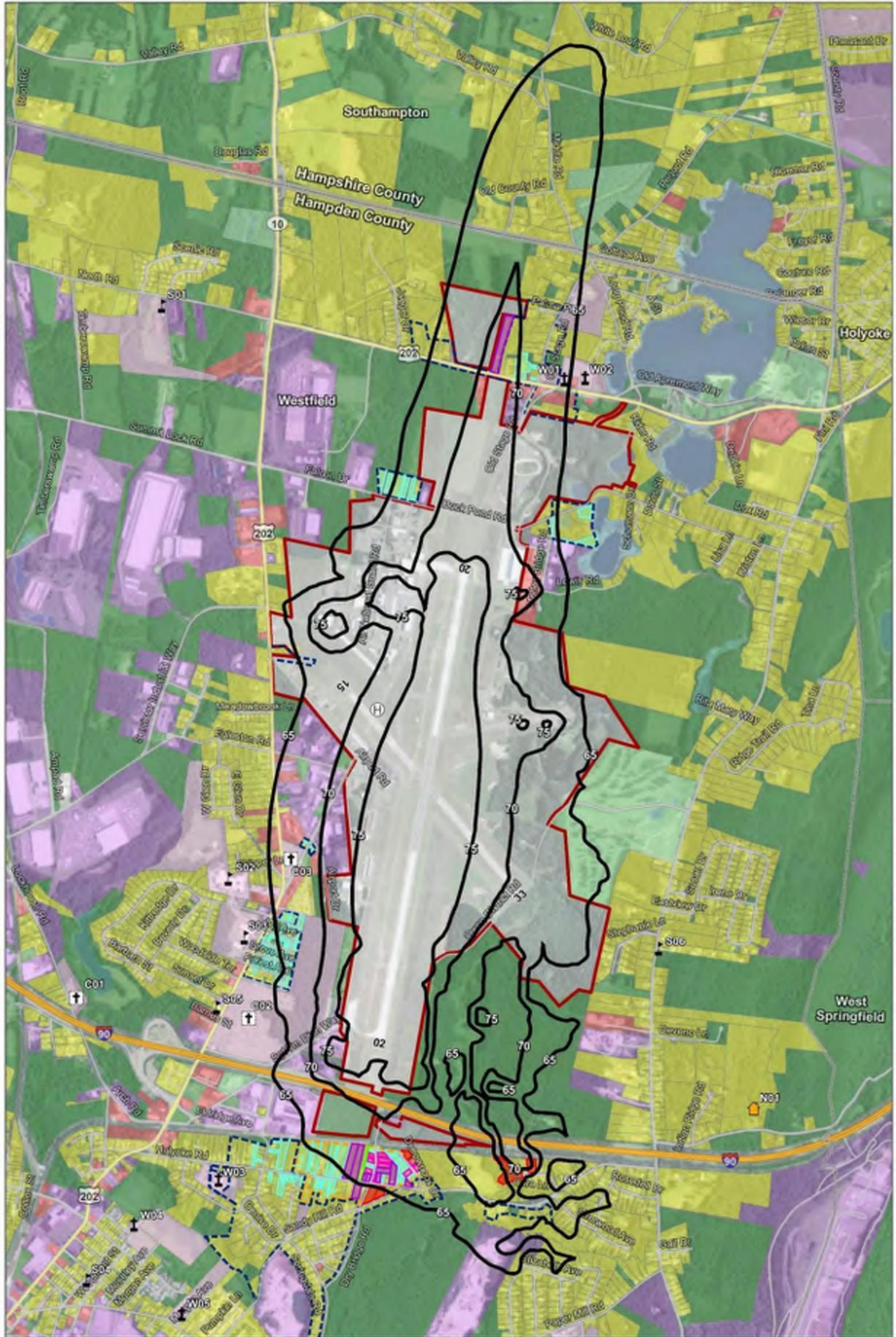


Figure 3-9. DNL Contours for Average Daily Aircraft Operations for CY2019



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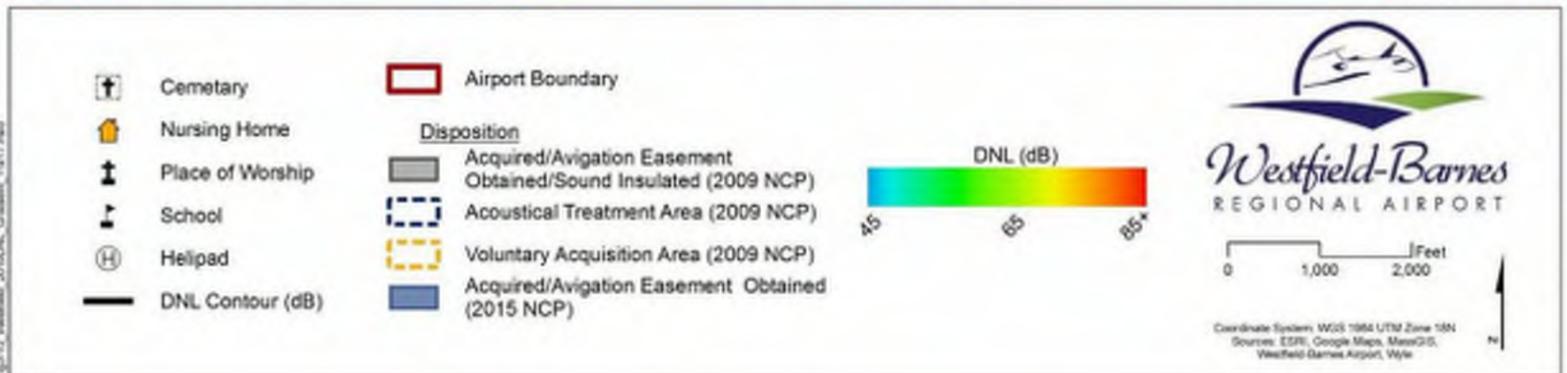
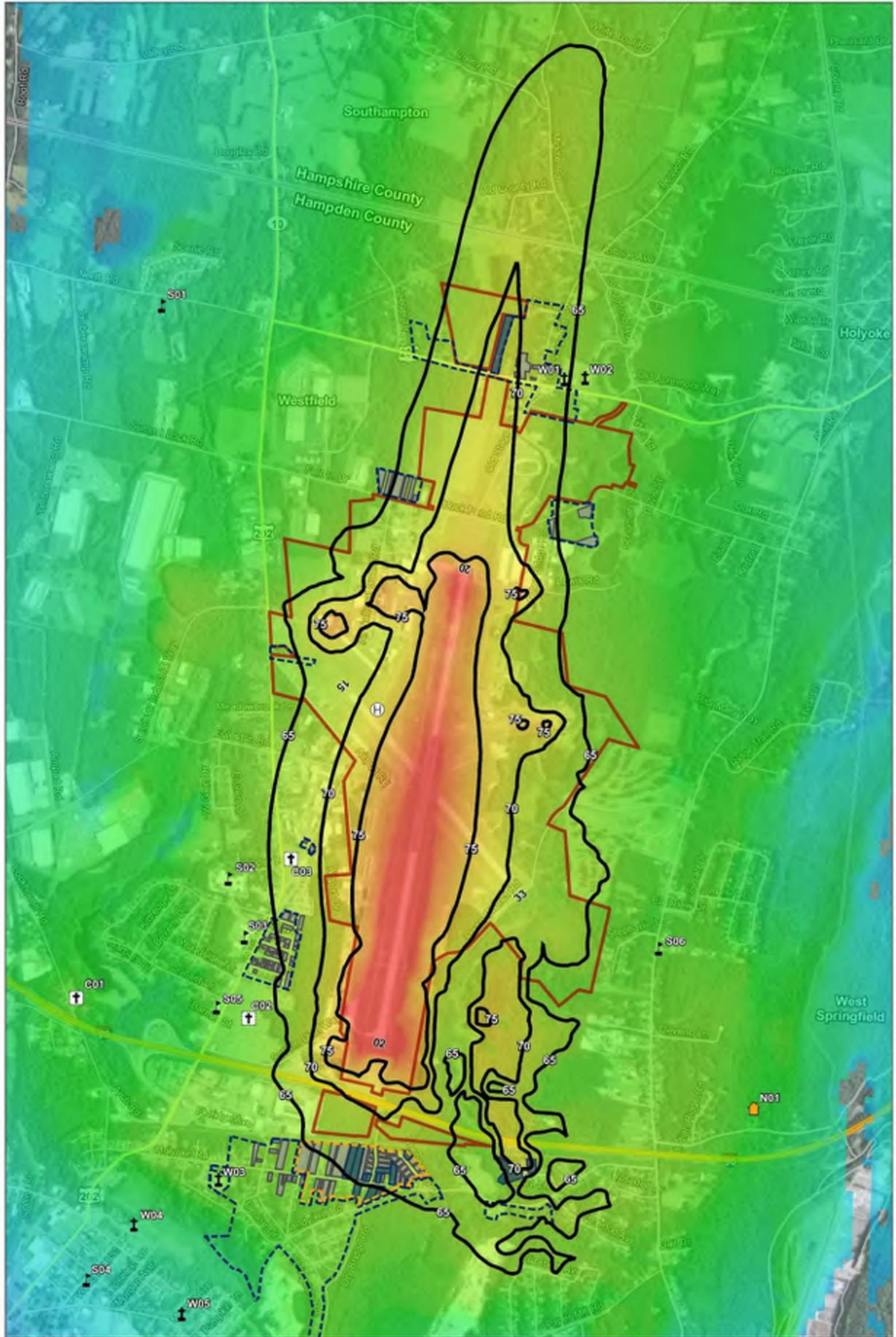


Figure 3-10. DNL Gradient for Average Daily Aircraft Operations for CY2019



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Table 3-7 Acreage and Population within Bands of DNL for CY2019

DNL Band (dBA)	Acreage (1)	Population (2)
65-70	766	415
70-75	179	13
75+	16	-
Total (≥65)	961	428

Notes:

1) off-airport; rounded to nearest acre

2) estimated from 2010 Census

Table 3-8 Land Use Acreage Within Bands of DNL for CY2019

Generalized Land Use	Band of DNL (dBA)			
	65-70	70-75	75+	Total (≥65)
Commercial	25	10	1	36
Industrial	79	30	4	113
Open/Agriculture	249	90	11	350
Public/ Quasi-Public	46	16	-	62
Recreation	36	-	-	36
Residential	280	13	-	293
Total	715	159	16	890

Note: rounded to nearest acre

Table 3-9 Categorization of Non-Compatible Properties for 2019 Scenario

DNL Band (dBA)	Program To Date with 2019 Scenario					Other 2019 Newly Incompatible Properties*	GRAND TOTAL	Properties to be Addressed **
	Acquired Properties	Avigation Easement	Sound Insulated Properties	Not Addressed*	Total			
65-70	19	4	49	49	121	150	271	199
70-75	1	2	-	2	5	1	6	3
75+	-	-	-	-	-	-	-	-
Total	20	6	49	51	126	151	277	202

Notes: property was counted if any portion of the parcel is within the DNL band; Arbor Mobile Home Park located on Southampton Rd is excluded.

* includes some parcels located outside of the DNL 65 dB

** equals those not addressed in the current Program plus those newly incompatible

For purposes of comparing the ‘existing conditions’ from the 2009 Part 150 Study Update, i.e., the 2009 scenario, Figure 3-11 shows a comparison of the 65 dB and 75 dB DNL contours from the 2009 case and from CY2019. Figure 3-12 shows the total airport operations since 1990 (solid blue line) along with the total flight operations modeled in the 2009 Part 150 Study Update (dashed red line) and the total flight operations modeled in this NEM Update (purple dashed line). With approximately 35% less total flight operations than the 2009 case, it was initially anticipated the CY2019 scenario would have a smaller overall DNL footprint.

However, the CY2019 65 dB DNL contour is noticeably different than the 2009 case’s 65 dB DNL contour. The differences in the contours are noticeable in each of the cardinal directions relative to the airport:

- To the west, the most noticeable difference is areas of on-airport 75-80 dB DNL of the CY2019 case north of Runway 15/33. These are due to more run-up operations (and/or longer durations) than the 2009 case.
- North of the airport, the departing MAANG F-15 aircraft have shallower climb profiles than the 2009 case. See Chapter 4 for further information.
- South of Runway 02, the differences are caused by the transition of noisier Stage II business jet aircraft (GIIB) to quieter Stage III business jet aircraft like the GIV in the CY2019 case with an approximate 33% reduction in flight operations relative to 2009. The noisier aircraft were dominating the DNL footprint south of the airport whereas F-15 VFR pattern operations dominate the DNL footprint here in the CY2019 case. See Chapter 4 for further information.
- To the east, inclusion of topographical (elevation and impedance) effects in the CY2019 case, with raising terrain to the east and southeast, cause the CY2019 65 dB, 70 dB and 75 dB DNL contours to spread further eastward than the 2009 case.

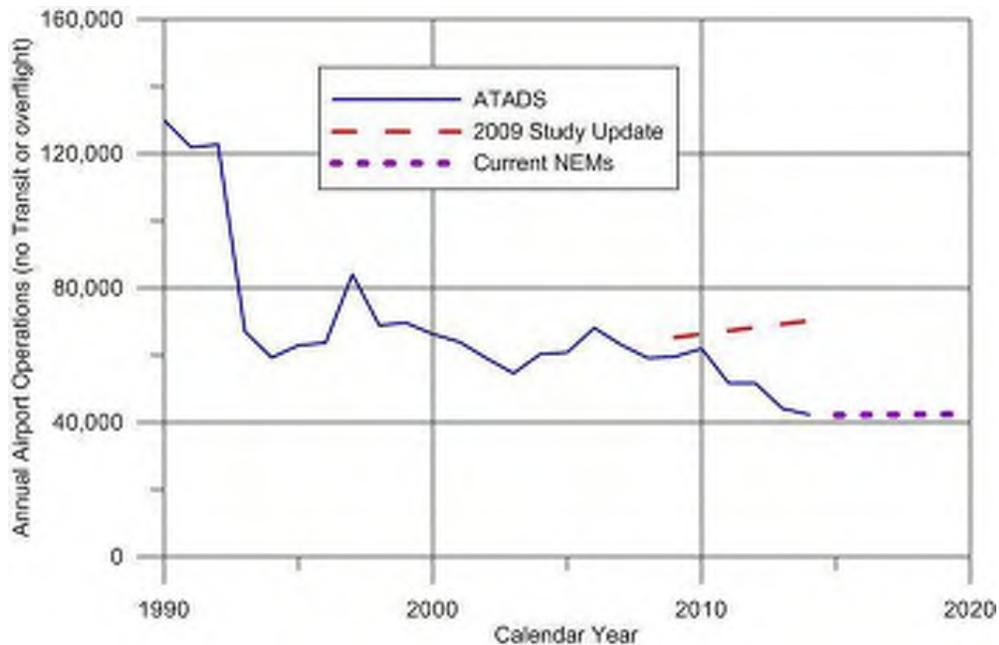


Figure 3-12. Historical and Future Annual Flight Operations at BA

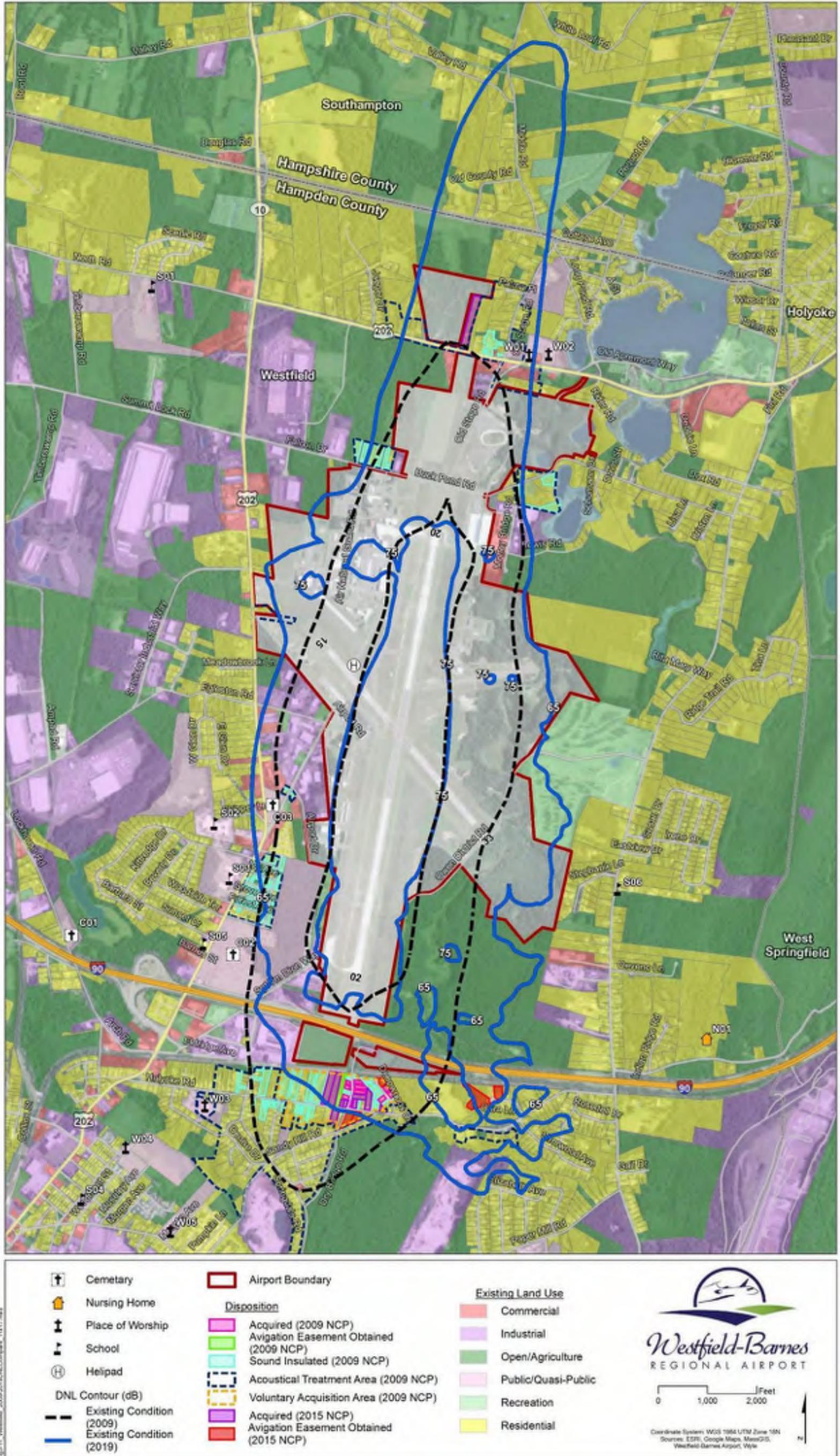


Figure 3-11. Comparison of Selected DNL Contours for 2009 and 2019 Scenarios



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4 Forecast NEM for 2024

This section documents the forecast CY2024 noise exposure at BAF. Section 4.1 details the input data for the CY2024 flight operations. Section 4.2 presents the resultant noise exposure and NEM.

4.1 Flight Operations

The operations of the four aircraft categories of air carrier, air taxi, general aviation, and military were derived for the CY2024 forecast scenario by first applying the FAA’s Terminal Area Forecast (TAF) (FAA 2015c) to estimate operations for 2015 and 2020. Flight operations are then expected to remain constant between 2020 and 2024. The percentage differences in each of the four aircraft categories between the listed TAF 2015 data and the 2024 data were calculated and are shown in Table 4-1. Of the four categories, the TAF only predicts an increase in GA traffic over the 9 year period. The TAF’s increase is only 1 percent for GA, less than 1 percent for overall total operations at BAF. Military, air carrier and air taxi operations would remain constant, relative to the 2015 scenario.

Table 4-2 shows the resultant 2024 forecast annual flight operations by aircraft type, type of operation and temporal period. The 1 percent increase from the TAF was applied to the operations of the following modeled aircraft types: GIV, Cessna 441 and GASEPF. The only other modification, relative to the 2015 scenario, was the Cessna 441 and GASEPF operations were scaled to reflect only 10% and 90% of the GA propeller operations, respectively, as predicted by BAF.

Relative to the baseline, the GA propeller aircraft would continue to dominate total flight operations with nearly 32,000 flight operations in the 2024 scenario. The overall percentage of DNL nighttime operations would remain at approximately 1%.

Table 4-1. Percentage Increases in Flight Operations from the FAA Terminal Area Forecast

TAF Year	Air Carrier	Air Taxi	GA	Military	Total
2015	14	762	33,394	6,585	40,755
2020	14	762	33,737	6,585	41,098
2024	14	762	33,737	6,585	41,098
Percent Increase	0%	0%	1%	0%	> 1%

Table 4-2. Forecast Annual Flight Operations for 2024

Annual Aircraft Flight Operations at Westfield-Barnes Regional Airport for Forecast (2020) Scenario																							
Category	Sub-category	Representing Aircraft Types	PAA	Modeled Aircraft ID (if different)	Departure			Non-Overhead Arrival			Overhead Arrival			VFR Closed Pattern (1)			IFR Closed Pattern (1)			TOTAL			
					Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	Day (7am-10pm)	Night (10pm-7am)	Total	
Military Based	ANG	F-15C (PW 220)	18	F-15E (PW220)	1,588	8	1,596	232	8	240	1,356	-	1,356	1,226	-	1,226	-	-	-	-	4,402	16	4,418
	Army	UH72	2	OH-58D	450	30	480	450	30	480	-	-	-	130	-	130	-	-	-	-	1,030	60	1,090
		HH60	6	UH60A	520	30	550	520	30	550	-	-	-	140	-	140	-	-	-	-	1,180	60	1,240
Military Transient	Heavy Cargo	C-5, C-17		C-5M	4	-	4	4	-	4	-	-	-	-	-	-	-	-	-	8	-	8	
	Tanker	KC-135		KC-135R	4	-	4	4	-	4	-	-	-	-	-	-	-	-	-	8	-	8	
	4-engine Turboprop	C-130		C-130J	58	2	60	58	2	60	-	-	-	789	-	789	263	-	263	1,168	4	1,172	
	2-engine Turboprop	C-12		C-12	3	-	3	3	-	3	-	-	-	-	-	-	-	-	-	6	-	6	
Civilian	Air Carrier	B737, RJ		737700	11	1	12	11	1	12	-	-	-	-	-	-	-	-	-	22	2	24	
	Air Taxi and GA Jet	G-450, G-550, CL60X		GIV	643	34	677	643	33	676	-	-	-	34	-	34	-	-	-	1,320	67	1,387	
	GA 2-engine turboprop or piston	Cessna 441, others		Learjet 35/36	637	34	671	637	33	670	-	-	-	-	-	-	-	-	-	1,274	67	1,341	
					1,590	-	1,590	1,590	-	1,590	-	-	-	-	-	-	-	-	-	-	3,180	-	3,180
	GA 1-engine turboprop or piston	Cessna 172, others		GASEPF	6,133	6	6,139	6,133	6	6,139	-	-	-	15,184	-	15,184	1,143	1	1,144	28,593	28	28,621	
	Military Based	Military Transient			2,568	68	2,626	1,202	68	1,270	1,356	-	1,356	1,496	-	1,496	-	-	-	6,612	136	6,748	
Air Carrier				69	2	71	69	2	71	-	-	-	789	-	789	263	-	263	1,190	4	1,194		
Air Taxi + GA				11	1	12	11	1	12	-	-	-	-	-	-	-	-	-	22	2	24		
Total				9,003	74	9,077	9,003	72	9,075	-	-	-	15,218	15	15,233	1,143	1	1,144	34,367	162	34,529		
Total				11,641	145	11,786	10,285	143	10,428	1,356	-	1,356	17,503	15	17,518	1,406	1	1,407	42,191	304	42,495		

Notes:
 1) Each circuit counted as 2 operations -- one arrival plus one departure.
 2) F-15s in AB for 75% of departures (day and night)

All of the other modeling parameters, namely runway utilization rates, flight tracks including utilization rate, aircraft profiles used on each of the flight tracks and aircraft noise and performance characteristics would be the same as those modeled for CY2019. Run-up operations for the Gulfstream aircraft would be increased by 1 percent, relative to the 2019 scenario, for consistency with the increase in flight operations.

4.2 Noise Exposure

Entering the above-described data into NOISEMAP and civilian operations data into AEDT, and combining the noise results from each model, the resultant 65 dB through 85 dB DNL contours, in 5 dB increments, are shown in Figure 4-1 for CY2024 annual average daily aircraft operations – the forecast NEM. The 65 dB DNL contour would extend about one mile along the heading of Runway 02/20 to the north. To the south, the 65 dB DNL contour would extend off-airport south of Penn Central Railroad by approximately 600 feet along the heading of Runway 02/20. The 65 dB DNL contour would extend off-airport to the southeast approximately 3,600 feet. The 65 dB DNL contour would extend approximately 1,500 feet west of the airport. South of Runway 15/33, the 65 dB DNL contour would extend approximately 2,800 feet east from airport property. The primary area where the 70 dB DNL contour would extend off-airport is south of Runway 15/33 where it would extend to the east off-airport by approximately 2,000 feet. The 75 dB DNL contour would extend from the airport boundary by no more than 400 feet. There would be a relatively small area of land exposed to DNL between 75 dB and 80 dB located approximately 1,200 feet east of the airport boundary, south of Runway 15/33.

In accordance with Part 150 regulations, Figure 4-1 shows noise-sensitive public buildings, e.g., schools, hospitals, and health care facilities. There would be no properties on or eligible for inclusion in the National Register of Historic Places in the map extent. As shown in Figure 4-1, no noise-sensitive public buildings would be affected by 65 dB DNL or greater.

Figure 4-2 shows the DNL gradient from 45 dB in light cyan to 85+ dB in red along with DNL contours. The gradient figure shows most of BAF's higher aircraft noise would remain along the heading of Runway 02. The area of 45 dB DNL would extend for miles from the airport, beyond the 65 dB DNL contour.

Using the land use compatibility matrix from Table 1-1, Table 4-3 shows an estimated 428 people would be exposed to 65 dB DNL or greater in 2024. Thirteen of the 428 people would be exposed to DNL between 70 dB and 75 dB DNL. No one would be exposed to DNL greater than or equal to 75 dB. Using the land use compatibility matrix from Table 1-1, Table 4-4 shows 293 of the 890 acres exposed to DNL greater than or equal to 65 dB would be incompatible with aircraft noise as they would be residential in their use.

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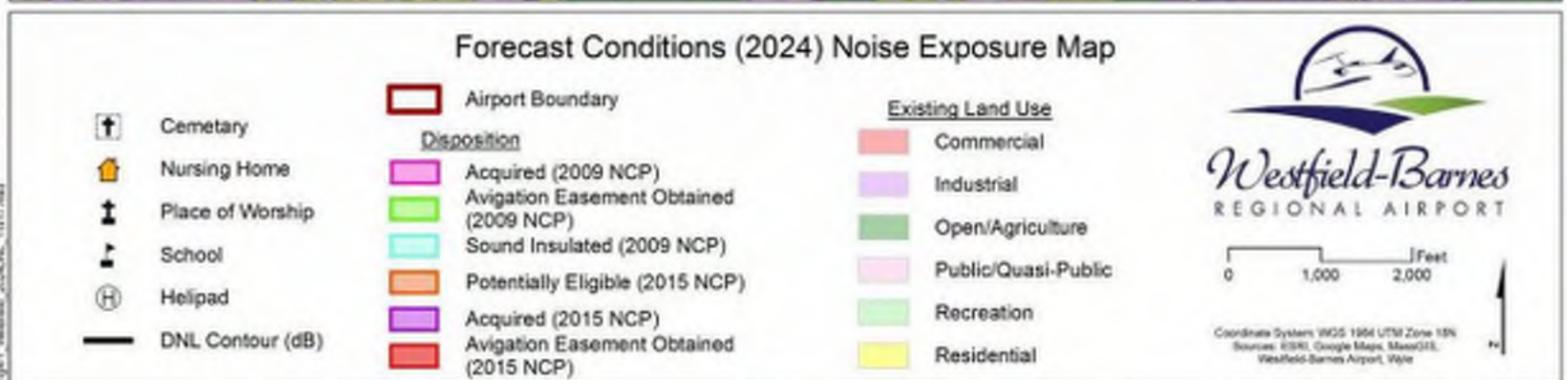


Figure 4-1. DNL Contours for Average Daily Aircraft Operations for CY2024 NEM



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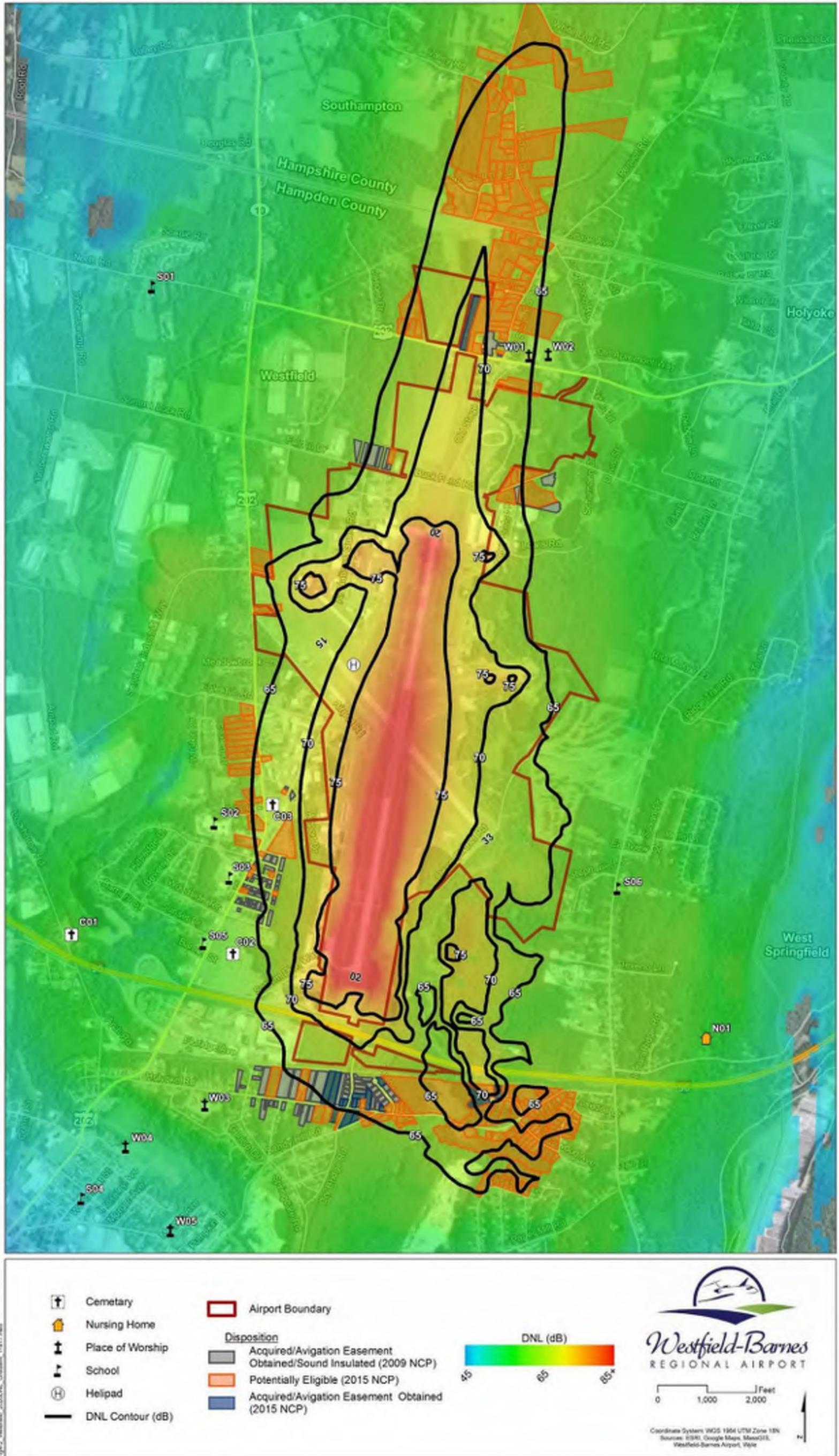


Figure 4-2. DNL Gradient for Average Daily Aircraft Operations for CY2024 NEM



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Table 4-3 Acreage and Population within Bands of DNL for 2024 NEM

DNL Band (dBA)	2019		2024 NEM		Increase re 2019	
	Acreage (1)	Population (2)	Acreage (1)	Population (2)	Acreage (1)	Population (2)
65-70	766	415	766	415	-	-
70-75	179	13	179	13	-	-
75+	16	-	16	-	-	-
Total (≥65)	961	428	961	428	-	-

Notes:

1) off-airport; rounded to nearest acre

2) estimated from 2010 Census

Table 4-4 Land Use Acreage Within Bands of DNL for CY2024 NEM

Generalized Land Use	2019				2024 NEM				Increase re 2019			
	Band of DNL (dBA)				Band of DNL (dBA)				Band of DNL (dBA)			
	65-70	70-75	75+	Total (≥65)	65-70	70-75	75+	Total (≥65)	65-70	70-75	75+	Total (≥65)
Commercial	25	10	1	36	25	10	1	36	-	-	-	-
Industrial	79	30	4	113	79	30	4	113	-	-	-	-
Open/Agriculture	249	90	11	350	249	90	11	350	-	-	-	-
Public/ Quasi-Public	46	16	-	62	46	16	-	62	-	-	-	-
Recreation	36	-	-	36	36	-	-	36	-	-	-	-
Residential	280	13	-	293	280	13	-	293	-	-	-	-
Total	715	159	16	890	715	159	16	890	-	-	-	-

Note: rounded to nearest acre

For context, Figure 4-4 shows a comparison of the 65 dB and 75 dB DNL contours from the 2024 NEM and the 2014 NEM from the 2009 Part 150 Study Update. The explanations provided in Section 3.4 for the differences between 2019 and the 2009 case would still apply to the comparison of the 2014 NEM and the 2024 NEM and the bullets from Section 3.4 are copied here:

- To the west, the most noticeable difference is areas of on-airport 75-80 dB DNL of the 2024 NEM north of Runway 15/33. These are due to more run-up operations (and/or longer durations) than the 2014 case.
- North of the airport, the departing MAANG F-15 aircraft have shallower climb profiles than the 2009/2014 cases. Figure 4-5 shows that the two scenarios differ in their climb profiles starting at approximately 5,000 feet from brake release. At 20,000 feet (approximately 4 miles) from brake release, the 2014 NEMs modeled the F-15 at an altitude of approximately 5,000 ft MSL whereas the 2019 and 2024 scenarios model the F-15 at an altitude of 2,000 ft MSL.
- South of Runway 02, the differences are caused by the transition of noisier Stage II business jet aircraft (GIIB) in the 2009/2014 cases to quieter Stage III business jet aircraft like the GIV in the 2024 NEM with approximately 50% less equivalent¹ annual flight operations (EAO), relative to the GIIB, in the 2014 NEM. The noisier GIIB aircraft were dominating the DNL footprint south of the airport whereas F-15 VFR pattern operations dominate the DNL footprint here in the CY2019 case. Figure 4-6 shows a two-dimensional representation of an aircraft's single-event Sound Exposure Level (SEL) and its number of EAO. The bigger the circle, the more EAO by the aircraft. The open circles are for the 2014 NEM from the 2009 Part 150 Study Update and the filled circles are for the 2024 scenario. The F-15E in the 2024 NEM would have approximately the same number of EAO as the F-15A did in the 2014 NEM but the F-15E has an SEL approximately 4 dB greater than the F-15A². The GIIB modeled in the 2014 NEM has an SEL of 112 dB (on par with an F-15E) whereas the GIV, with more EAO, has an SEL 20 dB less, at approximately 92 dB. To the east, inclusion of topographical (elevation and impedance) effects in the CY2019 case, with raising terrain to the east and southeast, cause the CY2019 65 dB, 70 dB and 75 dB DNL contours to spread further eastward than the 2009 case.

Tables 4-5 and 4-6 compare the 2024 NEM with the 2014 NEM with regard to off-airport acreage/population and land use, respectively. As evidenced by Table 4-5, the 2024 NEM would decrease the number of people exposed to 65 dB DNL by 324 people. Table 4-6 shows there would be 65 more incompatible (residential) acres exposed to at least 65 dB DNL in 2024, relative to the 2014 NEM. These opposite trends of less people but more residential acreage is due to less exposure in more densely populated areas and more exposure in less densely populated areas.

Table 4-7 details the disposition of the newly or formerly non-compatible properties for the 2024 NEM scenario. The total number of properties exposed to DNL greater than or equal to 65 dB would be 277. Of the 277, 49 (or 18%) were addressed by the current NCP and 51 (or 18.4%) were planned to be addressed by the current NCP.

In addition to depicting the parcels addressed by the 2009 NCP, Figures 4-1 through 4-4 also show the parcels potentially eligible for mitigation in the proposed 2015 NCP, as agreed upon with the FAA (Doucette 2015). The potentially eligible parcels are residential ones exposed to 65 dB DNL or greater (2024 NEM) or are part of a community block exposed to 65 dB DNL or greater. The latter criteria is known as 'block rounding'. As listed in Table 4-7, a revised NCP based on this 2024 NEM would include the 51 properties not yet addressed by the current NCP plus 151 properties not covered by the 65 dB contour area of the 2014 NEM, for a total of 202 potentially eligible properties. Three of these 202 would be exposed to DNL between 70 and 75 dB. None would be exposed to DNL greater than or equal to 75 dB. The 2024 NEM shows no change in this information.

¹ Equivalent annual operations equal the (DNL) daytime operations plus 10 times the (DNL) nighttime operations.

² Beside the difference in engines between the F-15A and F-15E, the difference is primarily due to the F-15E having a power setting 2%NC more than the F-15A and a speed 50 kts slower than the F-15A.

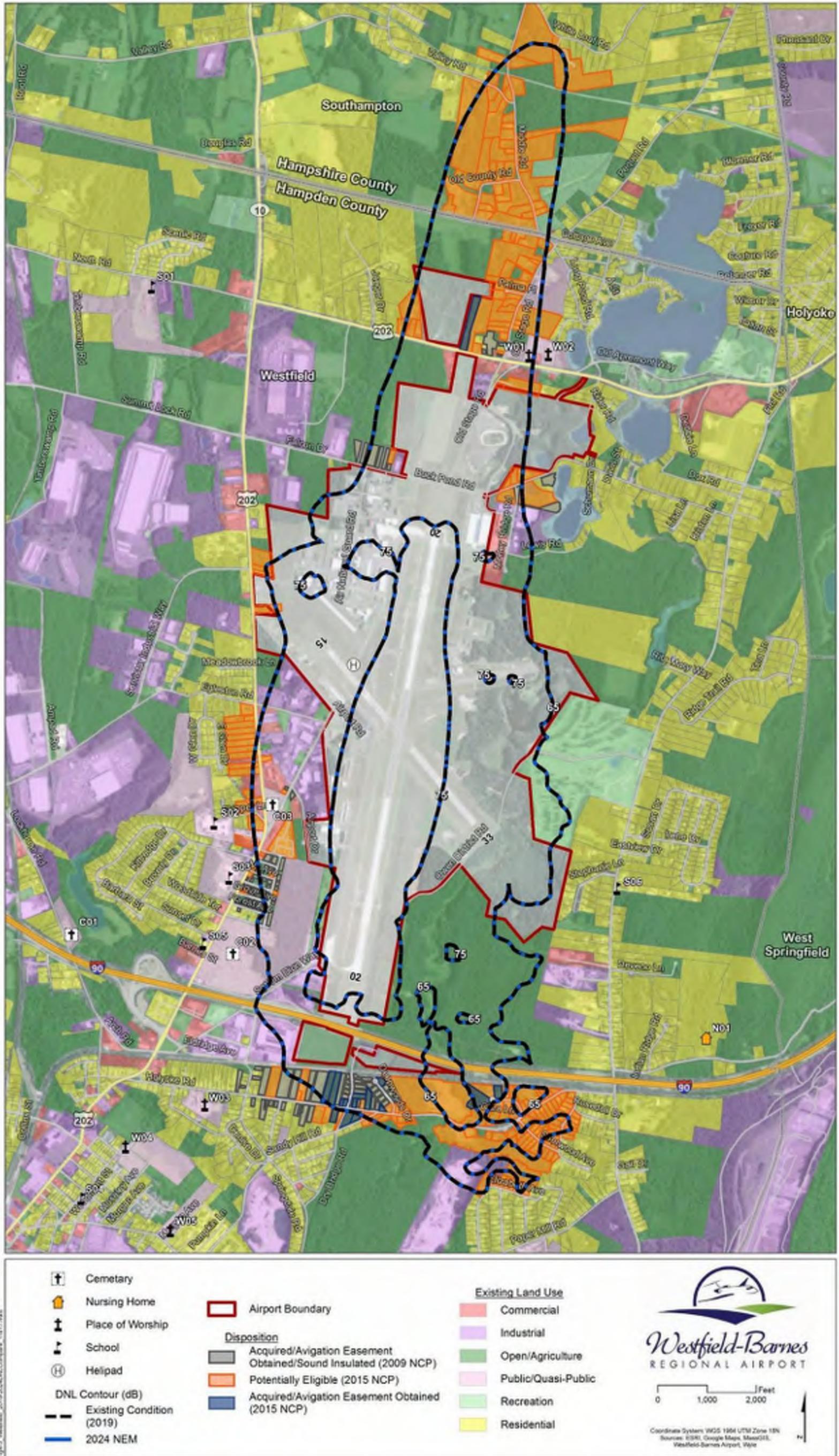


Figure 4-3. Comparison of Selected DNL Contours for CY2019 and CY2024 NEM



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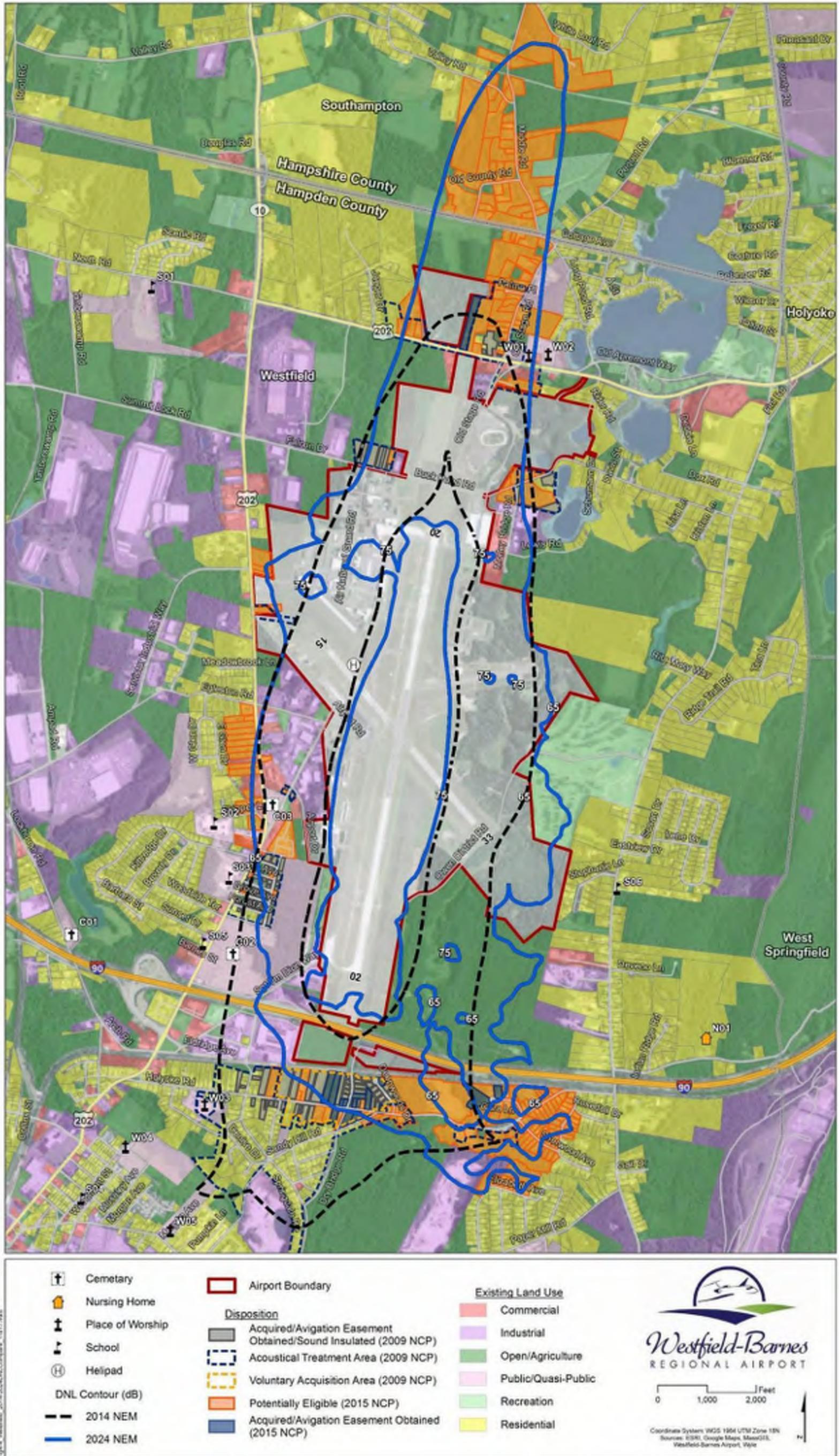


Figure 4-4. Comparison of Selected DNL Contours for 2014 NEM and CY2024 NEM



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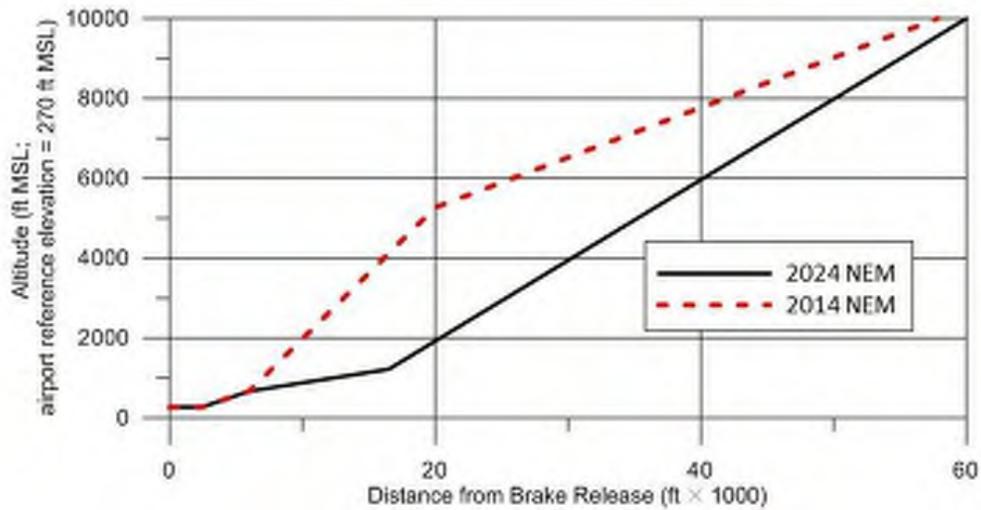
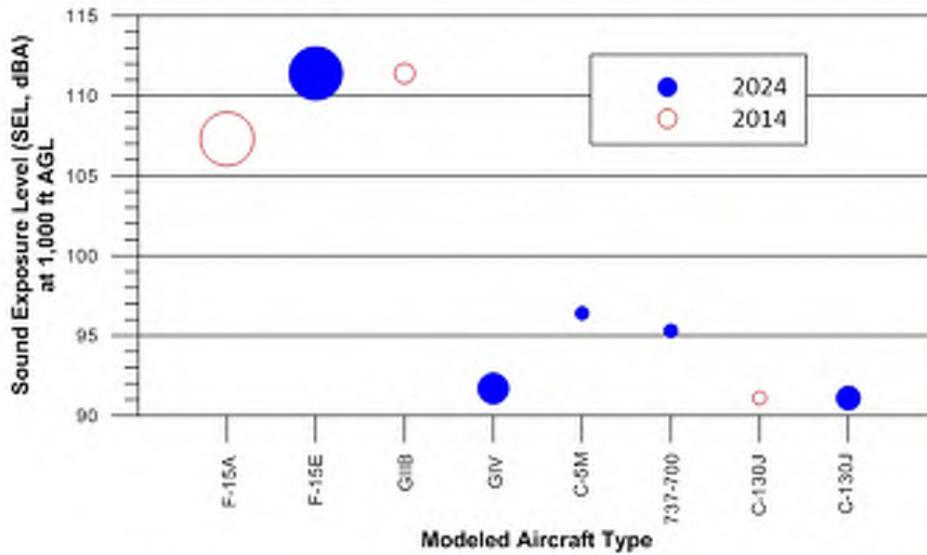


Figure 4-5. Comparison of Modeled F-15 Departure Altitude Profiles

Aircraft Type	Power setting	Speed (kts)
F-15A	88 %NC	350
F-15E	90 %NC	300
GIIB	9400 lbs	178
GIV	9400 lbs	178
C-5M	88 %N1	160
737-700	19513 lbs	150
C-130J	6200 HP	180



Note: bubble size proportional to number of equivalent annual operations (=day*10*night)

Figure 4-6. Departure SELs and Equivalent Annual Operations of Selected Modeled Aircraft Types

Table 4-5. Comparison of Acreage and Population within Bands of DNL for 2014 and 2024 NEMs

DNL Band (dBA)	2014 NEM		2024 NEM		Increase re 2014 NEM	
	Acreage (1)	Population (2)	Acreage (1)	Population (2)	Acreage (1)	Population (2)
65-70	615	702	766	415	151	(287)
70-75	170	50	179	13	8	(37)
75+	53	-	16	-	(37)	-
Total (≥65)	838	752	961	428	122	(324)

Notes:

1) off-airport; rounded to nearest acre

2) estimated from 2010 Census

Table 4-6. Comparison of Land Use Acreage within Bands of DNL for 2014 and 2024 NEMs

Generalized Land Use	2014 NEM				2024 NEM				Increase re 2014			
	Band of DNL (dBA)				Band of DNL (dBA)				Band of DNL (dBA)			
	65-70	70-75	75+	Total (≥65)	65-70	70-75	75+	Total (≥65)	65-70	70-75	75+	Total (≥65)
Commercial	28	5	-	33	25	10	1	36	(3)	5	1	3
Industrial	89	37	9	135	79	30	4	113	(10)	(7)	(5)	(22)
Open/Agriculture	182	62	32	276	249	90	11	350	67	28	(21)	74
Public/ Quasi-Public	41	29	6	76	46	16	-	62	5	(13)	(6)	(14)
Recreation	4	-	-	4	36	-	-	36	32	-	-	32
Residential	201	27	-	228	280	13	-	293	79	(14)	-	65
Total	545	160	47	752	715	159	16	890	170	(1)	(31)	138

Note: rounded to nearest acre

Table 4-7. Categorization of Non-Compatible Properties for 2024 NEM

DNL Band (dBA)	Program To Date with 2024 NEM					Other		GRAND TOTAL	Potential Properties to be Addressed **
	Acquired Properties	Avigation Easement	Sound Insulated Properties	Not Addressed*	Total	2019 Newly Incompatible Properties*			
65-70	19	4	49	49	121	150	271	199	
70-75	1	2	-	2	5	1	6	3	
75+	-	-	-	-	-	-	-	-	
Total (≥65)	20	6	49	51	126	151	277	202	

Notes: property was counted if any portion of the parcel is within the DNL band; Arbor Mobile Home Park located on Southampton Rd is excluded.

* includes some parcels located outside of the DNL 65 dB.

** equals those not addressed in the current Program plus those newly incompatible

5 Public Outreach

Public coordination and stakeholder consultation is a key part of the NEM Update and requires a concerted communication effort for the purposes of both collecting important input for the study and providing information about the noise analysis and the FAR Part 150 process. The study included public outreach components consisting of advertisement and a public meeting.

The public outreach process allowed for the dissemination and presentation of information about current FAR Part 150 guidelines and aircraft noise models and metrics. Appendix C contains information and input shared and derived through the public coordination and stakeholder consultation process used in the study. It also contains sign-in sheets and proof of publication notice.

5.1 Public Meeting

A public meeting was held on March 12, 2019 at 6:00 P.M. at the Westfield-Barnes Regional Airport's Terminal Building. The community was notified in advance about the meeting through a variety of communication and outreach tools, including:

- Announcement of public meetings on the City of Westfield's Local television channel;
- Direct notification of elected officials including City Council and Airport Commission; and
- Advertisement in the Springfield Republican newspaper and The Westfield News.

The community was provided with a primer in aircraft noise as well as an overview of the NEM Update study, its purpose, scope, and methodology. The community was provided with information about aircraft noise and the methods for assessing it in accordance with existing federal standards. The objective of the public workshop was to inform the community about the results of the NEM Update and provide an interactive platform for addressing community inquiries about aircraft noise at BAF. Workshop participants consulted display boards and were asked for comment about the development of the NEMs.

The meeting received press coverage by the Springfield Republican and a community newspaper called "The Westfield News." The articles are included in Appendix C.

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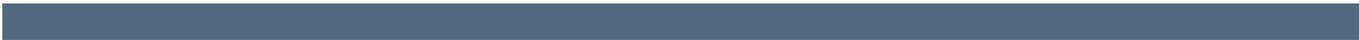
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APPENDIX A
Glossary and Discussion of Noise and Its Effect on the Environment

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Glossary

The noise study may use terms and abbreviations in its reports that may be unfamiliar to the public. We are providing this glossary as a reference of commonly used terms in a 14 CFR Part 150 Study.

A-weighted Sound Level (dBA): A measurement of loudness which accounts for the frequency sensitivity of the human ear. The “A” weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear’s lower sensitivities to those frequencies. Sound in each one third octave band is weighted and summed.

Acoustics: The study of the generation, propagation and reception of sound.

Advisory Circular (AC): A Federal Aviation Administration issued document providing methods, procedures, and practices for compliance with regulations and grant requirements.

Air Traffic Control (ATC): The function of providing positive control and aircraft separation services to participating aircraft through safe, orderly, and expeditious traffic flow procedures and instructions.

Air Traffic Control Tower (ATCT): A facility that provides local air traffic control services to aircraft operating into and out of an airport. Air Traffic Control Tower facilities are located on the airfield maintaining an unrestricted view of airside facilities (i.e., runway, taxiways). They are typically Federal Aviation Administration operated, but can also operate under contract.

Airport Elevation: The highest point within an airport’s movement area.

Airport Improvement Program (AIP): A federal funding mechanism that provides grants for planning and capital improvement projects at public-use airports included in the National Plan of Integrated Airport Systems (NPIAS).

Airport Layout Plan (ALP): A graphic illustration of existing and proposed airport facilities (e.g. runways, taxiways, terminal buildings, navigation aids, etc.).

Airport Noise and Capacity Act of 1990 (ANCA): The congressional act that established the first national noise policy. The ANCA created a timeline for the phase out of Stage 2 aircraft (year 2000) and created a review and approval process governing the implementation of local airport use or access restrictions by airport proprietors.

Airport Sponsor: The recipient of Airport Improvement Program (AIP) grant funding. In a Part 150 study, the airport operator is identified as the Airport Sponsor, but local jurisdictions can also assume ‘airport sponsor’ status when applying for AIP funding for noise mitigation programs.

Airspace: Airspace, in aeronautical terms, refers to the three-dimensional structure of the atmosphere in which aircraft operate. Airspace is classified as either controlled or uncontrolled. In controlled airspace (known as Class A, B, C, D, or E), aircraft are provided with air traffic control services and are subject to operating according to specific rules, regulations, and procedures. Uncontrolled airspace (Classes F and G) may not include air traffic control requirements and relies on visual flight rules.

Ambient Noise Level: The level of noise that is all-encompassing within a given environment for which a single source cannot be determined. It is usually a composite of sounds from many and varied sources near to and far from the receiver.

Arrival (or Approach): A flight operation that encompasses the descent and landing of an aircraft on an airport runway.

Attenuation: The decrease in sound level that occurs due to the loss of acoustical energy as sound waves pass through a medium (such as air or water). Also due in part to the interaction between sound waves that travel directly from the source to the receiver and reflected waves that bounce off any surfaces (such as the ground or a building) while traveling from the source to the receiver.

Aviation Safety and Noise Abatement Act of 1979 (ASNA): A congressional act authorizing the Federal Aviation Administration to award grants under the Airport Improvement Program for noise mitigation projects. The ASNA states that in order to access funding for noise mitigation projects, the project must be identified in an airport's Noise Compatibility Program (NCP) per 14 CFR Part 150.

Aviation Easement: An agreement which secures the right of flight with inherent noise and vibration above the surface, the right to remove existing obstructions, and a restriction against the establishment of future obstructions.

Building Code: A minimum set of standards for the structural safety of buildings set and enforced by local governments.

Building Permit: A written authorization by a municipality for new construction, additions to pre-existing structures, or major renovations.

CFR: Code of Federal Regulations.

CFR Part 150: Titled Airport Noise Compatibility Planning, CFR Part 150 establishes standards for the documentation of noise exposure in the airport environs, as well as procedures for obtaining Federal Aviation Administration approval of programs to reduce or eliminate incompatibilities between aircraft noise and surrounding land uses. A Part 150 study is comprised of both a set of Noise Exposure Maps which depict existing and future five-year forecast conditions and a Noise Compatibility Program, which identifies strategies to reduce, mitigate, and prevent existing and future incompatible land uses in the vicinity of an airport. An approved Noise Compatibility Program is required to access Airport Improvement Program funding for mitigation programs.

Closed-Pattern Operation (Touch and Go): An aircraft training operation flown in a closed pattern (generally oval or rectangular) around the runway and within site of the Air Traffic Control Tower, if present. A closed pattern operation consists of five legs: upwind, crosswind, downwind, base leg, and final approach.

Commuter Aircraft: A certified air carrier operator typically configured with 30 seats or less. Commuter aircraft operate a published flight schedule and operate under CFR Part 121.

Contour: see noise contour

Daytime (Acoustic): The period beginning at 7:00 a.m. and ending at 10:00 p.m. local time.

Day-Night Average Sound Level (DNL): The 24-hour decibel-average sound level, in A weighted decibels, with a 10-dB penalty for sound levels occurring between 10 p.m. and 7 a.m. local time.

Decibel (dB): The term used to identify 10 times the common logarithm of two like quantities proportional to power, such as sound power or sound pressure squared, commonly used to define the level produced by a sound source.

Displaced Threshold: A runway threshold at a location other than the beginning of the runway, generally designated in order to provide suitable obstacle clearance or safe pavement conditions for arriving aircraft. The displaced portion of the runway may still be used for departing aircraft.

Distance Measuring Equipment (DME): Equipment used to measure distance in nautical miles from an aircraft to a navigational aid.

Eminent Domain: A governmental unit's power to condemn private property for public or civic use, with the provision that the owner will be justly compensated.

Enroute: The portion of a flight outside the terminal airspace of both the origin and destination airports.

Engine Run-up Area: A designated area on an airfield used for prolonged aircraft engine testing.

Enplanements: The number of passengers boarding an aircraft.

Environmental Assessment (EA): An analysis prepared, pursuant to the National Environmental Policy Act (NEPA), to assess the potential environmental impacts of a proposed Federal action, which contains sufficient detail in order for a Federal determination of either a Finding of No Significant Impact (FONSI) or the need to pursue an Environmental Impact Statement (EIS).

Environmental Impact Statement (EIS): An analysis prepared pursuant to the National Environmental Policy Act (NEPA) that discloses the significant impacts of a proposed Federal action and evaluates a series of alternatives. The process for completing an EIS is outlined in Order 5050.4B and Order 1050.1E.

Environmental Protection Agency (EPA): The federal agency responsible for natural resource protection and oversight of the release of toxins and other pollutants into the environment.

Equivalent Sound Level (Leq): The level of a constant sound which, in the given time period, has the same average sound energy as does the actual time-varying sound. The time interval over which the measurement is taken should always be specified. Typically Leq is derived from A-weighted sound levels, thus, Leq is the decibel-average level of the individual A-weighted sound levels occurring during the time interval. The Leq metric can provide an accurate quantification of noise exposure for a specific period, particularly for daytime periods when the nighttime penalty under the DNL metric is inappropriate.

Federal Aviation Administration (FAA): The federal agency under the Department of Transportation responsible for regulating aviation activity, certifying pilots, air carriers, air traffic controllers and aircraft, as well as operating the National Airspace System (NAS) in the United States.

Fee Simple Land Acquisition: Fee simple acquisition is the purchase of lands that may have sensitive environmental concerns. In the context of airport noise mitigation projects, acquisition is subject to the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Final Approach: The final leg of an arrival flight path, which is typically the straight-in segment of the operation, except during circling and offset approaches whereby aircraft would not be directly aligned with the arrival runway.

Fixed Base Operator (FBO): A private-sector airport tenant that offers services to General Aviation (GA) and CFR Part 135 operators including refueling, de-icing, parking, maintenance services, flight training and other ground services.

Fleet mix: A representation of aircraft types operating at the airport or operated by a specific airline or tenant.

Flight Plan: A record filed by pilots and air carrier dispatchers with a Flight Service Station (FSS) declaring flight intent and requesting clearance and routing information. A typical flight plan includes information on aircraft, type, onboard equipment, origin and destination, fuel on board, and requested routing.

Flight Track (or path): The three-dimensional flight trajectory traveled by aircraft from the start of the departure (takeoff roll) to the destination. Flight tracks for noise modeling usually are derived from radar data and are generalized for input into the Integrated Noise Model (INM).

General Aviation (GA): All aircraft operating under CFR Part 91 typically consisting of single and multi-engine

propeller aircraft and business jet aircraft. General Aviation operations comprise all operations other than air carrier, air taxi, and military operations.

Geographical Information Systems (GIS): A group of software applications used to analyze, interpret, and visualize spatial data such as street, terrain, and demographic data.

Glide Slope: A vertically-guided path directed by a radio signal, which aircraft travel as they approach a runway on a precision approach, such as that offered by an Instrument Landing System (ILS). Glide slopes are indicated by a specific angle of approach, generally 3 degrees from a final approach fix to the runway threshold.

Global Positioning System (GPS): A constellation of orbiting satellites which provide position and time information to ground based and airborne receivers.

Hertz (Hz): The unit used to designate frequency. Specifically, the number of cycles per second.

Instrument Flight Rules (IFR): Flight during times when cloud cover and visibility are below published safety standards. Flight under Instrument Flight Rules conditions requires specific procedures, pilot certification requirements, and onboard instruments for aircraft navigation.

Instrument Landing System (ILS): A system consisting of a localizer (which provides runway centerline guidance), glide slope (which provides vertical guidance), outer and middle markers, and approach lights, which allows precision instrument approaches to runways during periods of low visibility.

Integrated Noise Model (INM): An integrated model required by the Federal Aviation Administration as the standard tool for the modeling of noise exposure resulting from aircraft operations at civilian airports in the U.S.

Knot: A unit of aircraft speed equal to 1 nautical mile per hour. 1 knot is equal to 1.15 (statute) miles per hour.

Land Use Compatibility: The ability of land adjacent to the airport to coexist with airport operations according to applicable federal, state, and local guidelines.

Land Use Controls: Regulations set forth by Federal, state, and local governments on the characteristics of development that may occur on a specific parcel of land, such as setback lines of buildings, zoning, or historic preservation guidelines.

Loudness: The attribute of an auditory sensation, in terms of which sounds may be ordered on a scale extending from soft (quiet) to loud. Loudness depends primarily upon the sound pressure of the source, but it also depends upon the frequency and wave form of the source.

Maximum Sound Level (L_{max}): The highest sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft over-flight). The A-weighting is implied.

Mean Sea Level (MSL): An altitude indicated as feet above sea level.

Missed Approach: A flight procedure that redirects the aircraft along a predefined course when an approach to a runway is not feasible due to weather or other considerations.

Mitigation: The lessening of severity or intensity. In the aviation planning context, mitigation generally refers to measures taken to reduce noise exposure. Residential sound insulation programs are an example of noise mitigation because they reduce the transmission of sound through buildings.

National Airspace System (NAS): The sovereign airspace under the control of the United States as defined by international law and governed by access and use restrictions.

National Environmental Policy Act (NEPA): A congressional Act which established the national policy for disclosing the potential environmental impacts of Federal actions. Compliance with NEPA requires the completion of an environmental document that outlines impacts that may significantly affect the quality of the human environment.

Navigation Aid: Typically, a ground-based facility designed to provide signal data to assist aircraft with navigation, approach and departure operations both within terminal airspace and in the enroute environment.

Nautical Mile: A unit of distance used in aviation; approximately 1.15 statute miles.

Noise: Disagreeable or unwanted sound.

Noise Abatement Procedure: A voluntary operational procedure for arriving and departing aircraft designed to reduce the impact of noise in a specific location.

Noise Attenuation: See Attenuation.

Noise Berm: A man-made structure or natural feature composed of either earthen or other materials to act as a mitigating barrier for the transmission of sound.

Noise Compatibility Program (NCP): A program that promulgates recommendations on the abatement and/or mitigation of existing impacts of aviation noise, and the prevention of future incompatibilities in areas identified as being significantly impacted by aircraft noise. A Noise Compatibility Program is created or updated as part of the CFR Part 150 process, following the completion of existing and future Noise Exposure Maps.

Noise Contour: A continuous line connecting a series of points of equal sound level values. The lines are generally drawn in 5-decibel increments so that they resemble elevation contours found in topographic maps except that the lines represent contours of equal noise level instead of elevation. Noise contours are generally used in depicting noise exposure around airports, highways and industrial plants. Noise contours are typically computed using noise models such as the FAA's Integrated Noise Model.

Noise exposure: The cumulative acoustic stimulation reaching the ear of a person over a specified time (e.g., a day, a work shift, or a lifetime).

Noise Exposure Map (NEM): Noise exposure contours overlaid on a background map which identifies future noise exposure conditions at an airport. An NEM is typically developed as part of the CFR Part 150 process.

Noise Reduction or Noise Level Reduction (NLR): The difference in sound levels between two adjacent areas or rooms. In the field of sound insulation, NLR is the difference between the outdoor noise level and the interior noise level. NLR combines the effect of the transmission loss performance of the built construction separating two areas or rooms, plus the effect of acoustic absorption present in the receiving room.

Nighttime (Acoustic): The period beginning at 10:00 p.m. and ending at 7:00 a.m. local time.

Operation: A departure, arrival, or closed pattern (touch and go) operation performed by aircraft at an airport.

Overflight: An aircraft operation that both originates and terminates at an airport outside of the airport of interest, yet transverse the terminal airspace.

Overlay District: A special zoning district which mandates regulatory standards for permitted land use and construction, in addition to existing zoning regulations.

Precision Approach Path Indicator (PAPI): A navigation aid on the end of a runway consisting of a single row of two to four lights which emit red or white beams depending on the altitude of the approaching aircraft. From the pilot's perspective, three to four red lights indicate a low approach; and three to four white lights indicate a high approach.

Precision Instrument Approach Procedure: An instrument approach where vertical guidance is provided.

Propagation: The radiation of sound energy from a source to a receiver.

Reliever Airport: A general aviation airport that serves to accommodate air traffic that would otherwise use the region's primary commercial service airport.

Run-up: A maintenance operation conducted to test aircraft engines following routine or major maintenance or repair. Run-ups consist of engine tests at varying durations and power settings.

Runway Use Program: A program that indicates the preferred use of specific runways at an airport. Runway use programs may be designed to enhance noise mitigation to airport communities for arriving and departing aircraft. Programs are categorized as formal (defined and acknowledged in a Letter of Understanding, with mandatory participation) or informal (voluntary participation).

Sound: Minute vibrations that travel through air and can be sensed by the human ear. Sounds are measured by their intensity, frequency, and duration.

Sound Exposure Level (SEL): A time-integrated metric quantifying the total acoustic energy of an event transmitted to the listener. SEL represents the same acoustic energy of a time-varying noise event such as an aircraft overflight or passing automobile, however, for SEL that energy is normalized to a one second duration. SEL is the building block for calculating the Day-Night Average Sound Level (DNL) in the FAA's INM.

Sound Insulation: Methods of construction or modification designed to reduce the transmission of sound energy through a structure.

Sound Level Meter: A portable device that measures sound pressure levels.

Sound Pressure Level: A measure in decibels of the magnitude of the sound. Specifically, the sound pressure level of a sound, in decibels, is 10 times the logarithm to the base 10 of the ratio of the squared pressure of this sound to the squared reference pressure. The reference pressure is usually 20 micropascals.

Standard Instrument Departure Procedure (SID): A published instrument departure procedure which provides detailed instructions for an aircraft during the transition from the terminal area to the enroute portion of flight.

Standard Terminal Arrival Route (STAR): A published instrument arrival procedure which transitions an aircraft from the enroute environment into the terminal area. A STAR specifies operational criteria such as the rate of descent, specific routing directions, and communications for arrival to an airport.

Terminal Airspace: Airspace immediately surrounding an airport in which guidance or instructions are issued to aircraft by local air traffic control. The size and classification of Terminal Airspace depends on airport size and other airspace characteristics in its vicinity. Airspace surrounding Lehigh Valley International Airport is classified as Class D airspace during hours in which the Air Traffic Control Tower is open, and Class G airspace during other times.

Terminal Radar Approach Control (TRACON): A Federal Aviation Administration air traffic control facility providing radar separation and vectoring services to aircraft within the terminal airspace of medium and large hub airports.

Traffic Pattern: Standard routes flown by aircraft in relation to the active runway.

Very High Frequency Omni-directional Range (VOR): A ground-based navigation aid which transmits very high frequency navigation signals in 360 degrees. A VOR may be co-located with other navigation equipment, such as a Tactical Air Navigation (TACAN) or Distance Measuring Equipment (DME).

Visual Approach: An approach which allows an aircraft to visually proceed to land on a given runway.

Visual Approach Slope Indicator (VASI): An airport lighting facility which provides vertical guidance to aircraft during an arrival.

Visual Flight Rules (VFR): A series of rules which apply to aircraft operating by visual reference and “see-and-avoid” procedures. VFR governs flights operating in weather conditions with ceilings of 1,000 feet Above Ground Level (AGL) and at least three miles visibility.

Zoning: The classification of land into separately regulated areas which specify permitted land uses, density, design, and placement of structures within each boundary.

This appendix discusses sound and noise and their potential effects on the human and natural environment. Section A.1 provides an overview of the basics of sound and noise. Section A.2 defines and describes the different metrics used to describe noise. The largest section, Section A.3, reviews the potential effects of noise, focusing on effects on humans but also addressing effects on property values, terrain, structures, and animals. Section A.4 contains the list of references cited.

A.1 Basics of Sound

Section A.1.1 describes sound waves and decibels. Section A.1.2 review sounds levels and types of sounds.

A.1.1 Sound Waves and Decibels

Sound consists of minute vibrations in the air that travel through the air and are sensed by the human ear. Figure A-1 is a sketch of sound waves from a tuning fork. The waves move outward as a series of crests where the air is compressed and troughs where the air is expanded. The height of the crests and the depth of the troughs are the amplitude or sound pressure of the wave. The pressure determines its energy or intensity. The number of crests or troughs that pass a given point each second is called the frequency of the sound wave.

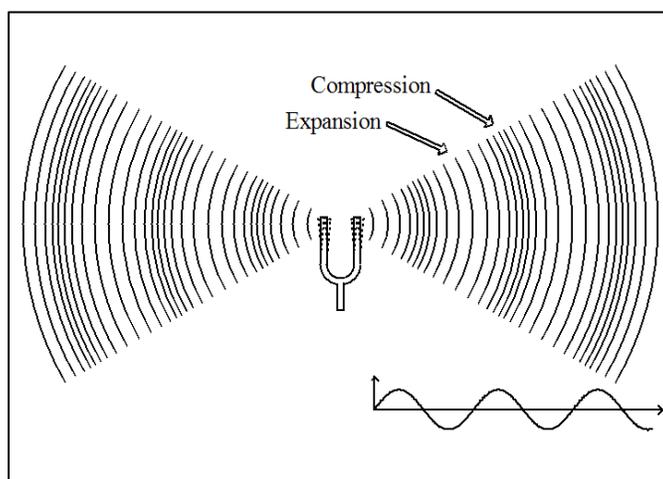


Figure A-1. Sound Waves from a Vibrating Tuning Fork

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration.

- **Intensity** is a measure of the acoustic energy of the sound and is related to sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound.
- **Frequency** determines how the pitch of the sound is perceived. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches.
- **Duration** or the length of time the sound can be detected.

As shown in Figure A-1, the sound from a tuning fork spreads out uniformly as it travels from the source. The spreading causes the sound's intensity to decrease with increasing distance from the source. For a source such as an aircraft in flight, the sound level will decrease by about 6 dB for every doubling of the distance. For a busy highway, the sound level will decrease by 3-4.5 dB for every doubling of distance.

As sound travels from the source it also gets absorbed by the air. The amount of absorption depends on the frequency composition of the sound, the temperature, and the humidity conditions. Sound with high frequency content gets absorbed by the air more than sound with low frequency content. More sound is absorbed in colder and drier conditions than in hot and wet conditions. Sound is also affected by wind and temperature gradients, terrain (elevation and ground cover) and structures.

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because of this vast range, it is unwieldy to use a linear scale to represent the intensity of sound. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 and 140 dB are felt as pain (Berglund and Lindvall, 1995).

Because of the logarithmic nature of the decibel unit, sound levels cannot simply be added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

$$\begin{aligned}60 \text{ dB} + 60 \text{ dB} &= 63 \text{ dB, and} \\80 \text{ dB} + 80 \text{ dB} &= 83 \text{ dB.}\end{aligned}$$

Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

$$60.0 \text{ dB} + 70.0 \text{ dB} = 70.4 \text{ dB.}$$

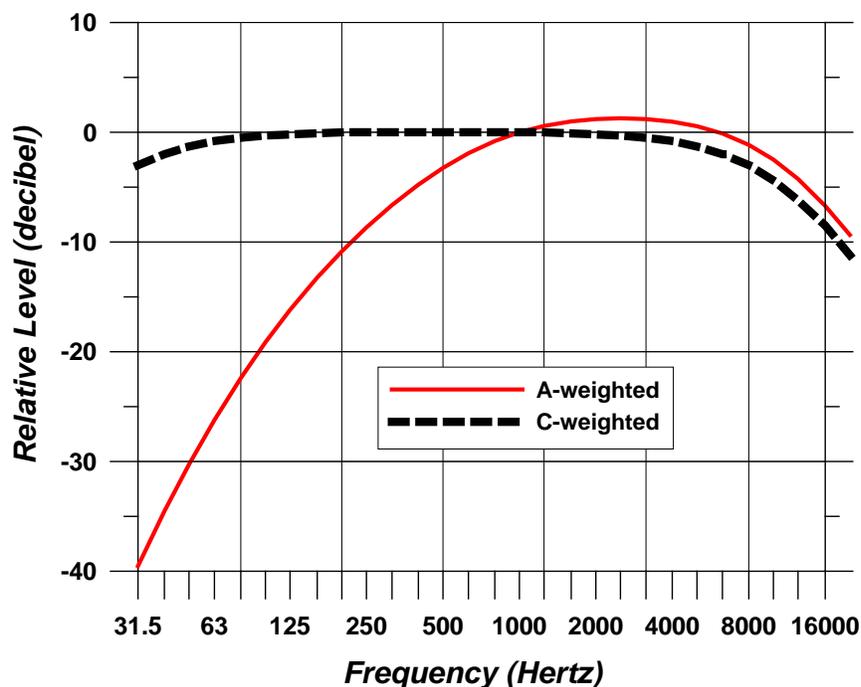
Because the addition of sound levels is different than that of ordinary numbers, this process is often referred to as "decibel addition."

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness. This relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90% decrease in sound intensity but only a 50% decrease in perceived loudness because the human ear does not respond linearly.

Sound frequency is measured in terms of cycles per second or hertz (Hz). The normal ear of a young person can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. As we get older, we lose the ability to hear high frequency sounds. Not all sounds in this wide range of frequencies are heard equally. Human hearing is most sensitive to frequencies in the 1,000 to 4,000 Hz range. The notes on a piano range from just over 27 Hz to 4,186 Hz, with middle C equal to 261.6 Hz. Most sounds (including a single note on a piano) are not simple pure tones like the tuning fork in Figure A-1, but contain a mix, or spectrum, of many frequencies.

Sounds with different spectra are perceived differently even if the sound levels are the same. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. These two curves, shown in Figure A-2, are adequate to quantify most environmental noises. A-weighting puts emphasis on the 1,000 to 4,000 Hz range.

Very loud or impulsive sounds, such as explosions or sonic booms, can sometimes be felt, and can cause secondary effects, such as shaking of a structure or rattling of windows. These types of sounds can add to annoyance, and are best measured by C-weighted sound levels, denoted dBC. C-weighting is nearly flat throughout the audible frequency range, and includes low frequencies that may not be heard but cause shaking or rattling. C-weighting approximates the human ear's sensitivity to higher intensity sounds.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure A-2. Frequency Characteristics of A- and C-Weighting

A.1.2 Sound Levels and Types of Sounds

Most environmental sounds are measured using A-weighting. They're called A-weighted sound levels, and sometimes use the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the term "A-weighted" is often omitted and the unit dB is used. Unless otherwise stated, dB units refer to A-weighted sound levels.

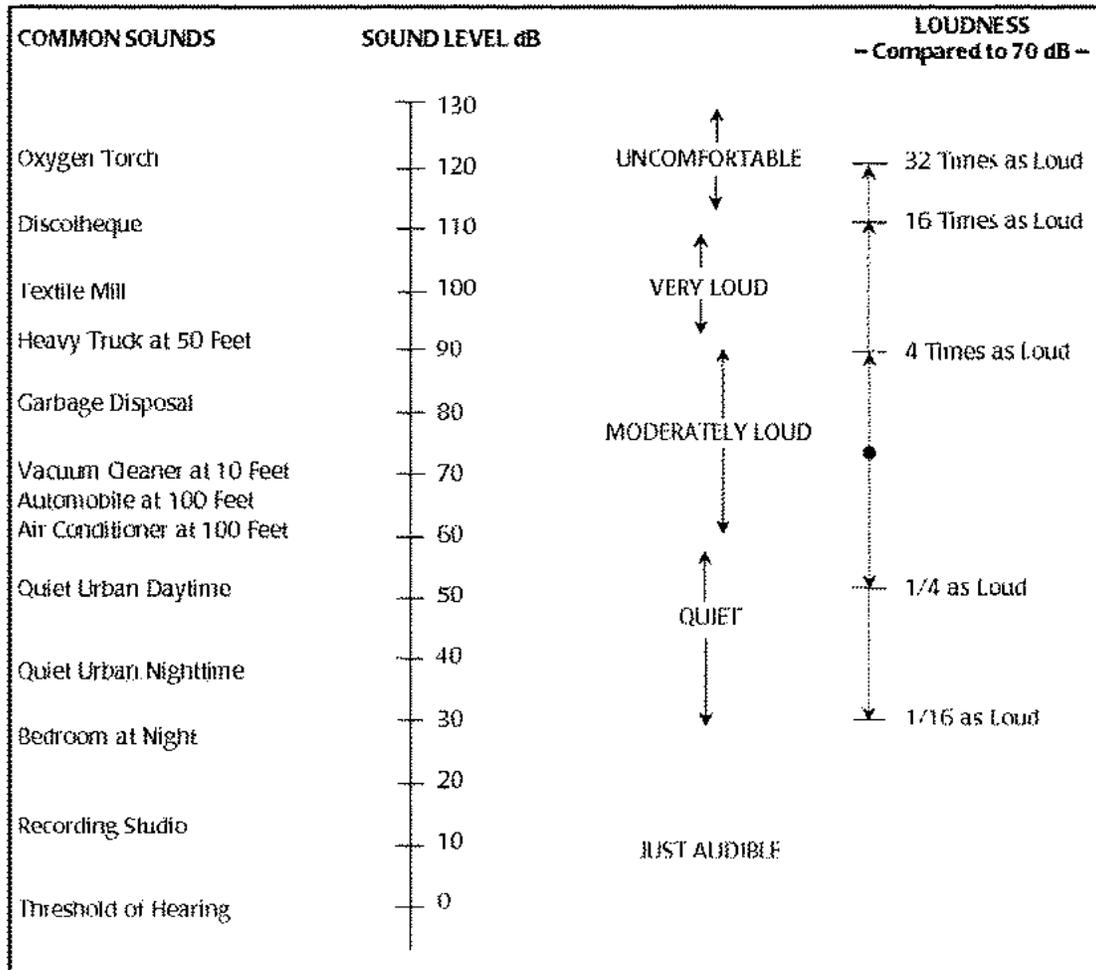
Sound becomes noise when it is unwelcome and interferes with normal activities, such as sleep or conversation. Noise is unwanted sound. Noise can become an issue when its level exceeds the ambient or background sound level. Ambient noise in urban areas typically varies from 60 to 70 dB, but can be as high as 80 dB in the center of a large city. Quiet suburban neighborhoods experience ambient noise levels around 45-50 dB (U.S. Environmental Protection Agency (USEPA) 1978).

Figure A-3 is a chart of A-weighted sound levels from common sources. Some sources, like the air conditioner and vacuum cleaner, are continuous sounds whose levels are constant for some time. Some sources, like the automobile and heavy truck, are the maximum sound during an intermittent event like a vehicle pass-by. Some sources like "urban daytime" and "urban nighttime" are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods. These are discussed in detail in Section A.2.

Aircraft noise consists of two major types of sound events: flight (including takeoffs, landings and flyovers), and stationary, such as engine maintenance run-ups. The former are intermittent and the latter primarily continuous. Noise from aircraft overflights typically occurs beneath main approach and departure paths, in local air traffic patterns around the airfield, and in areas near aircraft parking ramps and staging areas. As aircraft climb, the noise received on the ground drops to lower levels, eventually fading into the background or ambient levels.

Impulsive noises are generally short, loud events. Their single-event duration is usually less than 1 second. Examples of impulsive noises are small-arms gunfire, hammering, pile driving, metal impacts during rail-yard shunting operations, and riveting. Examples of high-energy impulsive sounds are quarry/mining explosions, sonic booms, demolition, and

industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams (American National Standards Institute [ANSI] 1996).

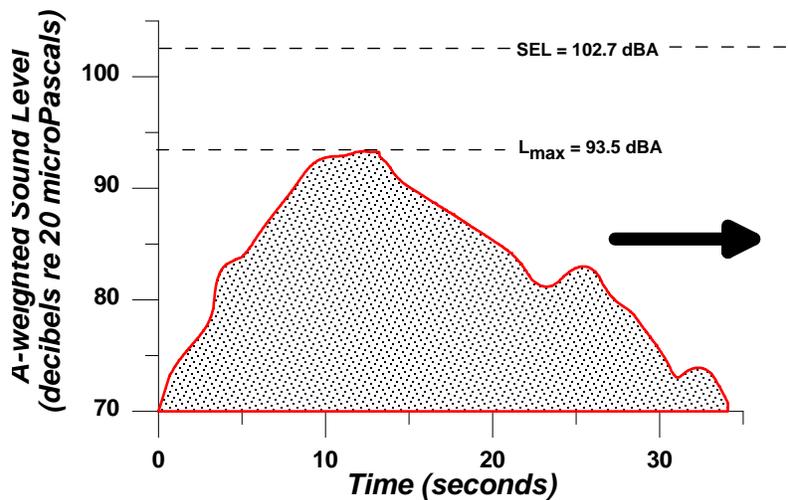


Sources: Harris 1979; Federal Interagency Committee on Aviation Noise (FICAN) 1997.

Figure A-3. Typical A-weighted Sound Levels of Common Sounds

A.2 Noise Metrics

Noise metrics quantify sounds so they can be compared with each other, and with their effects, in a standard way. The simplest metric is the A-weighted level, which is appropriate by itself for constant noise such as an air conditioner. Aircraft noise varies with time. During an aircraft overflight, noise starts at the background level, rises to a maximum level as the aircraft flies close to the observer, then returns to the background as the aircraft recedes into the distance. This is sketched in Figure A-4, which also indicates two metrics (L_{max} and SEL) that are described in Sections A.2.1 and A.2.3 below. Over time there can be a number of events, not all the same.



Source: Wyle Laboratories

Figure A-4. Example Time History of Aircraft Noise Flyover

There are a number of metrics that can be used to describe a range of situations, from a particular individual event to the cumulative effect of all noise events over a long time. This section describes the metrics relevant to environmental noise analysis.

A.2.1 Single-events

Maximum Sound Level (L_{max})

The highest A-weighted sound level measured during a single event in which the sound changes with time is called the maximum A-weighted sound level or Maximum Sound Level and is abbreviated L_{max} . The L_{max} is depicted for a sample event in Figure A-4.

L_{max} is the maximum level that occurs over a fraction of a second. For aircraft noise, the “fraction of a second” is one-eighth of a second, denoted as “fast” response on a sound level measuring meter (ANSI 1988). Slowly varying or steady sounds are generally measured over 1 second, denoted “slow” response. L_{max} is important in judging if a noise event will interfere with conversation, TV or radio listening, or other common activities. Although it provides some measure of the event, it does not fully describe the noise, because it does not account for how long the sound is heard.

Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level is the highest instantaneous level measured by a sound level measurement meter. L_{pk} is typically measured every 20 microseconds, and usually based on unweighted or linear response of the meter. It is used to describe individual impulsive events such as blast noise. Because blast noise varies from shot to shot and varies with meteorological (weather) conditions, the U.S. Department of Defense (DOD) usually characterizes L_{pk} by the metric PK 15(met), which is the L_{pk} exceeded 15% of the time. The “met” notation refers to the metric accounting for varied meteorological or weather conditions.

Sound Exposure Level (SEL)

Sound Exposure Level combines both the intensity of a sound and its duration. For an aircraft flyover, SEL includes the maximum and all lower noise levels produced as part of the overflight, together with how long each part lasts. It represents the total sound energy in the event. Figure A-4 indicates the SEL for an example event, representing it as if all the sound energy were contained within 1 second.

Because aircraft noise events last more than a few seconds, the SEL value is larger than L_{max} . It does not directly represent the sound level heard at any given time, but rather the entire event. SEL provides a much better measure of aircraft flyover noise exposure than L_{max} alone.

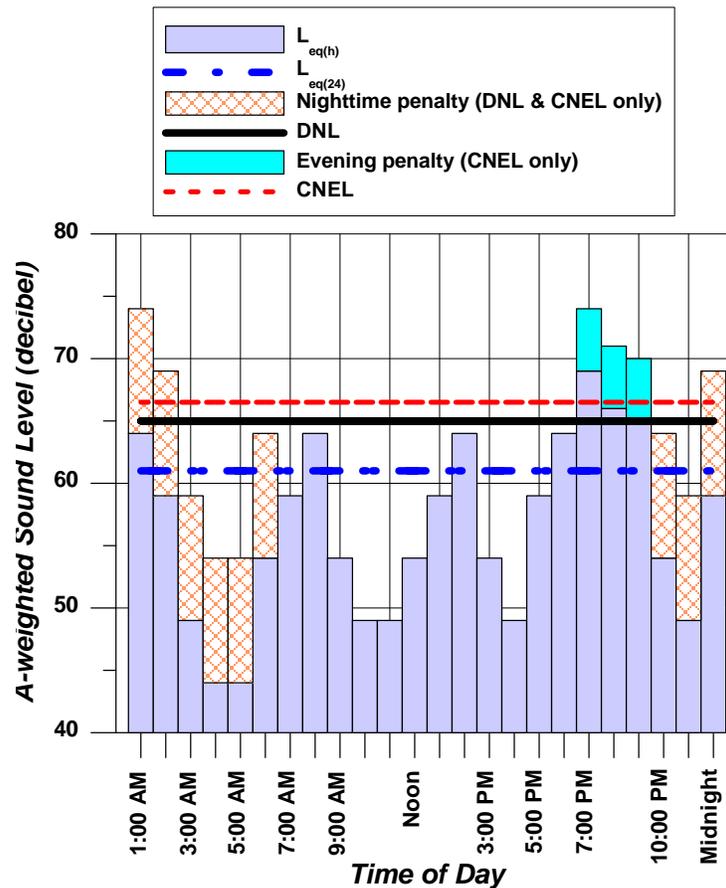
A.2.2 Cumulative Events

Equivalent Sound Level (L_{eq})

Equivalent Sound Level is a “cumulative” metric that combines a series of noise events over a period of time. L_{eq} is the sound level that represents the decibel average SEL of all sounds in the time period. Just as SEL has proven to be a good measure of a single event, L_{eq} has proven to be a good measure of series of events during a given time period.

The time period of an L_{eq} measurement is usually related to some activity, and is given along with the value. The time period is often shown in parenthesis (e.g., $L_{eq(24)}$ for 24 hours). The L_{eq} from 7 a.m. to 3 p.m. may give exposure of noise for a school day.

Figure A-5 gives an example of $L_{eq(24)}$ using notional hourly average noise levels ($L_{eq(h)}$) for each hour of the day as an example. The $L_{eq(24)}$ for this example is 61 dB.



Source: Wyle Laboratories

Figure A-5. Example of $L_{eq(24)}$, DNL and CNEL Computed from Hourly Equivalent Sound Levels

Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL)

Day-Night Average Sound Level is a cumulative metric that accounts for all noise events in a 24-hour period. However, unlike $L_{eq(24)}$, DNL contains a nighttime noise penalty. To account for our increased sensitivity to noise at night, DNL applies a 10 dB penalty to events during the nighttime period, defined as 10:00 p.m. to 7:00 a.m. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

CNEL is a variation of DNL specified by law in California (California Code of Regulations Title 21, *Public Works*) (Wyle Laboratories 1970). CNEL has the 10 dB nighttime penalty for events between 10:00 p.m. and 7:00 a.m. but also includes a 4.8 dB penalty for events during the evening period of 7:00 p.m. to 10:00 p.m. The evening penalty in CNEL accounts for the added intrusiveness of sounds during that period.

For airports and military airfields, DNL and CNEL represent the average sound level for annual average daily aircraft events.

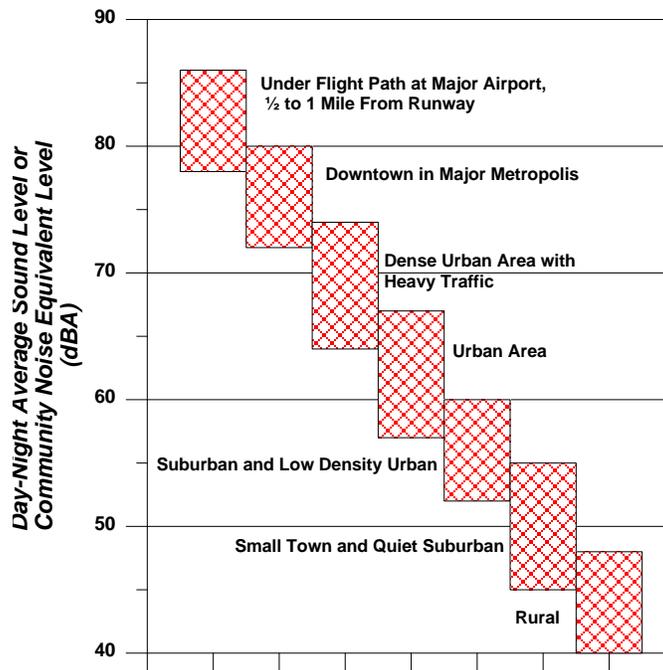
Figure A-5 gives an example of DNL and CNEL using notional hourly average noise levels ($L_{eq(h)}$) for each hour of the day as an example. Note the $L_{eq(h)}$ for the hours between 10 p.m. and 7 a.m. have a 10 dB penalty assigned. For CNEL the hours between 7p.m. and 10 p.m. have a 4.8 dB penalty assigned. The DNL for this example is 65 dB. The CNEL for this example is 66 dB.

Figure A-6 shows the ranges of DNL or CNEL that occur in various types of communities. Under a flight path at a major airport the DNL may exceed 80 dB, while rural areas may experience DNL less than 45 dB.

The decibel summation nature of these metrics causes the noise levels of the loudest events to control the 24-hour average. As a simple example, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

A feature of the DNL metric is that a given DNL value could result from a very few noisy events or a large number of quieter events. For example, 1 overflight at 90 dB creates the same DNL as 10 overflights at 80 dB.

DNL or CNEL do not represent a level heard at any given time, but represent long term exposure. Scientific studies have found good correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (Schultz 1978; USEPA 1978).



Source: DOD 1978.

Figure A-6. Typical DNL or CNEL Ranges in Various Types of Communities

Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operations Areas (MOAs), and Restricted Areas/Ranges generate a noise environment that is somewhat different from that around airfields. Rather than regularly occurring operations like at airfields, activity in SUAs is highly sporadic. It is often seasonal, ranging from 10 per hour to less than 1 per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-air-speed flyover can have a rather sudden onset, with rates of up to 150 dB per second.

The cumulative daily noise metric devised to account for the “surprise” effect of the sudden onset of aircraft noise events on humans and the sporadic nature of SUA activity is the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). Onset rates between 15 and 150 dB per second require an adjustment of 0 to 11 dB to the event’s SEL, while onset rates below 15 dB per second require no adjustment to the event’s SEL (Stusnik et al. 1992). The term ‘monthly’ in L_{dnmr} refers to the noise assessment being conducted for the month with the most operations or sorties -- the so-called busiest month.

In California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m.) and is denoted $CNEL_{mr}$.

A.2.3 Supplemental Metrics

Number-of-Events Above (NA) a Threshold Level (L)

The Number-of-Events Above (NA) metric gives the total number of events that exceed a noise level threshold (L) during a specified period of time. Combined with the selected threshold, the metric is denoted NAL. The threshold can be either SEL or L_{max} , and it is important that this selection is shown in the nomenclature. When labeling a contour line or point of interest (POI), NAL is followed by the number of events in parentheses. For example, where 10 events exceed an SEL of 90 dB over a given period of time, the nomenclature would be NA90SEL(10). Similarly, for L_{max} it would be NA90 L_{max} (10). The period of time can be an average 24-hour day, daytime, nighttime, school day, or any other time period appropriate to the nature and application of the analysis.

NA is a supplemental metric. It is not supported by the amount of science behind DNL/CNEL, but it is valuable in helping to describe noise to the community. A threshold level and metric are selected that best meet the need for each situation. An L_{\max} threshold is normally selected to analyze speech interference, while an SEL threshold is normally selected for analysis of sleep disturbance.

The NA metric is the only supplemental metric that combines single-event noise levels with the number of aircraft operations. In essence, it answers the question of how many aircraft (or range of aircraft) fly over a given location or area at or above a selected threshold noise level.

Time Above (TA) a Specified Level (L)

The Time Above (TA) metric is the total time, in minutes, that the A-weighted noise level is at or above a threshold. Combined with the threshold level (L), it is denoted TAL. TA can be calculated over a full 24-hour annual average day, the 15-hour daytime and 9-hour nighttime periods, a school day, or any other time period of interest, provided there is operational data for that time.

TA is a supplemental metric, used to help understand noise exposure. It is useful for describing the noise environment in schools, particularly when assessing classroom or other noise sensitive areas for various scenarios. TA can be shown as contours on a map similar to the way DNL contours are drawn.

TA helps describe the noise exposure of an individual event or many events occurring over a given time period. When computed for a full day, the TA can be compared alongside the DNL in order to determine the sound levels and total duration of events that contribute to the DNL. TA analysis is usually conducted along with NA analysis so the results show not only how many events occur, but also the total duration of those events above the threshold.

A.3 Noise Effects

Noise is of concern because of potential adverse effects. The following subsections describe how noise can affect communities and the environment, and how those effects are quantified. The specific topics discussed are:

- Annoyance;
- Speech interference;
- Sleep disturbance;
- Noise-induced hearing impairment;
- Non-auditory health effects;
- Performance effects;
- Noise effects on children;
- Property values;
- Noise-induced vibration effects on structures and humans;
- Noise effects on terrain;
- Noise effects on historical and archaeological sites; and
- Effects on domestic animals and wildlife.

A.3.1 Annoyance

With the introduction of jet aircraft in the 1950s, it became clear that aircraft noise annoyed people and was a significant problem around airports. Early studies, such as those of Rosenblith et al. (1953) and Stevens et al. (1953) showed that effects depended on the quality of the sound, its level, and the number of flights. Over the next 20 years considerable research was performed refining this understanding and setting guidelines for noise exposure. In the early 1970s, the USEPA published its “Levels Document” (USEPA 1974) that reviewed the factors that affected communities. DNL (still known as L_{dn} at the time) was identified as an appropriate noise metric, and threshold criteria were recommended.

Threshold criteria for annoyance were identified from social surveys, where people exposed to noise were asked how noise affects them. Surveys provide direct real-world data on how noise affects actual residents.

Surveys in the early years had a range of designs and formats, and needed some interpretation to find common ground. In 1978, Schultz showed that the common ground was the number of people “highly annoyed,” defined as the upper 28% range of whatever response scale a survey used (Schultz 1978). With that definition, he was able to show a remarkable consistency among the majority of the surveys for which data were available. Figure A-7 shows the result of his study relating DNL to individual annoyance measured by percent highly annoyed (%HA).

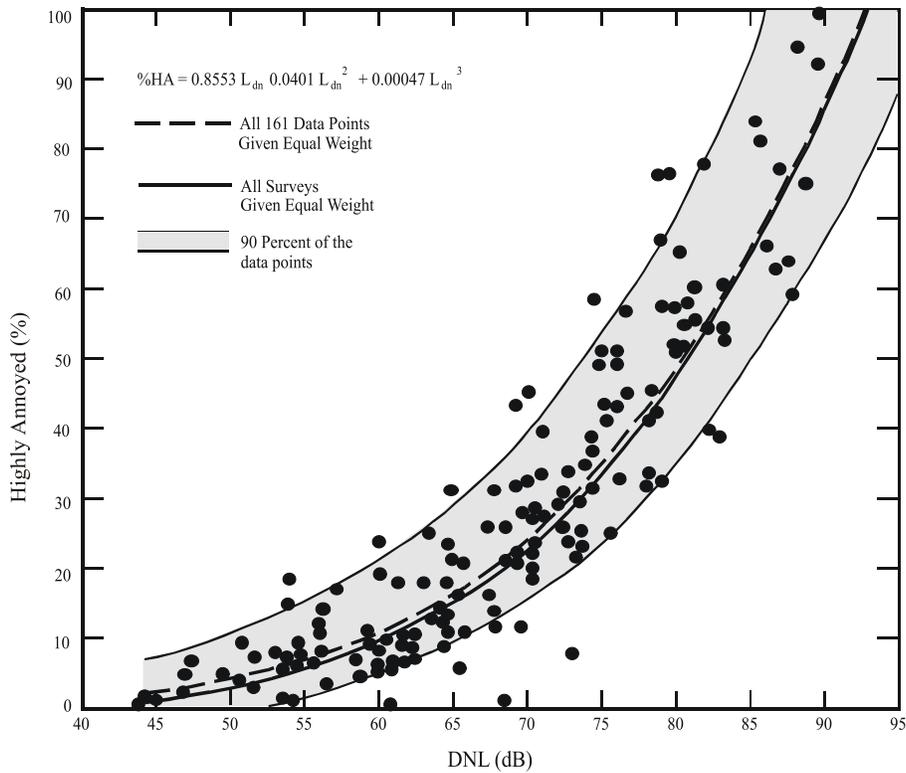


Figure A-7. Schultz Curve Relating Noise Annoyance to DNL (Schultz 1978)

Schultz's original synthesis included 161 data points. Figure A-8 compares revised fits of the Schultz data set with an expanded set of 400 data points collected through 1989 (Finegold et al. 1994). The new form is the preferred form in the US, endorsed by the Federal Interagency Committee on Aviation Noise (FICAN 1997). Other forms have been proposed, such as that of Fidell and Silvati (2004), but have not gained widespread acceptance.

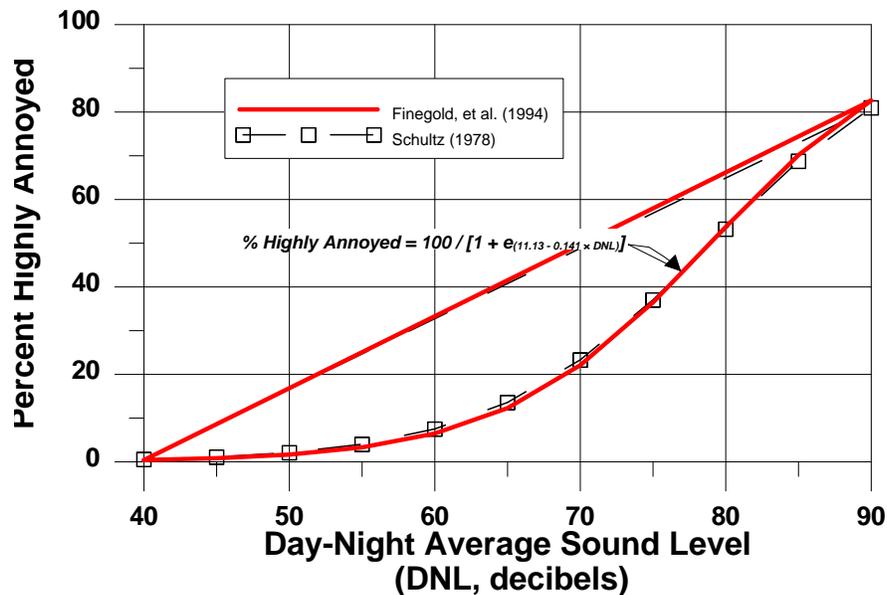


Figure A-8. Response of Communities to Noise; Comparison of Original Schultz (1978) with Finegold et al (1994)

When the goodness of fit of the Schultz curve is examined, the correlation between groups of people is high, in the range of 85-90%. The correlation between individuals is lower, 50% or less. This is not surprising, given the personal differences between individuals. The surveys underlying the Schultz curve include results that show that annoyance to noise is also affected by non-acoustical factors. Newman and Beattie (1985) divided the non-acoustic factors into the emotional and physical variables shown in Table A-1.

Table A-1. Non-Acoustic Variables Influencing Aircraft Noise Annoyance

Emotional Variables	Physical Variables
Feeling about the necessity or preventability of the noise;	Type of neighborhood;
Judgement of the importance and value of the activity that is producing the noise;	Time of day;
Activity at the time an individual hears the noise;	Season;
Attitude about the environment;	Predictability of the noise;
General sensitivity to noise;	Control over the noise source; and
Belief about the effect of noise on health; and	Length of time individual is exposed to a noise.
Feeling of fear associated with the noise.	

Schreckenber and Schuemer (2010) recently examined the importance of some of these factors on short term annoyance. Attitudinal factors were identified as having an effect on annoyance. In formal regression analysis, however, sound level (L_{eq}) was found to be more important than attitude.

A recent study by Plotkin et al. (2011) examined updating DNL to account for these factors. It was concluded that the data requirements for a general analysis were much greater than most existing studies. It was noted that the most significant issue with DNL is that it is not readily understood by the public, and that supplemental metrics such as TA and NA were valuable in addressing attitude when communicating noise analysis to communities (DOD 2009a).

A factor that is partially non-acoustical is the source of the noise. Miedema and Vos (1998) presented synthesis curves for the relationship between DNL and percentage “Annoyed” and percentage “Highly Annoyed” for three transportation noise sources. Different curves were found for aircraft, road traffic, and railway noise. Table A-2 summarizes their results. Comparing the updated Schultz curve suggests that the percentage of people highly annoyed by aircraft noise may be higher than previously thought.

Table A-2. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Highly Annoyed (%HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema and Vos 1998.

As noted by the World Health Organization (WHO), however, even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 1999).

Consistent with WHO’s recommendations, the Federal Interagency Committee on Noise (FICON 1992) considered the Schultz curve to be the best source of dose information to predict community response to noise, but recommended further research to investigate the differences in perception of noise from different sources.

A.3.2 Speech Interference

Speech interference from noise is a primary cause of annoyance for communities. Disruption of routine activities such as radio or television listening, telephone use, or conversation leads to frustration and annoyance. The quality of speech communication is important in classrooms and offices. In the workplace, speech interference from noise can cause fatigue and vocal strain in those who attempt to talk over the noise. In schools it can impair learning.

There are two measures of speech comprehension:

1. *Word Intelligibility* - the percent of words spoken and understood. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.
2. *Sentence Intelligibility* – the percent of sentences spoken and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

U.S. Federal Criteria for Interior Noise

In 1974, the USEPA identified a goal of an indoor $L_{eq(24)}$ of 45 dB to minimize speech interference based on sentence intelligibility and the presence of steady noise (USEPA 1974). Figure A-9 shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background indoor sound levels of less than 45 dB L_{eq} are expected to allow 100% sentence intelligibility.

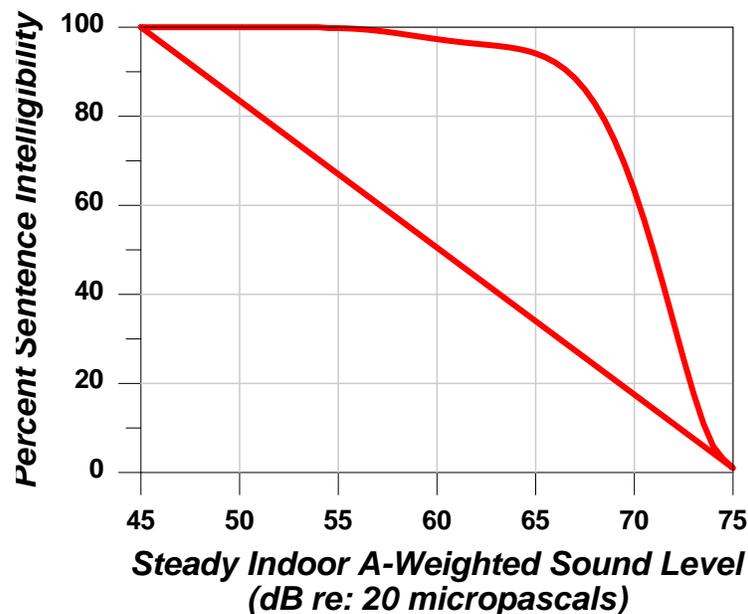


Figure A-9. Speech Intelligibility Curve (digitized from USEPA 1974)

The curve in Figure A-9 shows 99% intelligibility at L_{eq} below 54 dB, and less than 10% above 73 dB. Recalling that L_{eq} is dominated by louder noise events, the USEPA $L_{eq(24)}$ goal of 45 dB generally ensures that sentence intelligibility will be high most of the time.

Classroom Criteria

For teachers to be understood, their regular voice must be clear and uninterrupted. Background noise has to be below the teacher's voice level. Intermittent noise events that momentarily drown out the teacher's voice need to be kept to a minimum. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Lazarus (1990) found that for listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., a comparison of the level of the sound to the level of background noise) is in the range of 15 to 18 dB. The initial ANSI classroom noise standard (ANSI 2002) and American Speech-Language-Hearing Association (ASLHA 1995) guidelines concur, recommending at least a 15 dB signal-to-noise ratio in classrooms. If the teacher's voice level is at least 50 dB, the background noise level must not exceed an average of 35 dB. The National Research Council of Canada (Bradley 1993) and WHO (1999) agree with this criterion for background noise.

For eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} during normal school hours (FAA 1985).

Most aircraft noise is not continuous. It consists of individual events like the one sketched in Figure A-4. Since speech interference in the presence of aircraft noise is caused by individual aircraft flyover events, a time-averaged metric alone, such as L_{eq} , is not necessarily appropriate. In addition to the background level criteria described above, single-event criteria that account for those noisy events are also needed.

A 1984 study by Wyle for the Port Authority of New York and New Jersey recommended using Speech Interference Level (SIL) for classroom noise criteria (Sharp and Plotkin 1984). SIL is based on the maximum sound levels in the frequency range that most affects speech communication (500-2,000 Hz). The study identified an SIL of 45 dB as the goal. This would provide 90% word intelligibility for the short time periods during aircraft overflights. While SIL is technically the best metric for speech interference, it can be approximated by an L_{max} value. An SIL of 45 dB is equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

Lind et al. (1998) also concluded that an L_{max} criterion of 50 dB would result in 90% word intelligibility. Bradley (1985) recommends SEL as a better indicator. His work indicates that 95% word intelligibility would be achieved when indoor SEL did not exceed 60 dB. For typical flyover noise this corresponds to an L_{max} of 50 dB. While WHO (1999) only specifies a background L_{max} criterion, they also note the SIL frequencies and that interference can begin at around 50 dB.

The United Kingdom Department for Education and Skills (UKDfES) established in its classroom acoustics guide a 30-minute time-averaged metric of $L_{eq(30min)}$ for background levels and the metric of $L_{A1,30min}$ for intermittent noises, at thresholds of 30-35 dB and 55 dB, respectively. $L_{A1,30min}$ represents the A-weighted sound level that is exceeded 1% of the time (in this case, during a 30-minute teaching session) and is generally equivalent to the L_{max} metric (UKDfES 2003).

Table A-3 summarizes the criteria discussed. Other than the FAA (1985) 45 dB L_{max} criterion, they are consistent with a limit on indoor background noise of 35-40 dB L_{eq} and a single event limit of 50 dB L_{max} . It should be noted that these limits were set based on students with normal hearing and no special needs. At-risk students may be adversely affected at lower sound levels.

Table A-3. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	$L_{eq}(\text{during school hours}) = 45 \text{ dB}$	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used.
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	$L_{max} = 50 \text{ dB} / \text{SIL } 45$	Single event level permissible in the classroom.
WHO (1999)	$L_{eq} = 35 \text{ dB}$ $L_{max} = 50 \text{ dB}$	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB.
U.S. ANSI (2010)	$L_{eq} = 35 \text{ dB}$, based on Room Volume (e.g., cubic feet)	Acceptable background level for continuous and intermittent noise.
U.K. DFES (2003)	$L_{eq(30min)} = 30\text{-}35 \text{ dB}$ $L_{max} = 55 \text{ dB}$	Minimum acceptable in classroom and most other learning environs.

A.3.3 Sleep Disturbance

Sleep disturbance is a major concern for communities exposed to aircraft noise at night. A number of studies have attempted to quantify the effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies. Emphasis is on studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on sleep observations performed under laboratory conditions.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations.

Initial Studies

The relation between noise and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep and the noise level, but also on the non-acoustic factors cited for annoyance. The easiest effect to measure is the number of arousals or awakenings from noise events. Much of the literature has therefore focused on predicting the percentage of the population that will be awakened at various noise levels.

FICON’s 1992 review of airport noise issues (FICON 1992) included an overview of relevant research conducted through the 1970s. Literature reviews and analyses were conducted from 1978 through 1989 using existing data (Griefahn 1978; Lukas 1978; Pearsons et. al. 1989). Because of large variability in the data, FICON did not endorse the reliability of those results.

FICON did, however, recommend an interim dose-response curve, awaiting future research. That curve predicted the percent of the population expected to be awakened as a function of the exposure to SEL. This curve was based on research conducted for the U.S. Air Force (Finegold 1994). The data included most of the research performed up to that point, and predicted a 10% probability of awakening when exposed to an interior SEL of 58 dB. The data used to derive this curve were primarily from controlled laboratory studies.

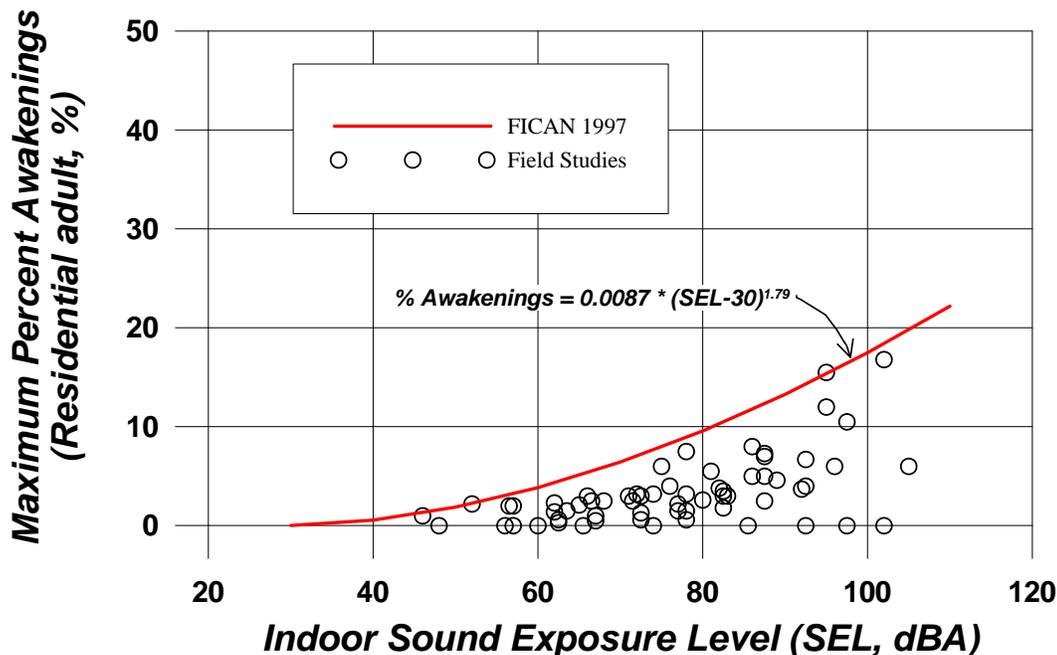
Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted that early sleep laboratory studies did not account for some important factors. These included habituation to the laboratory, previous exposure to noise, and awakenings from noise other than aircraft. In the early 1990s, field studies in people’s homes were conducted to validate the earlier laboratory work conducted in the 1960s and 1970s. The field studies of the 1990s found that 80-90% of sleep disturbances were not related to outdoor noise events, but rather to indoor noises and non-noise factors. The results showed that, in real life conditions, there was less of an effect of noise on sleep than had been previously reported from laboratory studies. Laboratory sleep studies tend to show more sleep disturbance than field studies because people who sleep in their own homes are used to their environment and, therefore, do not wake up as easily (FICAN 1997).

FICAN

Based on this new information, in 1997 FICAN recommended a dose-response curve to use instead of the earlier 1992 FICAN curve (FICAN 1997). Figure A-10 shows FICAN's curve, the red line, which is based on the results of three field studies shown in the figure (Ollerhead et al. 1992; Fidell et al. 1994; Fidell et al. 1995a, 1995b), along with the data from six previous field studies.

The 1997 FICAN curve represents the upper envelope of the latest field data. It predicts the maximum percent awakened for a given residential population. According to this curve, a maximum of 3% of people would be awakened at an indoor SEL of 58 dB. An indoor SEL of 58 dB is equivalent to an outdoor SEL of 83 dB, with the windows closed (73 dB with windows open).



Source: FICAN 1997

Figure A-10. FICAN 1997 Recommended Sleep Disturbance Dose-Response Relationship

Number of Events and Awakenings

It is reasonable to expect that sleep disturbance is affected by the number of events. The German Aerospace Center (DLR Laboratory) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and related factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance. It involved both laboratory and in-home field research phases. The DLR investigators developed a dose-response curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

A different approach was taken by an ANSI standards committee (ANSI 2008). The committee used the average of the data shown in Figure A-10 (i.e., the blue dashed line) rather than the upper envelope, to predict average awakening from one event. Probability theory is then used to project the awakening from multiple noise events.

Currently, there are no established criteria for evaluating sleep disturbance from aircraft noise, although recent studies have suggested a benchmark of an outdoor SEL of 90 dB as an appropriate tentative criterion when comparing the effects of different operational alternatives. The corresponding indoor SEL would be approximately 25 dB lower (at 65 dB) with doors and windows closed, and approximately 15 dB lower (at 75 dB) with doors or windows open. According to the ANSI (2008) standard, the probability of awakening from a single aircraft event at this level is between 1 and 2% for people habituated to the noise sleeping in bedrooms with windows closed, and 2-3% with

windows open. The probability of the exposed population awakening at least once from multiple aircraft events at noise levels of 90 dB SEL is shown in Table A-4.

Table A-4. Probability of Awakening from NA90SEL

Number of Aircraft Events at 90 dB SEL for Average 9-Hour Night	Minimum Probability of Awakening at Least Once	
	Windows Closed	Windows Open
1	1%	2%
3	4%	6%
5	7%	10%
9 (1 per hour)	12%	18%
18 (2 per hour)	22%	33%
27 (3 per hour)	32%	45%

Source: DOD 2009b.

In December 2008, FICAN recommended the use of this new standard. FICAN also recognized that more research is underway by various organizations, and that work may result in changes to FICAN’s position. Until that time, FICAN recommends the use of the ANSI (2008) standard (FICAN 2008).

Summary

Sleep disturbance research still lacks the details to accurately estimate the population awakened for a given noise exposure. The procedure described in the ANSI (2008) Standard and endorsed by FICAN is based on probability calculations that have not yet been scientifically validated. While this procedure certainly provides a much better method for evaluating sleep awakenings from multiple aircraft noise events, the estimated probability of awakenings can only be considered approximate.

A.3.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear’s sensitivity or acuity to perceive sound (i.e., a shift in the hearing threshold to a higher level). This change can either be a Temporary Threshold Shift (TTS) or a Permanent Threshold Shift (PTS) (Berger et al. 1995).

TTS can result from exposure to loud noise over a given amount of time. An example of TTS might be a person attending a loud music concert. After the concert is over, there can be a threshold shift that may last several hours. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz). Normal hearing eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover. A common example of PTS is the result of regularly working in a loud factory. A TTS can eventually become a PTS over time with repeated exposure to high noise levels. Even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a TTS results in a PTS is difficult to identify and varies with a person’s sensitivity.

Criteria for Permanent Hearing Loss

It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1978). A large amount of data on hearing loss have been collected, largely for workers in manufacturing industries, and analyzed by the scientific/medical community. The Occupational Safety and Health Administration (OSHA) regulation of 1971 places the limit on workplace noise exposure at an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (U.S. Department of Labor 1971). Some hearing loss is still expected at those levels. The most protective criterion, with no measurable hearing loss after 40 years of exposure, is an average sound level of 70 dB over a 24-hour period.

The USEPA established 75 dB $L_{eq(8)}$ and 70 dB $L_{eq(24)}$ as the average noise level standard needed to protect 96% of the population from greater than a 5 dB PTS (USEPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 dB as the lowest level at which hearing loss may occur (CHABA 1977). WHO concluded that environmental and leisure-time noise below an $L_{eq(24)}$ value of 70 dB “will not cause hearing loss in the large majority of the population, even after a lifetime of exposure” (WHO 1999).

Hearing Loss and Aircraft Noise

The 1982 USEPA Guidelines report (USEPA 1982) addresses noise-induced hearing loss in terms of the “Noise-Induced Permanent Threshold Shift” (NIPTS). This defines the permanent change in hearing caused by exposure to noise. Numerically, the NIPITS is the change in threshold that can be expected from daily exposure to noise over a normal working lifetime of 40 years. A grand average of the NIPITS over time and hearing sensitivity is termed the Average NIPITS, or Ave. NIPITS for short. The Ave. NIPITS that can be expected for noise measured by the $L_{eq(24)}$ metric is given in Table A-5. Table A-5 assumes exposure to the full outdoor noise throughout the 24 hours. When inside a building, the exposure will be less (Eldred and von Gierke 1993).

The Ave. NIPITS is estimated as an average over all people exposed to the noise. The actual value of NIPITS for any given person will depend on their physical sensitivity to noise – some will experience more hearing loss than others. The USEPA Guidelines provide information on this variation in sensitivity in the form of the NIPITS exceeded by 10% of the population, which is included in the Table A-5 in the “10th Percentile NIPITS” column (USEPA 1982). For individuals exposed to $L_{eq(24)}$ of 80 dB, the most sensitive of the population would be expected to show degradation to their hearing of 7 dB over time.

Table A-5. Ave. NIPITS and 10th Percentile NIPITS as a Function of $L_{eq(24)}$

$L_{eq(24)}$	Ave. NIPITS (dB)*	10 th Percentile NIPITS (dB)*
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0
85-86	6.0	12.0
86-87	7.0	13.5
87-88	7.5	15.0
88-89	8.5	16.5
89-90	9.5	18.0

* rounded to the nearest 0.5 dB

Source: DOD 2012.

To put these numbers in perspective, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. Furthermore, there is no known evidence that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ± 5 dB (USEPA 1974).

The scientific community has concluded that noise exposure from civil airports has little chance of causing permanent hearing loss (Newman and Beattie 1985). For military airbases, DOD policy requires that hearing risk loss be estimated for population exposed to $L_{eq(24)}$ of 80 dB or higher (DOD 2012), including residents of on-base housing. Exposure of workers inside the base boundary is assessed using DOD regulations for occupational noise exposure.

Noise in low-altitude military airspace, especially along MTRs where L_{max} can exceed 115 dB, is of concern. That is the upper limit used for occupational noise exposure (e.g., U.S. Department of Labor 1971). One laboratory study (Ising et al. 1999) concluded that events with L_{max} above 114 dB have the potential to cause hearing loss. Another laboratory study of participants exposed to levels between 115 and 130 dB (Nixon et al. 1993), however, showed conflicting results. For an exposure to four events across that range, half the subjects showed no change in hearing, a quarter showed a temporary 5 dB decrease in sensitivity, and a quarter showed a temporary 5 dB increase in sensitivity. For exposure to eight events of 130 dB, subjects showed an increase in sensitivity of up to 10 dB (Nixon et al. 1993).

Summary

Aviation noise levels are not comparable to the occupational noise levels associated with hearing loss of workers in manufacturing industries. There is little chance of hearing loss at levels less than 75 dB DNL. Noise levels equal to or greater than 75 dB DNL can occur near military airbases, and DOD policy specifies that NIPTS be evaluated when exposure exceeds 80 dB $L_{eq(24)}$ (DOD 2009c). There is some concern about L_{max} exceeding 115 dB in low altitude military airspace, but no research results to date have definitely related permanent hearing impairment to aviation noise.

A.3.5 Non-auditory Health Effects

Studies have been performed to see whether noise can cause health effects other than hearing loss. The premise is that annoyance causes stress. Prolonged stress is known to be a contributor to a number of health disorders. Cantrell (1974) confirmed that noise can provoke stress, but noted that results on cardiovascular health have been contradictory. Some studies have found a connection between aircraft noise and blood pressure (e.g., Michalak et al. 1990; Rosenlund et al. 2001), while others have not (e.g., Pulles et al. 1990).

Kryter and Poza (1980) noted, “It is more likely that noise related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body.”

The connection from annoyance to stress to health issues requires careful experimental design. Some highly publicized reports on health effects have, in fact, been rooted in poorly done science. Meecham and Shaw (1979) apparently found a relation between noise levels and mortality rates in neighborhoods under the approach path to Los Angeles International Airport. When the same data were analyzed by others (Frerichs et al. 1980) no relationship was found. Jones and Tauscher (1978) found a high rate of birth defects for the same neighborhood. But when the Centers For Disease Control performed a more thorough study near Atlanta’s Hartsfield International Airport, no relationships were found for levels above 65 dB (Edmonds et al. 1979).

A carefully designed study, Hypertension and Exposure to Noise near Airports (HYENA), was conducted around six European airports from 2002 through 2006 (Jarup et al. 2005, 2008). There were 4,861 subjects, aged between 45 and 70. Blood pressure was measured, and questionnaires administered for health, socioeconomic and lifestyle factors, including diet and physical exercise. Hypertension was defined by WHO blood pressure thresholds (WHO 2003). Noise from aircraft and highways was predicted from models.

HYENA results were presented as an odds ratio (OR). An OR of 1 means there is no added risk, while an OR of 2 would mean risk doubles. An OR of 1.14 was found for nighttime aircraft noise, measured by L_{night} , the L_{eq} for nighttime hours. For daytime aircraft noise, measured by $L_{\text{eq}(16)}$, the OR was 0.93. For road traffic noise, measured by the full day $L_{\text{eq}(24)}$, the OR was 1.1.

Note that OR is a statistical measure of change, not the actual risk. Risk itself and the measured effects were small, and not necessarily distinct from other events. Haralabidis et al. (2008) reported an increase in systolic blood pressure of 6.2 millimeters of mercury (mmHg) for aircraft noise, and an increase of 7.4 mmHg for other indoor noises such as snoring.

It is interesting that aircraft noise was a factor only at night, while traffic noise is a factor for the full day. Aircraft noise results varied among the six countries so that result is pooled across all data. Traffic noise results were consistent across the six countries.

One interesting conclusion from a 2013 study of the HYENA data (Babisch et al. 2013) states there is some indication that noise level is a stronger predictor of hypertension than annoyance. That is not consistent with the idea that annoyance is a link in the connection between noise and stress. Babisch et al. (2012) present interesting insights on the relationship of the results to various modifiers.

Two recent studies examined the correlation of aircraft noise with hospital admissions for cardiovascular disease. Hansell et al. (2013) examined neighborhoods around London's Heathrow airport. Correia et al. (2013) examined neighborhoods around 89 airports in the United States. Both studies included areas of various noise levels. They found associations that were consistent with the HYENA results. The authors of these studies noted that further research is needed to refine the associations and the causal interpretation with noise or possible alternative explanations.

Summary

The current state of scientific knowledge cannot yet support inference of a causal or consistent relationship between aircraft noise exposure and non-auditory health consequences for exposed residents. The large scale HYENA study, and the recent studies by Hansell et al. (2013) and Correia et al. (2013) offer indications, but it is not yet possible to establish a quantitative cause and effect based on the currently available scientific evidence.

A.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have found links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies where noise levels are above 85 dB. Little change has been found in low-noise cases. Moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on workers.

A.3.7 Noise Effects on Children

Recent studies on school children indicate a potential link between aircraft noise and both reading comprehension and learning motivation. The effects may be small but may be of particular concern for children who are already scholastically challenged.

A.3.7.1 Effects on Learning and Cognitive Abilities

Early studies in several countries (Cohen et al. 1973, 1980, 1981; Bronzaft and McCarthy 1975; Green et al. 1982; Evans et al. 1998; Haines et al. 2002; Lercher et al. 2003) showed lower reading scores for children living or attending school in noisy areas than for children away from those areas. In some studies noise exposed children were less likely to solve difficult puzzles or more likely to give up.

More recently, the Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health (RANCH) study (Stansfeld et al. 2005; Clark et al. 2005) compared the effect of aircraft and road traffic noise on over 2,000 children in three countries. This was the first study to derive exposure-effect associations for a range of cognitive and health effects, and was the first to compare effects across countries.

The study found a linear relation between chronic aircraft noise exposure and impaired reading comprehension and recognition memory. No associations were found between chronic road traffic noise exposure and cognition. Conceptual recall and information recall surprisingly showed better performance in high road traffic noise areas. Neither aircraft noise nor road traffic noise affected attention or working memory (Stansfeld et al. 2005; Clark et al. 2006).

Figure A-11 shows RANCH's result relating noise to reading comprehension. It shows that reading falls below average (a z-score of 0) at L_{eq} greater than 55 dB. Because the relationship is linear, reducing exposure at any level should lead to improvements in reading comprehension.

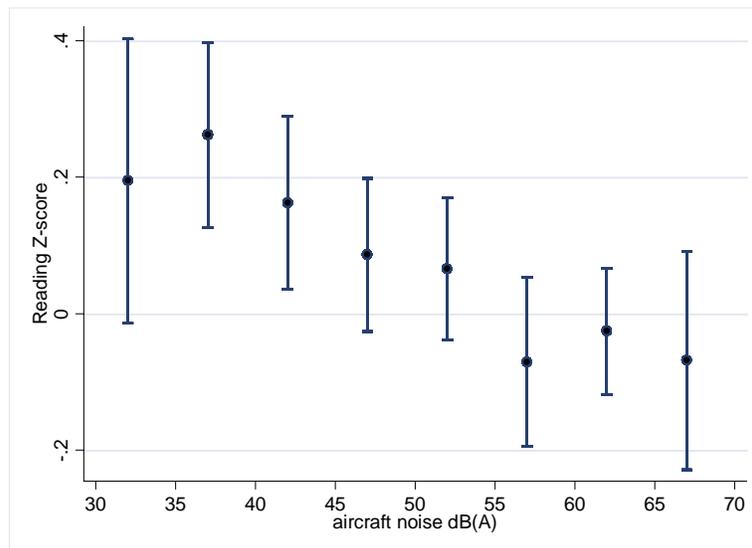


Figure A-11. RANCH Study Reading Scores Varying with L_{eq}
Sources: Stansfeld et al. 2005; Clark et al. 2006

An observation of the RANCH study was that children may be exposed to aircraft noise for many of their childhood years and the consequences of long-term noise exposure were unknown. A follow-up study of the children in the RANCH project is being analyzed to examine the long-term effects on children's reading comprehension (Clark et al. 2009). Preliminary analysis indicated a trend for reading comprehension to be poorer at 15-16 years of age for children who attended noise-exposed primary schools. There was also a trend for reading comprehension to be poorer in aircraft noise exposed secondary schools. Further analysis adjusting for confounding factors is ongoing, and is needed to confirm these initial conclusions.

FICAN funded a pilot study to assess the relationship between aircraft noise reduction and standardized test scores (Eagan et al. 2004; FICAN 2007). The study evaluated whether abrupt aircraft noise reduction within classrooms, from either airport closure or sound insulation, was associated with improvements in test scores. Data were collected in 35 public schools near three airports in Illinois and Texas. The study used several noise metrics. These were, however, all computed indoor levels, which makes it hard to compare with the outdoor levels used in most other studies.

The FICAN study found a significant association between noise reduction and a decrease in failure rates for high school students, but not middle or elementary school students. There were some weaker associations between noise reduction and an increase in failure rates for middle and elementary schools. Overall the study found that the associations observed were similar for children with or without learning difficulties, and between verbal and math/science tests. As a pilot study, it was not expected to obtain final answers, but provided useful indications (FICAN 2007).

While there are many factors that can contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led WHO and a North Atlantic Treaty Organization (NATO) working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (NATO 2000; WHO 1999). The awareness has also led to the classroom noise standard discussed earlier (ANSI 2002).

A.3.7.2 Health Effects

A number of studies, including some of the cognitive studies discussed above, have examined the potential for effects on children's health. Health effects include annoyance, psychological health, coronary risk, stress hormones, sleep disturbance and hearing loss.

Annoyance. Chronic noise exposure causes annoyance in children (Bronzaft and McCarthy 1975; Evans et al. 1995). Annoyance among children tends to be higher than for adults, and there is little habituation (Haines et al. 2001a). The RANCH study found annoyance may play a role in how noise affects reading comprehension (Clark et al. 2005).

Psychological Health. Lercher et al. (2002) found an association between noise and teacher ratings of psychological health, but only for children with biological risk defined by low birth weight and/or premature birth. Haines et al. (2001b) found that children exposed to aircraft noise had higher levels of psychological distress and hyperactivity. Stansfeld et al. (2009) replicated the hyperactivity result, but not distress.

As with studies of adults, the evidence suggests that chronic noise exposure is probably not associated with serious psychological illness, but there may be effects on well-being and quality of life. Further research is needed, particularly on whether hyperactive children are more susceptible to stressors such as aircraft noise.

Coronary Risk. The HYENA study discussed earlier indicated a possible relation between noise and hypertension in older adults. Cohen et al. (1980, 1981) found some increase in blood pressure among school children, but within the normal range and not indicating hypertension. Hygge et al. (2002) found mixed effects. The RANCH study found some effect for children at home and at night, but not at school. Overall the evidence for noise effects on children's blood pressure is mixed, and less certain than for older adults.

Stress Hormones. Some studies investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines et al. 2001a, 2001b). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Sleep Disturbance. A sub-study of RANCH in a Swedish sample used sleep logs and the monitoring of rest/activity cycles to compare the effect of road traffic noise on child and parent sleep (Ohrstrom et al. 2006). An exposure-response relationship was found for sleep quality and daytime sleepiness for children. While this suggests effects of noise on children's sleep disturbance, it is difficult to generalize from one study.

Hearing loss. A few studies have examined hearing loss from exposure to aircraft noise. Noise-induced hearing loss for children who attended a school located under a flight path near a Taiwan airport was greater than for children at another school far away (Chen et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was greater than 75 dB DNL and L_{max} were about 87 dB during overflights.

Conversely, several other studies reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Andrus et al. 1975; Fisch 1977; Wu et al. 1995). It is not clear from those results whether children are at higher risk than adults, but the levels involved are higher than those desirable for learning and quality of life.

Ludlow and Sixsmith (1999) conducted a cross-sectional pilot study to examine the hypothesis that military jet noise exposure early in life is associated with raised hearing thresholds. The authors concluded that there were no significant differences in audiometric test results between military personnel who as children had lived in or near stations where fast jet operations were based, and a similar group who had no such exposure as children.

A.3.8 Property Values

Noise can affect the value of homes. Economic studies of property values based on selling prices and noise have been conducted to find a direct relation.

The value-noise relation is usually presented as the Noise Depreciation Index (NDI) or Noise Sensitivity Depreciation Index (NSDI), the percent loss of value per dB (measured by the DNL metric). An early study by Nelson (1978) at three airports found an NDI of 1.8-2.3% per dB. Nelson also noted a decline in NDI over time which he theorized could be due to either a change in population or the increase in commercial value of the property near airports. Crowley (1978) reached a similar conclusion. A larger study by Nelson (1980) looking at 18 airports found an NDI from 0.5 to 0.6% per dB.

In a review of property value studies, Newman and Beattie (1985) found a range of NDI from 0.2 to 2% per dB. They noted that many factors other than noise affected values.

Fidell et al. (1996) studied the influence of aircraft noise on actual sale prices of residential properties in the vicinity of a military base in Virginia and one in Arizona. They found no meaningful effect on home values. Their results may have been due to non-noise factors, especially the wide differences in homes between the two study areas.

Recent studies of noise effects on property values have recognized the need to account for non-noise factors. Nelson (2004) analyzed data from 33 airports, and discussed the need to account for those factors and the need for careful statistics. His analysis showed NDI from 0.3 to 1.5% per dB, with an average of about 0.65% per dB. Nelson (2007) and Andersson et al. (2013) discuss statistical modeling in more detail.

Enough data is available to conclude that aircraft noise has a real effect on property values. This effect falls in the range of 0.2 to 2.0% per dB, with the average on the order of 0.5% per dB. The actual value varies from location to location, and is very often small compared to non-noise factors.

A.3.9 Noise-Induced Vibration Effects on Structures and Humans

High noise levels can cause buildings to vibrate. If high enough, building components can be damaged. The most sensitive components of a building are the windows, followed by plaster walls and ceilings. Possibility of damage depends on the peak sound pressures and the resonances of the building. In general, damage is possible only for sounds lasting more than one second above an unweighted sound level of 130 dB (CHABA 1977). That is higher than expected from normal aircraft operations. Even low altitude flyovers of heavy aircraft do not reach the potential for damage (Sutherland 1990).

Noise-induced structural vibration may cause annoyance to dwelling occupants because of induced secondary vibrations, or "rattle", of objects within the dwelling – hanging pictures, dishes, plaques, and bric-a-brac. Loose window panes may also vibrate noticeably when exposed to high levels of airborne noise, causing homeowners to fear breakage. In general, rattling occurs at peak unweighted sound levels that last for several seconds at levels above 110 dB, which is well above that considered normally compatible with residential land use. Thus, assessments of noise exposure levels for compatible land use will also be protective of noise-induced rattle.

The sound from an aircraft overflight travels from the exterior to the interior of the house in one of two ways: through the solid structural elements and directly through the air. Figure A-12 illustrates the sound transmission through a wall constructed with a brick exterior, stud framing, interior finish wall, and absorbent material in the cavity. The sound transmission starts with noise impinging on the wall exterior. Some of this sound energy will be reflected away and some will make the wall vibrate. The vibrating wall radiates sound into the airspace, which in turn sets the interior finish surface vibrating, with some energy lost in the airspace. This surface then radiates sound into the dwelling interior. As the figure shows, vibrational energy also bypasses the air cavity by traveling through the studs and edge connections.

Normally, the most sensitive components of a structure to airborne noise are the windows, followed by plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally sufficient to determine the possibility of damage. In general, at unweighted sound levels above 130 dB, there is the possibility of structural damage. While certain frequencies (such as 30 Hertz for window breakage) may be of more concern than other frequencies, conservatively, only sounds lasting more than one second above a unweighted sound level of 130 dB are potentially damaging to structural components (von Gierke and Ward 1991).

In the assessment of vibration on humans, the following factors determine if a person will perceive and possibly react to building vibrations:

1. Type of excitation: steady state, intermittent, or impulsive vibration.
2. Frequency of the excitation. International Organization for Standardization (ISO) standard 2631-2 (ISO 1989) recommends a frequency range of 1 to 80 Hz for the assessment of vibration on humans.
3. Orientation of the body with respect to the vibration.
4. The use of the occupied space (i.e., residential, workshop, hospital).
5. Time of day.

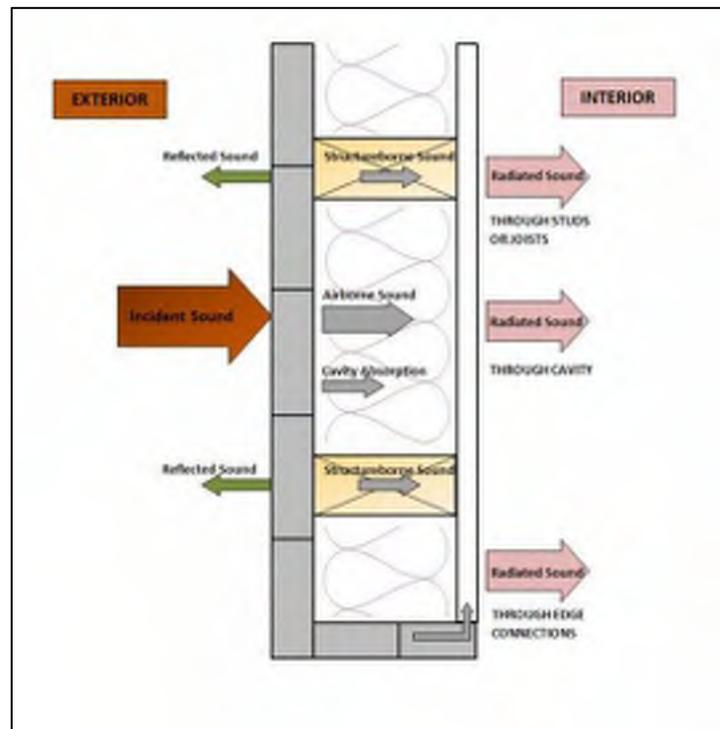


Figure A-12. Depiction of Sound Transmission through Built Construction

Table A-6 lists the whole-body vibration criteria from ISO 2631-2 for one-third octave frequency bands from 1 to 80 Hz.

Table A-6. Vibration Criteria for the Evaluation of Human Exposure to Whole-Body Vibration

Frequency (Hz)	RMS Acceleration (m/s/s)		
	Combined Criteria Base Curve	Residential Night	Residential Day
1.00	0.0036	0.0050	0.0072
1.25	0.0036	0.0050	0.0072
1.60	0.0036	0.0050	0.0072
2.00	0.0036	0.0050	0.0072
2.50	0.0037	0.0052	0.0074
3.15	0.0039	0.0054	0.0077
4.00	0.0041	0.0057	0.0081
5.00	0.0043	0.0060	0.0086
6.30	0.0046	0.0064	0.0092
8.00	0.0050	0.0070	0.0100
10.00	0.0063	0.0088	0.0126
12.50	0.0078	0.0109	0.0156
16.00	0.0100	0.0140	0.0200
20.00	0.0125	0.0175	0.0250
25.00	0.0156	0.0218	0.0312
31.50	0.0197	0.0276	0.0394
40.00	0.0250	0.0350	0.0500
50.00	0.0313	0.0438	0.0626
63.00	0.0394	0.0552	0.0788
80.00	0.0500	0.0700	0.1000

Source: ISO 1989.

A3.10 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such events. It is improbable that such effects would result from routine subsonic aircraft operations.

A3.11 Noise Effects on Historical and Archaeological Sites

Historical buildings and sites can have elements that are more fragile than conventional structures. Aircraft noise may affect such sites more severely than newer, modern structures. In older structures, seemingly insignificant surface cracks caused by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved measurements of noise and vibration in a restored plantation house, originally built in 1795. It is located 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. The aircraft measured was the Concorde. There was special concern for the building’s windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning (Wesler 1977).

As for conventional structures, noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites. Unique sites should, of course, be analyzed for specific exposure.

A3.12 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal’s ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Mancini et al. (1988), assert that the consequences that physiological effects may have on

behavioral patterns are vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960s and 1970s on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Mancini et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Mancini et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights.

Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Mancini et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the Mancini et al. (1988) literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Mancini et al. (1988) reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

A.3.12.1 Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottreau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarized the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally. A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft. Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994a).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sotnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a 1-year time period and none were associated with aircraft disturbances (U.S. Air Force 1993). In 1987, researchers contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Of the 43 cattle previously exposed to low-altitude flights, 3 showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level (AGL) and 400 knots by running less than 10 meters (m). They resumed normal activity within 1 minute (U.S. Air Force 1994a). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30-60 feet overhead did not affect milk production and pregnancies of 44 cows in a 1964 study (U.S. Air Force 1994a).

Additionally, Beyer (1983) reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflowed by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights. A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994a).

In a report to Congress, the U. S. Forest Service concluded that “evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50-100 m), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflowed by aircraft at altitudes of 50-100 m, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate.” These varied study results

suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994a). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of “flight-fright” reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded; noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100-135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Gladwin et al. 1988; Mancini et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 feet) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994b). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during “pile-up” situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994b). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus

(U.S. Air Force 1994b). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120-130 dB.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s. Many of the claims were disproved or did not have sufficient supporting evidence. The claims were

filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994b).

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles et al. 1990). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994b).

A.3.12.2 Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock. This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci et al. 1988).

Mammals

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dB can damage mammals' ears, and levels at 95 dB can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet AGL over important grizzly and polar bear habitat. Wolves have been frightened by low-altitude flights that were 25-1,000 feet AGL. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, rising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kilogram animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed (Weisenberger et al. 1996).

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, are not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America 1980). Since 1980 it appears that research on responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dB caused a greater intensity of startle reactions than lower-intensity booms at 72-79 dB. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater “disturbance level” exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Park Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles et al. 1993).

Birds

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of 1,000 to 5,000 Hz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Ellis et al. 1991; Grubb and King 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant to 85 dB for crested tern (Brown 1990; Ward and Stehn 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by “raucous discordant cries.” There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Mancini et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Mancini et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A cooperative study between the DOD and the U.S. Fish and Wildlife Service (USFWS), assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 m away and SELs were 70 dB.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for 10-20 seconds. No apparent nest failure occurred as a result of the sonic booms. Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4-8 m). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15-20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

Raptors

In a literature review of raptor responses to aircraft noise, Mancini et al. (1988) found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris’ hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both

long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were “well grown.” Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or re-occupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation (Ellis et al. 1991).

Manci et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dB) was “watching the aircraft fly by.” No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle. A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 m away caused reactions similar to other disturbance types. Ellis et al. (1991) showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 m, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (USFWS 1998). However, Fraser et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey. A study by Trimper et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences. The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk. Anderson et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (9 of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

Migratory Waterfowl

Fleming et al. (1996) conducted a study of caged American black ducks found that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects (Fleming et al. 1996).

Another study by Conomy et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dB. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38% to 6% in 17 days and remained stable at 5.8% thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were less than 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci et al. 1988, reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards et al. 1979).

Wading and Shorebirds

Black et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dB on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology.

Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75% of the 220 observations. Approximately 90% displayed no reaction or merely looked toward the direction of the noise source. Another 6% stood up, 3% walked from the nest, and 2% flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85-100 dB on approach and 94-105 dB on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the Concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of sooty terns on the Dry Tortugas (Austin et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, sooty terns were observed to react to sonic booms by rising in a “panic flight,” circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of noddies on the same island hatched successfully in 1969, the year of the sooty tern hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Cottreau 1972; Cogger and Zegarra 1980; Bowles et al. 1991, 1994) failed to show adverse effects on hatching of eggs. A structural analysis by Ting et al. (2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoot toads, may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Mancini et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodylians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodylians (the American alligator and the spectacled caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including a DNL of 85 dB.

A.3.12.3 Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

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APPENDIX B
Supporting Technical Data

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Table B-1. Generalization of Land Use Data

Assessor Use Code	Description	Generalized Category for NEM Update
0101	Mixed use, primary single-family	Residential
010R	Colonial	Commercial
011C	Apartment GD	Commercial
013V	Unknown	Residential
0170	Mixed Use (Primarily Residential, some Agriculture)	Residential
032R	Cape Cod	Commercial
033R	Cape Cod	Commercial
034R	Cape Cod	Commercial
101	Single Family Residential	Residential
1010	Single Family Residential	Residential
101R	Conventional	Residential
1020	Residential Condominium	Residential
103	Mobile Home (includes mobile home park land)	Residential
1030	Mobile Home (includes mobile home park land)	Residential
103R	Bungalow	Residential
1040	Two-Family Residential	Residential
104R	Cape Cod	Residential
1050	Three-Family Residential	Residential
105R	Colonial	Residential
1060	Accessory Land with Improvement	Open/Agriculture
106R	Cape Cod	Residential
109	Multiple Houses on one parcel	Residential
1090	Multiple Houses on one parcel	Residential
109R	Bungalow	Residential
111	Apartments with Four to Eight Units	Residential
1110	Apartments with Four to Eight Units	Residential
112C	Apartment GD	Residential
1210	Rooming and Boarding Houses	Residential
130	Developable Residential Land	Open/Agriculture
1300	Developable Residential Land	Open/Agriculture
1310	Potentially Developable Residential Land	Open/Agriculture
1320	Undevelopable Residential Land	Open/Agriculture
1400	Child Care Facility	Residential
140R	Ranch	Residential
3000	Hotels	Commercial
3010	Motels	Commercial
310	Tanks Holding Fuel and Oil Products for Retail Distribution, either Above Ground or Underground	Industrial
313R	Ranch	Industrial
3140	Trucking Terminals	Industrial
314C	Warehouse	Industrial
316	Other Storage, Warehouse, and Distribution facilities (see also usecode 401)	Industrial
3160	Other Storage, Warehouse, and Distribution facilities (see also usecode 401)	Industrial
316C	Garage/Office	Industrial
316V	Unknown	Industrial
317	Farm Buildings - barns, silo, utility shed, etc	Industrial

Notes: Some parcels' generalized land use categories were changed from the above classifications after validating the dataset against imagery.

Table B-1. Generalization of Land Use Data - *continued*

Assessor Use Code	Description	Generalized Category for NEM Update
3210	Facilities providing building materials, hardware and farm equip, heating, hardware, plumbing, lumber supplies and equip	Commercial
3211	Service Shop	Commercial
322	Discount Stores, Junior Department Stores, Department Stores	Commercial
3220	Discount Stores, Junior Department Stores, Department Stores	Commercial
322I	Department Str	Commercial
322L	Service Shop	Commercial
322V	Unknown	Commercial
3230	Shopping Centers/Malls	Commercial
3250	Small Retail and Services stores (under 10,000 sq. ft.)	Commercial
326	Eating and Drinking Establishments - restaurants, diners, fast food establishments, bars, nightclubs	Residential
3260	Eating and Drinking Establishments - restaurants, diners, fast food establishments, bars, nightclubs	Commercial
330	Automotive Vehicles Sales and Service	Commercial
3320	Auto Repair Facilities	Commercial
332I	Auto Sales Rpr	Commercial
332R	Colonial	Commercial
3340	Gasoline Service Stations - providing engine repair or maintenance services, and fuel products	Commercial
337V	Unknown	Commercial
3380	Other Motor Vehicles Sales and Services	Commercial
3400	General Office Buildings	Commercial
340I	Garage/Office	Commercial
340R	Colonial	Commercial
340V	Unknown	Commercial
3410	Bank Buildings	Commercial
3420	Medical Office Buildings	Commercial
3510	Educational Properties	Commercial
3530	Fraternal Organizations	Commercial
3540	Bus Transportation Facilities and Related Properties	Commercial
355R	Family Conver.	Commercial
380	Golf Courses (not Ch. 61B)	Recreation
3880	Other Outdoor facilities - e.g. driving ranges, miniature golf, baseball batting ranges, etc... (not Ch. 61B)	Recreation
3900	Developable Commercial Land	Open/Agriculture
3910	Potentially Developable Commercial Land	Open/Agriculture
3920	Undevelopable Commercial Land	Open/Agriculture
3930	Agricultural/Horticultural Land not included in Chapter 61A	Open/Agriculture
400	Buildings for manufacturing operations	Industrial
4000	Buildings for manufacturing operations	Industrial
400C	Heavy Indust	Industrial
400V	Unknown	Industrial
4010	Warehouses for storage of manufactured products	Industrial
401C	Office Bldg	Industrial
401V	Unknown	Industrial
402	Office Building - part of manufacturing operation	Industrial
4020	Office Building - part of manufacturing operation	Industrial
4022	Industrial bldg	Industrial

Notes: Some parcels' generalized land use categories were changed from the above classifications after validating the dataset against imagery.

Table B-1. Generalization of Land Use Data - *continued*

Assessor Use Code	Description	Generalized Category for NEM Update
4030	Land - integral part of manufacturing operation	Industrial
403V	Unknown	Industrial
410	Sand and Gravel Mining/Quarry	Industrial
410C	Office Bldg	Industrial
412	Rock Mining/Quarry	Industrial
432	Cable TV Transmitting Facilities	Industrial
4330	Radio, Television Transmission Facilities	Industrial
4400	Developable Industrial Land	Open/Agriculture
440V	Unknown	Industrial
441	Potentially Developable Industrial Land	Open/Agriculture
4410	Potentially Developable Industrial Land	Industrial
441V	Unknown	Industrial
4420	Undevelopable Industrial Land	Open/Agriculture
601	All land designated under Chapter 61 (not classified as Open Space)	Industrial
6010	All land designated under Chapter 61 (not classified as Open Space)	Open/Agriculture
7120	Truck Crops - vegetables (Ch. 61A, not classified as Open Space)	Open/Agriculture
7130	Field Crops - hay, wheat, tillable forage, cropland, etc... (Ch. 61A, not classified as Open Space)	Open/Agriculture
7131	Ch61a field crop	Open/Agriculture
7140	Orchards - pears, apples, grape vineyards, etc... (Ch. 61A, not classified as Open Space)	Open/Agriculture
7150	Christmas Trees (Ch. 61A, not classified as Open Space)	Open/Agriculture
7170	Productive Woodland - woodlots (Ch. 61A, not classified as Open Space)	Open/Agriculture
7180	Pasture (Ch. 61A, not classified as Open Space)	Open/Agriculture
7190	Nurseries (Ch. 61A, not classified as Open Space)	Open/Agriculture
8010	Hiking - trails or paths, Camping - areas with sites for overnight camping, Nature Study (Ch. 61B, not classified as OS)	Recreation
8020	Camping - areas with sites for overnight camping (Ch. 61B, not classified as Open Space)	Recreation
9010	(formerly Commonwealth of Massachusetts. Removed June 2009.)	Open/Agriculture
901C	Light Indust	Industrial
9011	Heavy Indust	Industrial
901V	Unknown	Open/Agriculture
9030	(formerly Municipalities/Districts. Removed June 2009.)	Open/Agriculture
9032	Fire	Public/Quasi-Public
9036	Town highway	Open/Agriculture
9050	(formerly Charitable Organizations (private hospitals, etc...)). Removed June 2009.)	Public/Quasi-Public
9060	(formerly Religious Organizations. Removed June 2009.)	Public/Quasi-Public
910	Dept. of Conservation and Recreation (DCR), Division of State Parks and Recreation	Recreation
910R	Camp	Recreation
9190	Comm. Of Mass. (Other)	Open/Agriculture
9200	Dept. of Conservation and Recreation (DCR) - Division of Urban Parks and Recreation (non-reimbursable)	Recreation
9300	Vacant, Selectmen or City Council (Municipal)	Open/Agriculture
9310	Improved, Selectmen or City Council (Municipal)	Open/Agriculture

Notes: Some parcels' generalized land use categories were changed from the above classifications after validating the dataset against imagery.

Table B-1. Generalization of Land Use Data - concluded

Assessor Use Code	Description	Generalized Category for NEM Update
932	Vacant, Conservation (Municipal or County)	Open/Agriculture
9330	Vacant, Education (Municipal or County)	Open/Agriculture
9340	Improved, Education (Municipal or County)	Public/Quasi-Public
9350	Improved, Municipal Public Safety	Public/Quasi-Public
9360	Vacant, Tax Title/Treasurer	Open/Agriculture
937R	Conventional	Public/Quasi-Public
9500	Vacant, Conservation Organizations (Charitable Org.)	Open/Agriculture
9510	Other (Charitable Org.)	Public/Quasi-Public
9540	Function Halls, Community Centers, Fraternal Organizations (Charitable Org.)	Public/Quasi-Public
959R	Conventional	Residential
9600	Church, Mosque, Synagogue, Temple, etc...	Public/Quasi-Public
9610	Rectory or Parsonage	Public/Quasi-Public
961R	Colonial	Public/Quasi-Public
9620	Other (Religious Org.)	Public/Quasi-Public
9700	Housing Authority	Residential
9710	Utility Authority - Electric, Light, Sewer, Water	Industrial
9720	Transportation Authority	Industrial
9740	Vacant, Utility Authority	Open/Agriculture
975	Vacant, Transportation Authority	Open/Agriculture
9750	Vacant, Transportation Authority	Open/Agriculture
9990	Condo Land Exempt	Residential

Notes: Some parcels' generalized land use categories were changed from the above classifications after validating the dataset against imagery.

Table B-2. Annual Average Daily Track Utilization Percentages

Operation Type	Run-way	Flight Track		Military Fixed-Wing										Military Helicopter				Air Carrier		GA Jet		GA Propeller							
				F-15E (PW-220)				C-130J		C-5M / KC-135		C-12		OH-58D		UH-60		737700		Lear 35 and GIV		Cessna 441		Cessna 172					
				Dest./ Origin Desc.	% (Day & Night)	turn direction	turn dir % (day & night)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)				
Departure	02	02D1	To Keene					18%	18%	-	-	-	-	-	-	-	-	-	-	100%	100%	-	-	-	-	-	-		
		02D2	To Chester					18%	18%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		02D3	To Pawling					2%	2%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		02D5	To Putnam					62%	62%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		02D2P	To Chester																					37%		37%	37%		
		02D3P	To Pawling																					38%		38%	38%		
		02D4P	To Hartford																					10%		10%	10%		
		02D5P	To Putnam																					5%		5%	5%		
		02D1T	To Keene					-	-	-	-	28%	0%	28%	0%	-	-	-	-	-	-	-	-	10%	10%	10%		10%	10%
		02D2T	To Chester					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37%	37%				
		02D3T	To Pawling					-	-	50%	50%	72%	0%	72%	0%	-	-	-	-	-	-	-	-	38%	38%				
		02D4T	To Hartford					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10%	10%				
	02D5T	To Putnam					-	-	50%	50%	-	-	-	-	-	-	-	-	-	-	-	-	5%	5%					
	20	20D1R			to Keene	18%	right turn	50%	100%	100%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
		20D1L					left turn	50%	100%	100%	-	-	28%	0%	28%	0%	-	-	-	-	-	-	10%	10%	10%		10%	10%	
		20D2	To Chester					18%	18%	-	-	-	-	-	-	-	-	-	-	-	-	-	37%	37%	37%		37%	37%	
		20D3	To Pawling					2%	2%	50%	50%	72%	0%	72%	0%	-	-	-	-	-	-	-	38%	38%	38%		38%	38%	
		20D4	To Hartford					-	-	-	-	-	-	-	-	-	-	-	-	-	100%	100%	10%	10%	10%		10%	10%	
		20D5	To Putnam (F-15)					62%	62%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	15	15D1P	To Keene					-	-	-	-	-	-	28%	0%	-	-	-	-	-	-	-	10%	10%	10%	10%	10%	10%	
		15D2P	To Chester					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37%	37%	37%	37%	37%	37%	
		15D3P	To Pawling					-	-	-	-	-	-	72%	0%	-	-	-	-	-	-	-	38%	38%	38%	38%	38%	38%	
		15D4P	To Hartford					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10%	10%	10%	10%	10%	10%	
		15D5P	To Putnam					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5%	5%	5%	5%	5%	5%	
	33	33D1P	To Keene					-	-	-	-	-	-	28%	0%	-	-	-	-	-	-	-	10%	10%	10%	10%	10%	10%	
		33D2P	To Chester					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37%	37%	37%	37%	37%	37%	
		33D3P	To Pawling					-	-	-	-	-	-	72%	0%	-	-	-	-	-	-	-	38%	38%	38%	38%	38%	38%	
		33D4P	To Hartford					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10%	10%	10%	10%	10%	10%	
		33D5P	To Putnam					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5%	5%	5%	5%	5%	5%	
	Pad	H07D1	to 90 deg heading													100%	100%	100%	100%										
		H15D1	Riverbend (150 heading)					-	-	-	-	-	-	-	-	100%	100%	100%	100%										
		H15D2	180-200 heading													100%	100%	100%	100%										
		H33D1	Quarry (initial 330)					-	-	-	-	-	-	-	-	0%	0%	0%	0%										

Table B-2. Annual Average Daily Track Utilization Percentages - *continued*

Operation Type	Runway	Flight Track		Military Fixed-Wing											Military Helicopter				Air Carrier		GA Jet		GA Propeller					
				F-15E (PW-220)				C-130J		C-5M / KC-135		C-12		OH-58D		UH-60		737700		Lear 35 and GIV		Cessna 441		Cessna 172				
		ID	Description	Dest./ Origin Desc.	% (Day & Night)	turn direction	turn dir % (day & night)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)							
Overhead Arrival	02	02O1aL	from West	Yankee (Keene)	17%	left (west)	75%	50%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		02O1aR	from West			right (east)	25%	50%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O1bL	from East	Ft Drum (Chester)	19%	left (west)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O1bR	from East			right (east)	25%	50%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O2L		west (Pawling)	2%	left (west)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O2R				right (east)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O3L		Putnam	62%	left (west)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		02O3R				right (east)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	02O5L		Keene	17%	left (west)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	02O5R				right (east)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	20	20O1L		Chester	19%	left (east)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20O1R				right (west)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20O2L		Pawling	2%	left (east)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20O2R				right (west)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20O3L		Putnam	62%	left (east)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20O3R				right (west)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20O5L			Putnam	62%	left (east)	75%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
20O5R					right (west)	25%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Table B-2. Annual Average Daily Track Utilization Percentages – continued

Operation Type	Run-way	Flight Track		Military Fixed-Wing										Military Helicopter				Air Carrier		GA Jet		GA Propeller					
				F-15E (PW-220)				C-130J		C-5M / KC-135		C-12		OH-58D		UH-60		737700		Lear 35 and GIV		Cessna 441		Cessna 172			
		ID	Description	Dest./ Origin Desc.	% (Day & Night)	turn direction	turn dir % (day & night)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)		
VFR Pattern	02	02C2L	VFR 1.5nm upwind, turn left, 1nm abeam, 15kft dnwd, 1nm final				75%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	100%	
		02C2R	VFR 1.5nm upwind, turn right, 1nm abeam, 15kft dnwd, 1nm final				25%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		02C4	VFR box, 1.5nm upwind, turn right, 1.5nm abeam, 21kft dnwd, 2nm final				-	-	33%	0%	-	-	-	-	-	-	-	-	-	-	100%	0%	-	-	-	-	
		02C5	VFR 1.7nm upwind, turn right, 1.2nm abeam, 16.5kft dnwd, 1nm final				-	-	67%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		02CH	helo												100%	100%	100%	100%									
	20	20C2L	VFR 1.5nm upwind, turn left, 1nm abeam, 15kft dnwd, 1nm final				75%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	100%
		20C2R	VFR 1.5nm upwind, turn right, 1nm abeam, 15kft dnwd, 1nm final				25%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		20CH	helo - remember to move and modify old profiles on 20CH1				-	-	-	-	-	-	-	-	100%	100%	100%	100%			-	-	-	-	-	-	
		20C4	VFR box, 1.5nm upwind, turn right, 1.5nm abeam, 21kft dnwd, 2nm final				-	-	33%	0%	-	-	-	-	-	-	-	-	-	-	100%	0%	-	-	-	-	
		20C5	VFR 1.7nm upwind, turn right, 1.2nm abeam, 16.5kft dnwd, 1nm final				-	-	67%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	15	15C1	VFR 1.5nm upwind, turn left, 1nm abeam, 15kft dnwd, 1nm final				-	-			-	-	-	-	-	-	-	-	-	-	100%	0%	-	-	100%	100%	
		15C5	VFR 1.7nm upwind, turn left, 1.2nm abeam, 16.5kft dnwd, 1nm final						100%	0%																	
		15CH	helo												100%	100%	100%	100%									
	33	33C1	VFR 1.5nm upwind, turn left, 1nm abeam, 15kft dnwd, 1nm final				-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	0%	-	-	100%	100%	
		33C2	Right Base				-	-	50%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
33C3		Left Base				-	-	50%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
33CH		helo				-	-	-	-	-	-	-	-	100%	100%	100%	100%			-	-	-	-	-	-		

Table B-2. Annual Average Daily Track Utilization Percentages – concluded

Operation Type	Run-way	Flight Track		Military Fixed-Wing												Military Helicopter				Air Carrier		GA Jet		GA Propeller					
				F-15E (PW-220)				C-130J		C-5M / KC-135		C-12		OH-58D		UH-60		737700		Lear 35 and GIV		Cessna 441		Cessna 172					
				Dest./ Origin Desc.	% (Day & Night	turn direction	turn dir % (day & night)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)	Day (7am-10pm)	Night (10pm-7am)										
IFR Pattern	02	02IFR1	IFR box, 1.5nm upwind, turn left, 3.5nm abeam, 4nm dnwd, 2.5nm final					100%	0%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	100%
	20	20IFR1	IFR box, 1.5nm upwind, turn right, 3.5nm abeam, 4nm dnwd, 2.5nm final					100%	0%	100%	0%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100%	100%
	15	15IFR1	IFR box, 1.5nm upwind, turn left, 3.5nm abeam, 4nm dnwd, 2.5nm final																									100%	100%
	33	33IFR1	IFR box, 1.5nm upwind, turn left, 3.5nm abeam, 4nm dnwd, 2.5nm final																									100%	100%

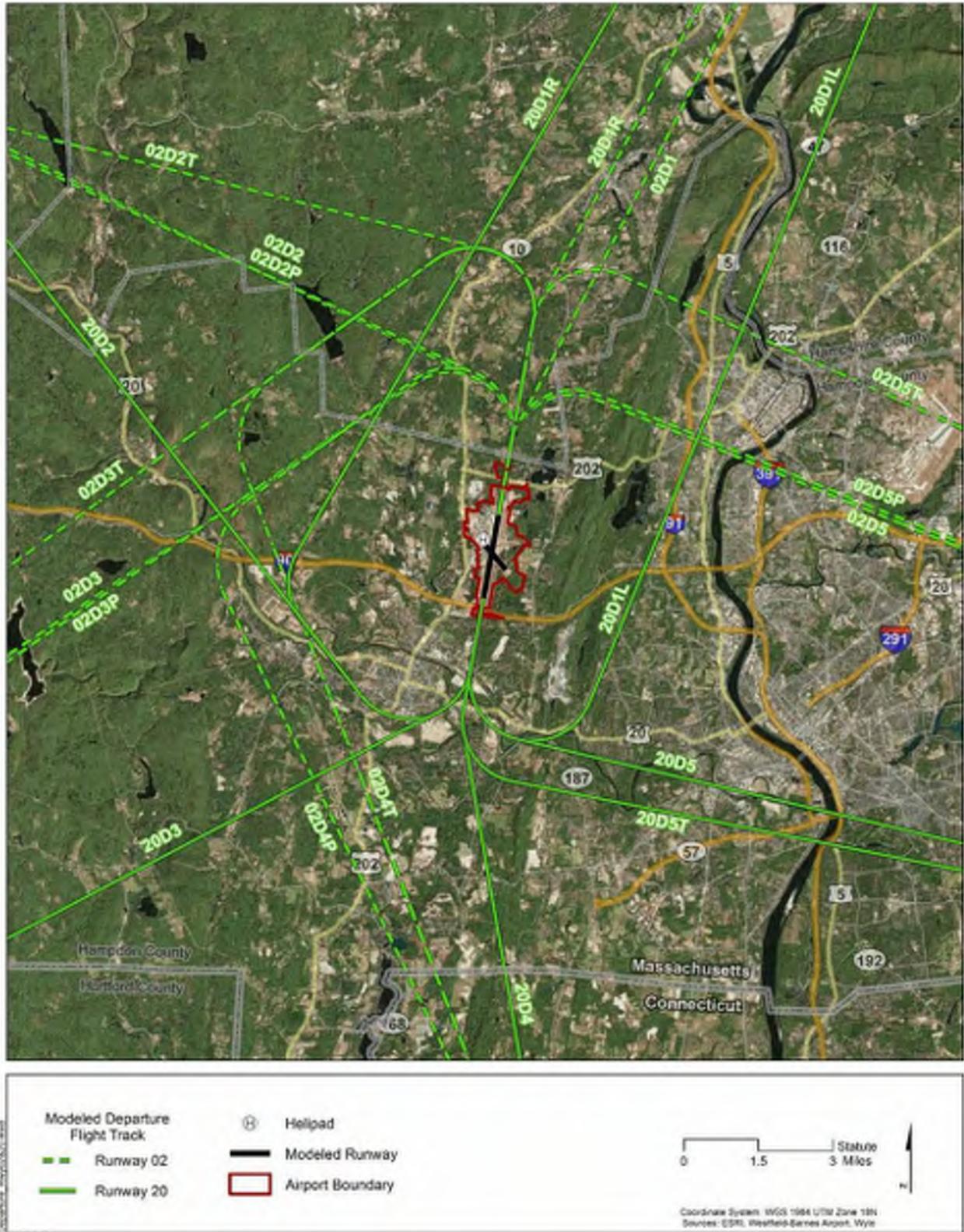


Figure B-1. Modeled Average Daily Fixed-Wing Departure Flight Tracks for Runways 02 and 20

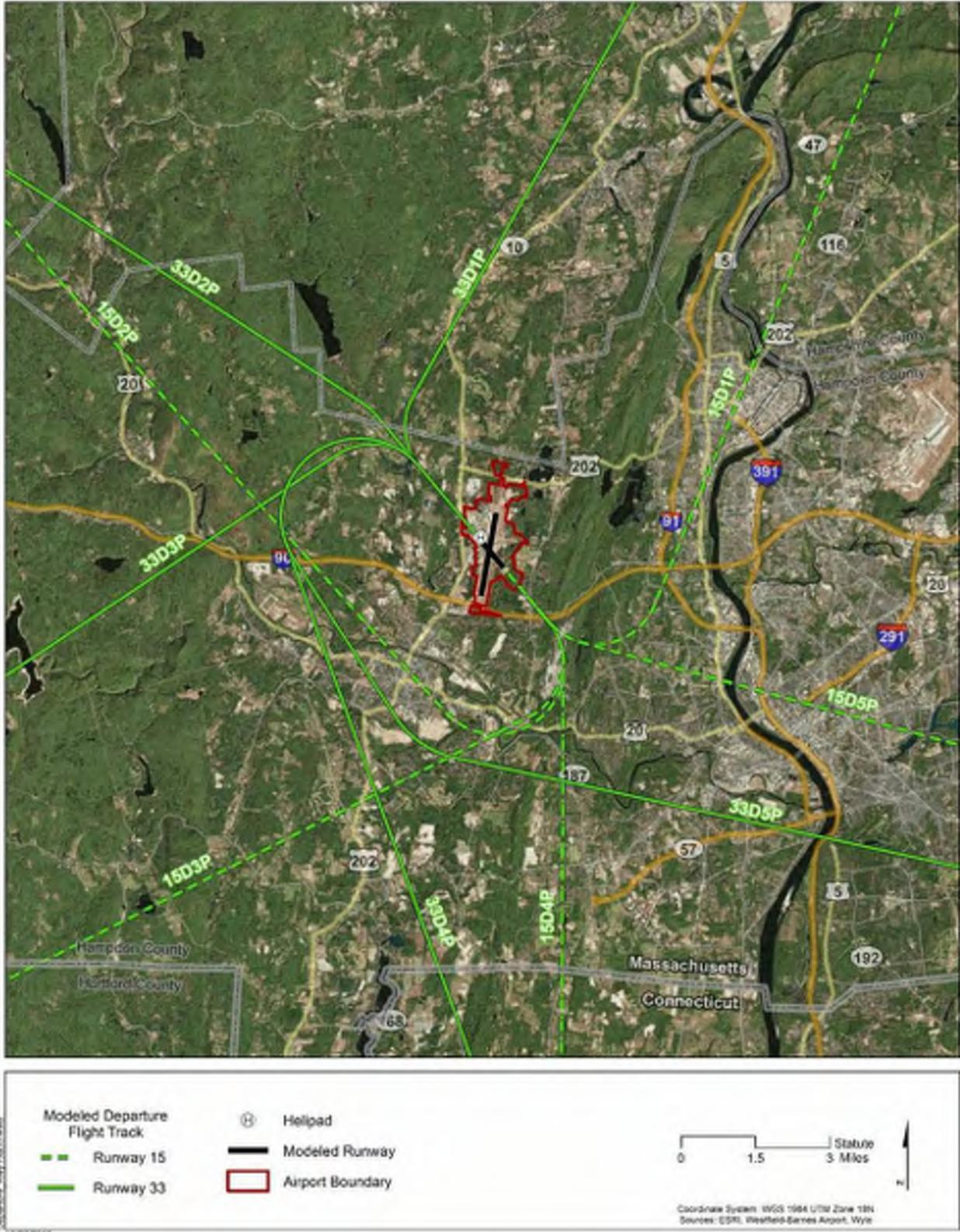


Figure B-2. Modeled Average Daily Fixed-Wing Departure Flight Tracks for Runways 15 and 33



Figure B-3. Modeled Average Daily Rotary-Wing Departure Flight Tracks

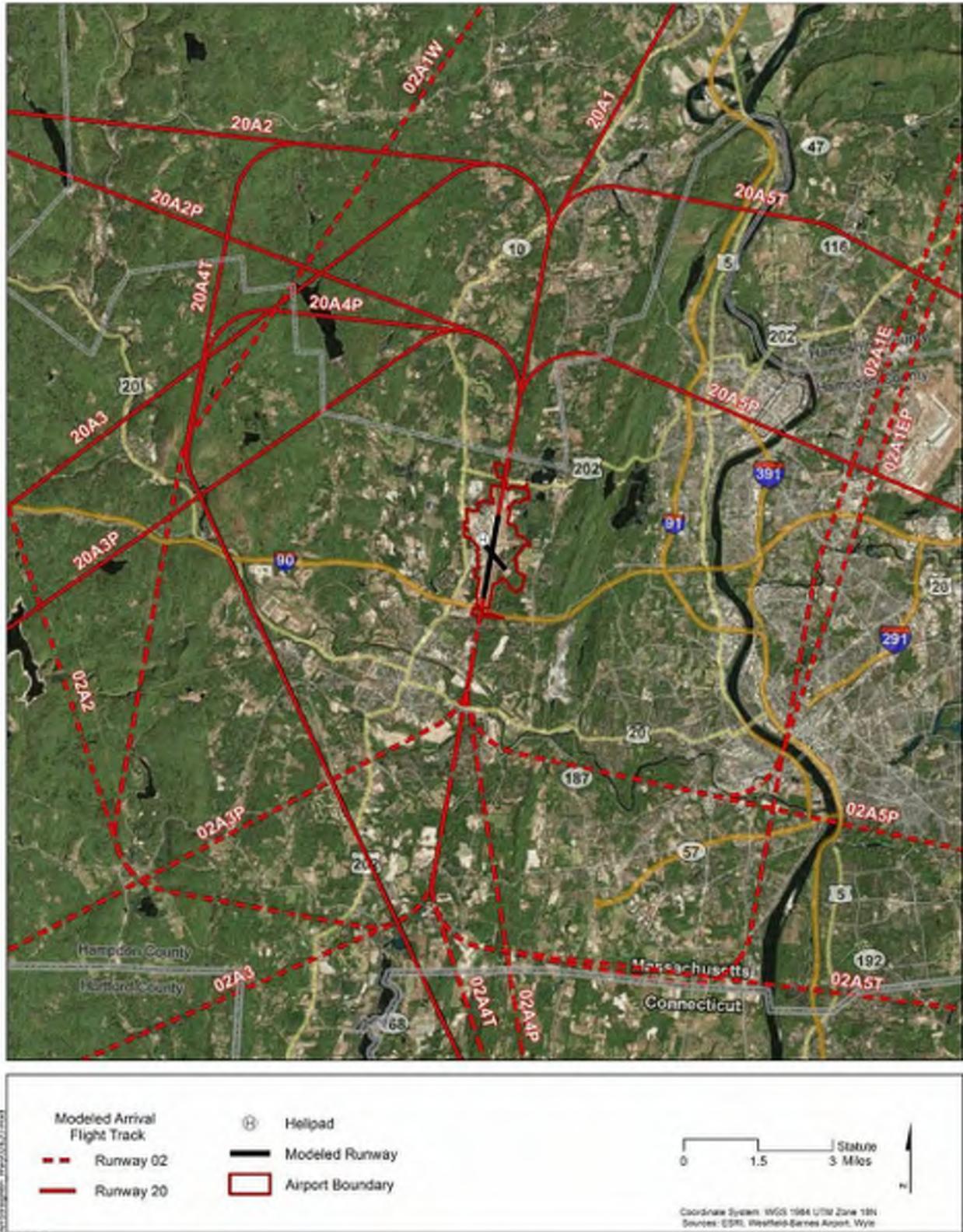


Figure B-4. Modeled Average Daily Fixed-Wing Non-Break Arrival Flight Tracks for Runways 02 and 20

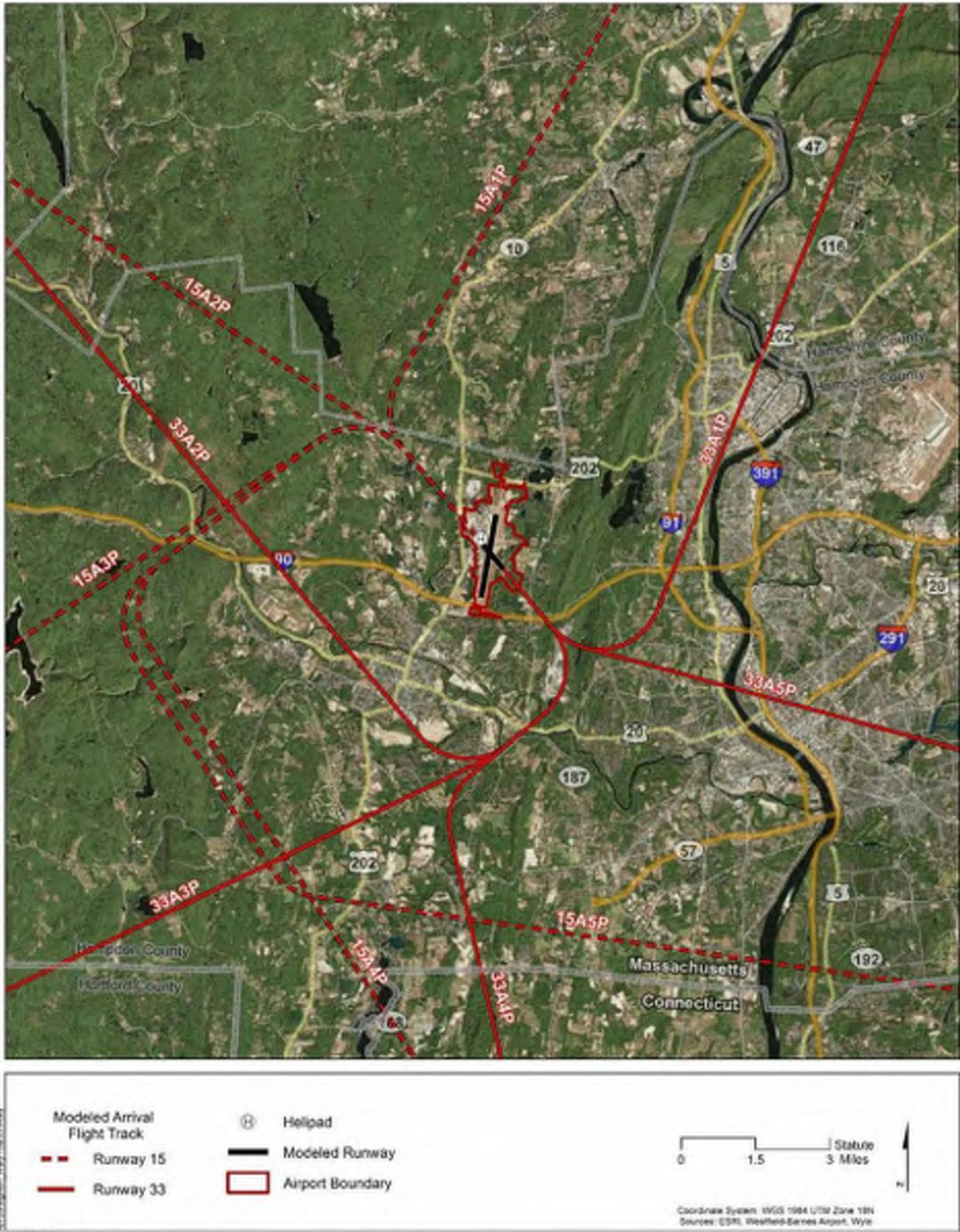


Figure B-5. Modeled Average Daily Fixed-Wing Non-Break Arrival Flight Tracks for Runways 15 and 33



Figure B-6. Modeled Average Daily Rotary-Wing Arrival Flight Tracks

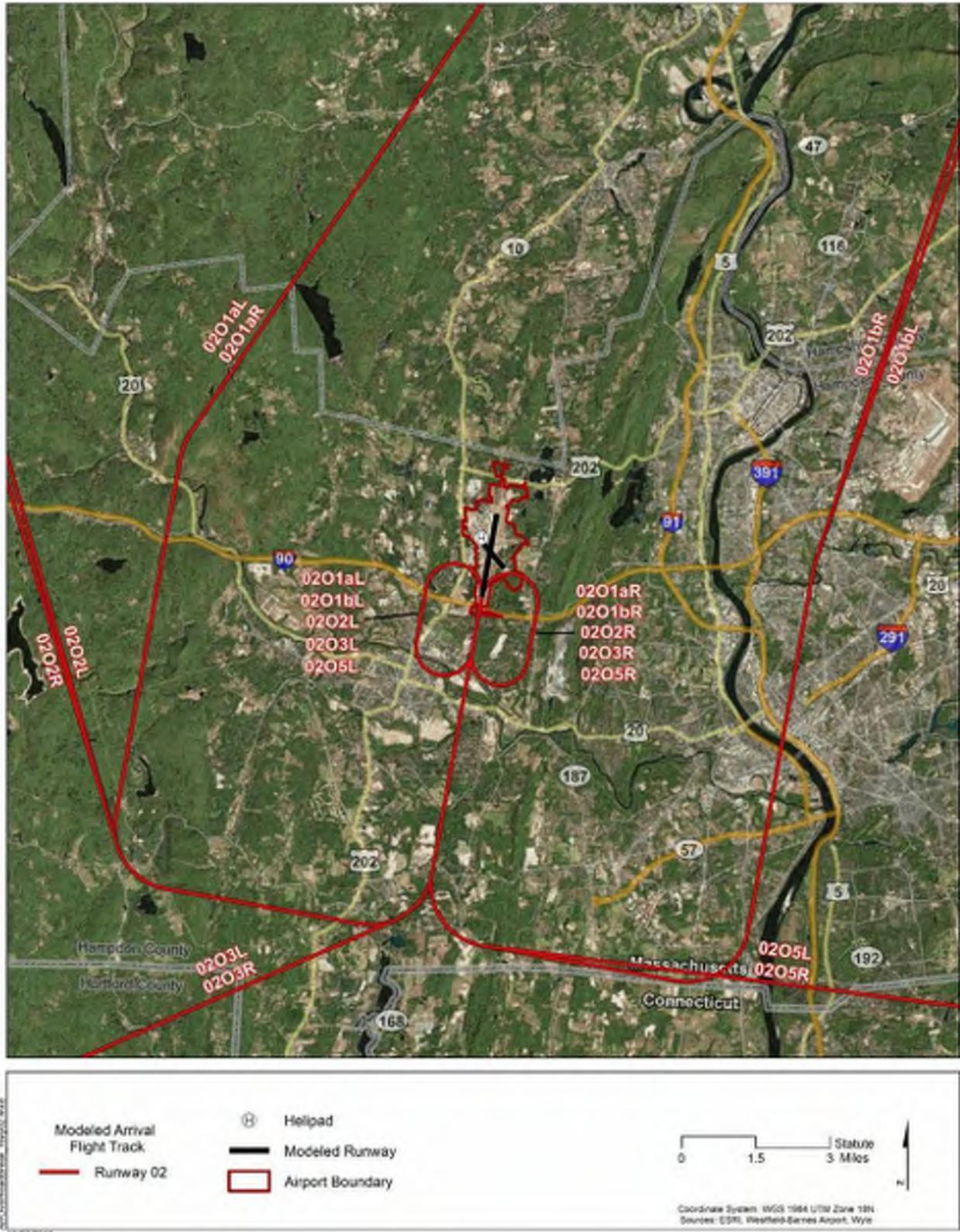


Figure B-7. Modeled Average Daily Fixed-Wing Overhead Break Arrival Flight Tracks for Runway 02



Figure B-8. Modeled Average Daily Fixed-Wing Overhead Break Arrival Flight Tracks for Runway 20

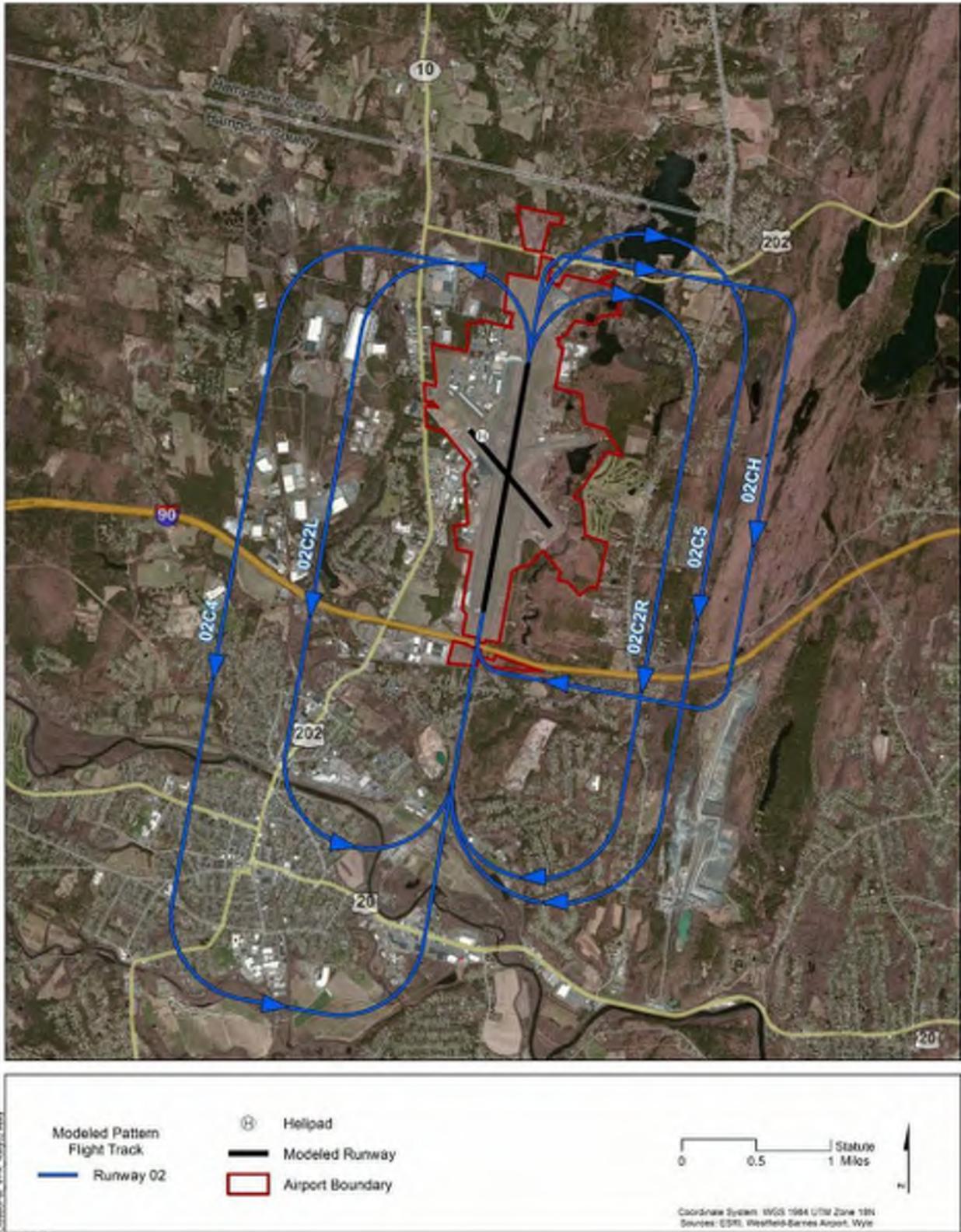


Figure B-9. Modeled Average Daily VFR Pattern Flight Tracks for Runway 02

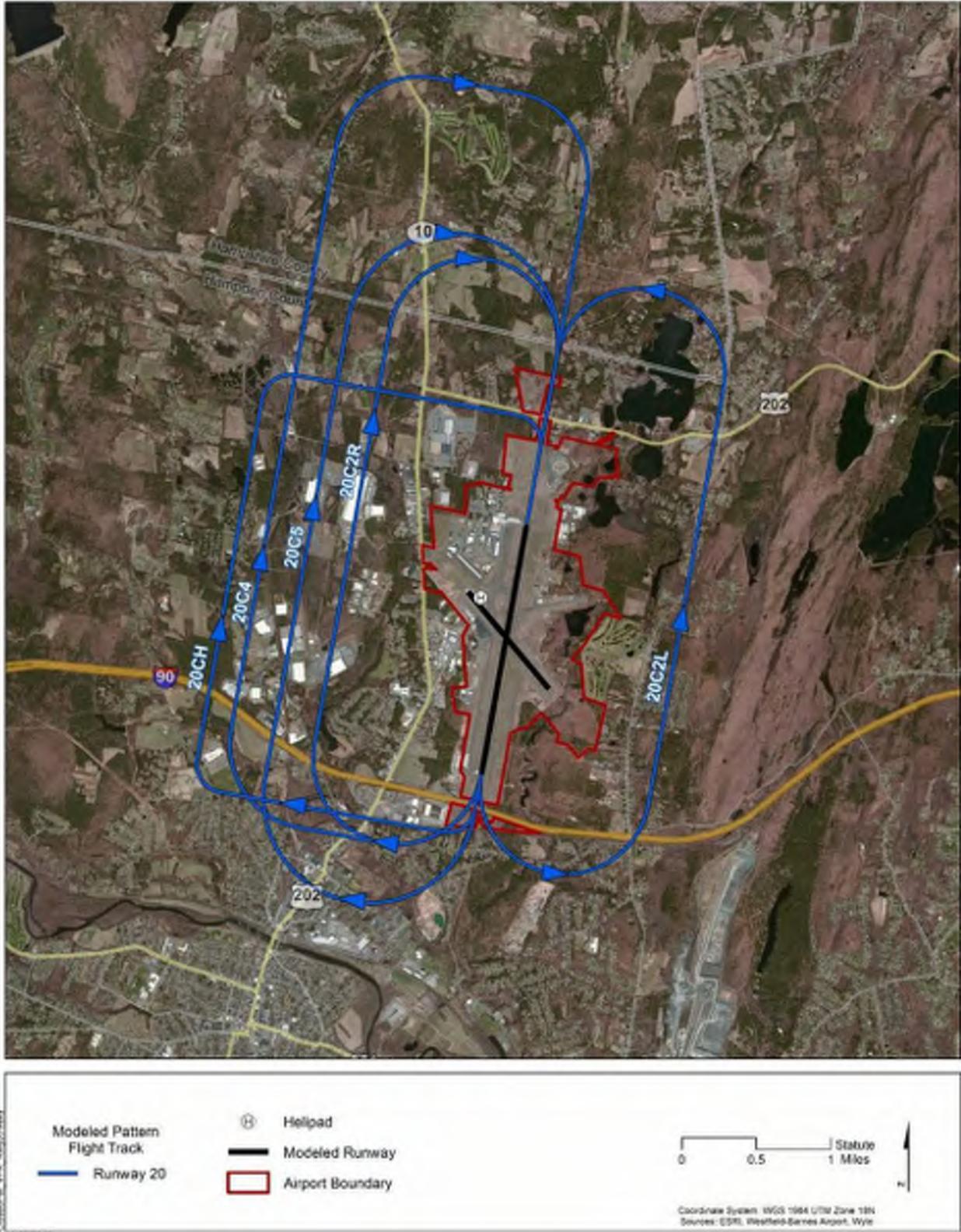


Figure B-10. Modeled Average Daily VFR Pattern Flight Tracks for Runway 20

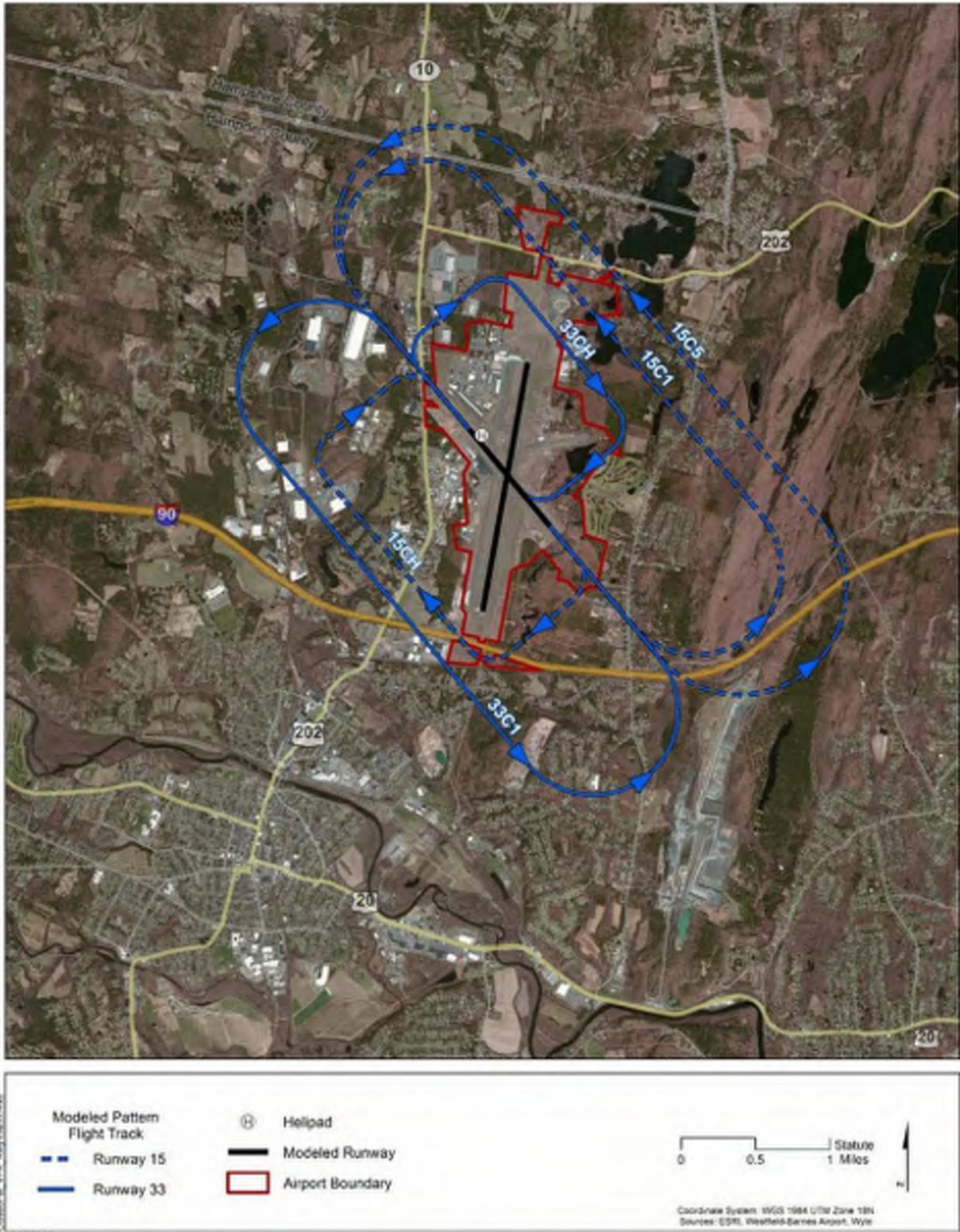


Figure B-11. Modeled Average Daily VFR Pattern Flight Tracks for Runways 15 and 33 (excluding C-130 on Runway 33)

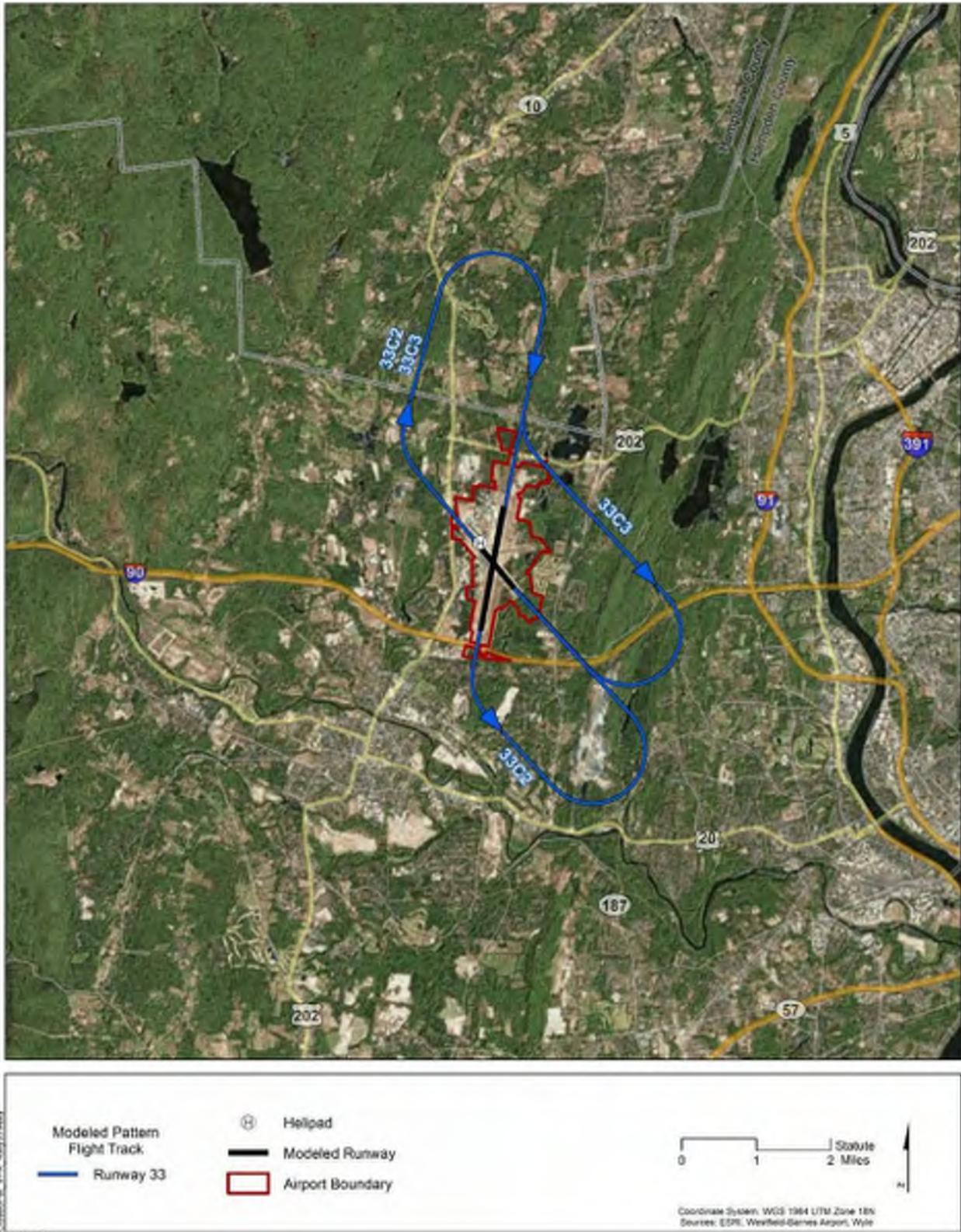
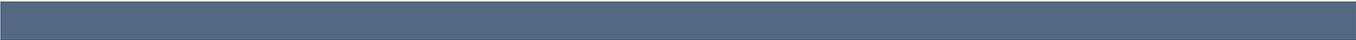
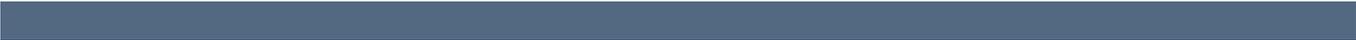


Figure B-12. Modeled Average Daily C-130 VFR Pattern Flight Tracks for Runway 33



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APPENDIX C
Public Outreach

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Sections

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Community Workshop – Comment Card.....	C-17
Community Workshop – Brochure	C-18

Notice of Community Workshop

Advertisement in Springfield Republican newspaper and The Westfield News



Legal Notice

March 5, 6, and 7, 2019

City of Westfield

Westfield-Barnes Regional Airport

Notice is hereby given of a public meeting to be held on March 12, 2019 at 6:00 P.M. at the Westfield-Barnes Regional Airport, Second Floor Conference Room, 110 Airport Road, Westfield, Ma. to review the proposed update to the current Future Forecast Conditions (2024) Noise Exposure Map for the Westfield-Barnes Regional Airport.

All residents that are or could be affected by the proposed revisions to the Noise Exposure Map are invited to attend, review and comment on any proposed revisions.

Thank You, Eric J. Billowitz, Airport Manager

Community Workshop – Display Boards

Note: Display boards in this section show the 2019 and 2024 Noise Exposure Maps (NEMs) which are identical to the 2015 and 2020 NEMs presented at the workshop.

Welcome to Westfield-Barnes Regional Airport's Noise Exposure Map Update Public Meeting

Purpose of Noise Exposure Map Update:

- Updated the 2019 and 2024 Noise Exposure Maps (NEMs) using AEDT Version 2C to estimate noise due to the civil aircraft operations; previously, civil aircraft noise was estimated using Noisemap
- The updated 2019 and 2024 NEMs now combine military aircraft noise, estimated with Noisemap, with civil aircraft noise estimated with AEDT
- Estimating civil aircraft noise with AEDT produced no significant change to the NEMs

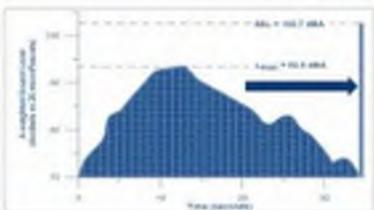



Basics of Sound and Aircraft Noise

Noise is subjective. It is unwanted sound that disturbs activities and enjoyment of "peace and quiet"

Sound is logarithmic. It is measured in Decibels (dB)

- Adding noise levels: 70 dB + 70 dB = 73 dB
- Normal conversation = 60 to 65 dB

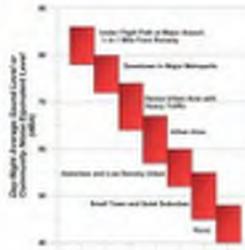


Common Indoor Sound Levels	Noise Level (dB)	Common Outdoor Sound Levels
Maximum levels in audibility of Rock concerts	118	On platform by passing train
Food store (cashier / P.S.)	80	Typical outdoor (AEDT) 1 mile from noise off directly under flight path
Normal (20-30) Busy office	65	On sidewalk by passing train
Library	45	On sidewalk by passing typical automobile
Restaurant at night (noisy) (noisy) study	40	Typical suburban area background
Quiet office	35	Quiet Street Area at Night
Quiet home	30	Quiet Suburban area at night
Quiet home	25	Library reading
Threshold of hearing	10	

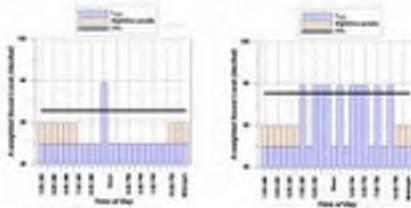
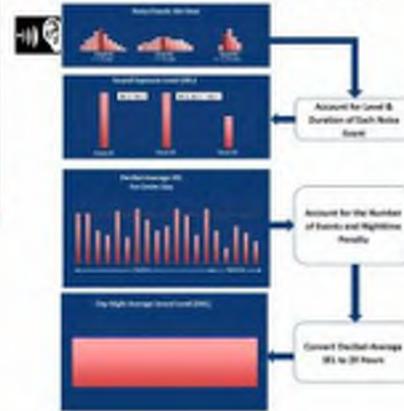


What is Day-Night Average Sound Level (DNL)?

- DNL is the Federally-mandated noise metric for long-term aircraft noise exposure for NEM studies
- DNL is the total noise exposure over an average 24-hour period
- DNL accounts for the cumulative noise exposure of single events and their number of occurrences
- DNL is not a level you hear
- FAA uses 65 dB DNL as the threshold to identify structures incompatible with aircraft noise



DNL adds 10-decibel "nighttime penalty" to events occurring between 10 pm and 7 am



DNL tends towards the levels of the 'louder' events



What is AEDT?

Aviation Environmental Design Tool (AEDT):

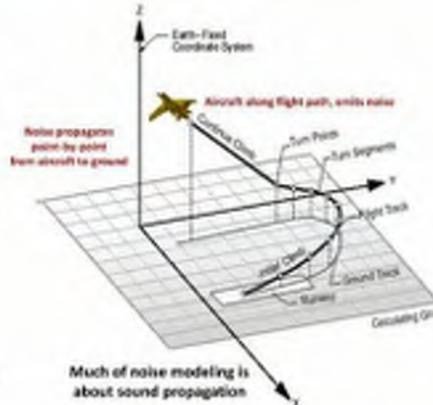
- Is the FAA's software system that dynamically models aircraft performance in space and time to produce estimates of fuel burn, emissions, and noise
- Analyses are possible for study sizes ranging from a single flight at an airport to scenarios at the regional, national, and global levels
- Relies on an extensive database of actual measurements of real aircraft and incorporates the effect of ground elevation



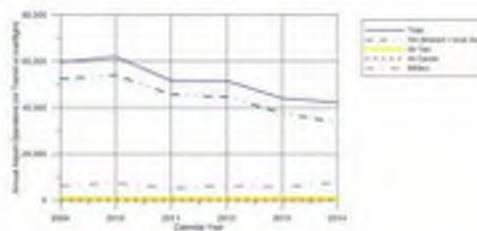
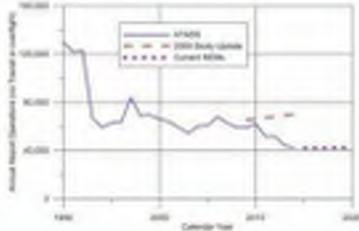
What is NOISEMAP?

NOISEMAP:

- Is a suite of computer-based programs used by the Department of Defense to compute DNL from annual average daily aircraft operations
- Relies on an extensive database of actual measurements of real aircraft
- Incorporates the effect of ground elevation
- Version 7.3 was used for the NEM Update

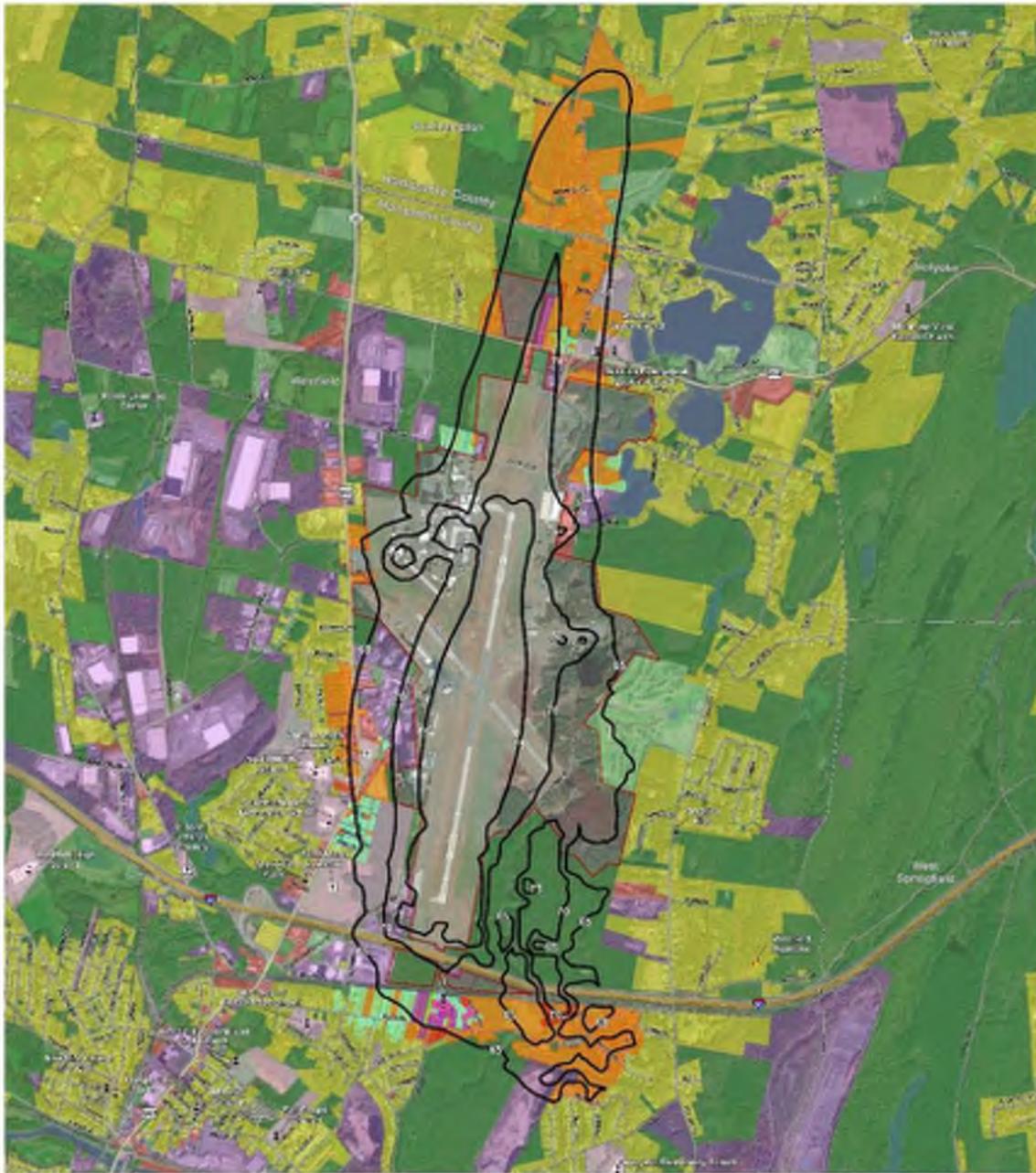


Airport Operations – 2015 and 2020



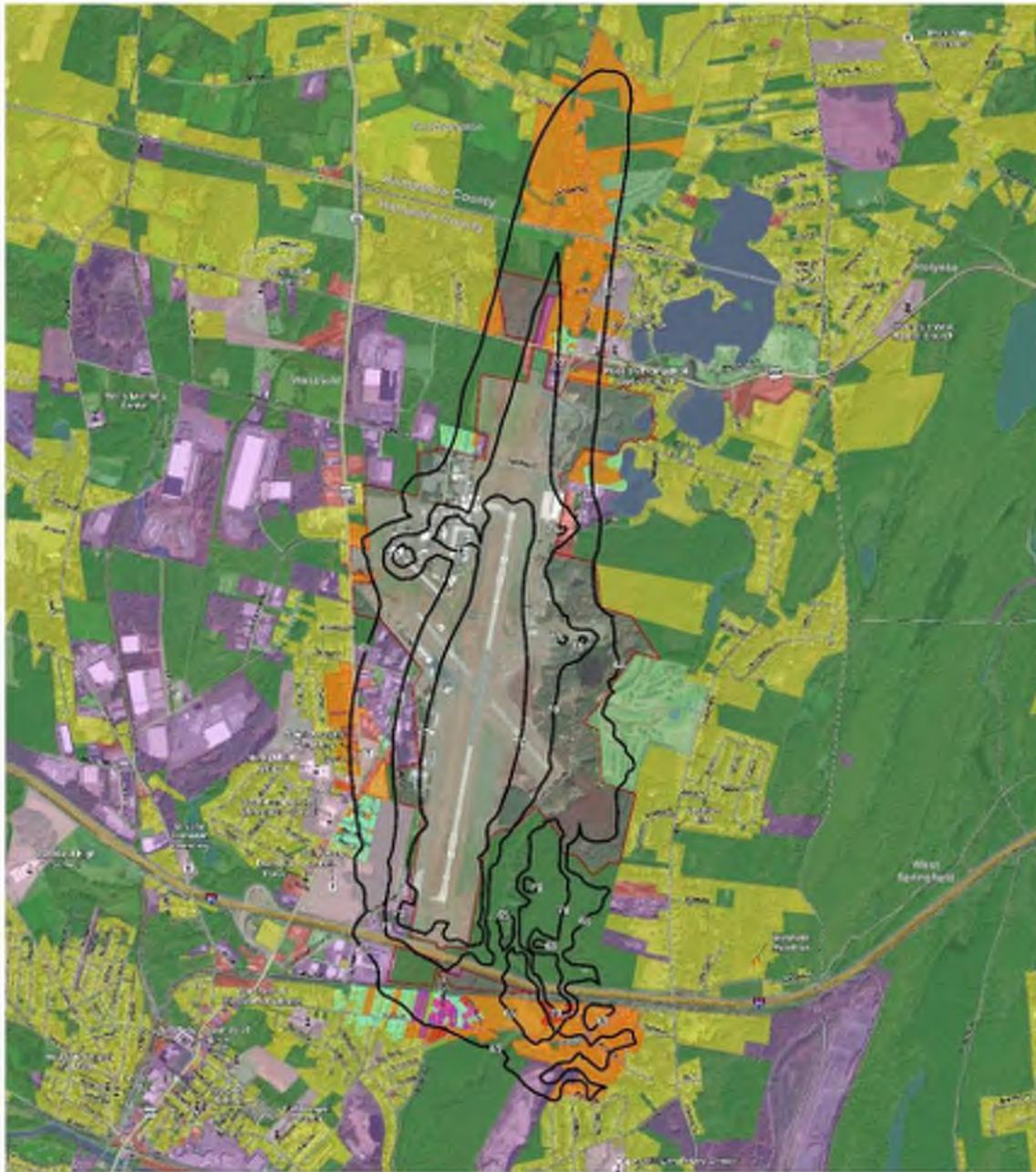
Category	Subcategory	Recommended Aircraft Types	2015			2020		
			Type A	Type B	Total	Type A	Type B	Total
Military Support	AT-19	AT-19 (20)	4,000	0	4,000	4,000	0	4,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
Military Transport	AT-19	AT-19 (20)	4,000	0	4,000	4,000	0	4,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
Civilian	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
	AT-19	AT-19 (20)	1,000	0	1,000	1,000	0	1,000
Total			11,000	0	11,000	11,000	0	11,000





Existing Conditions (2019) Noise Exposure Map

<ul style="list-style-type: none"> Y Cemetery Nursing Home Place of Worship School Hospital 	<ul style="list-style-type: none"> — (dotted) Contour (dB) — Airport Boundary 	<p>Disposition</p> <ul style="list-style-type: none"> Acquired (2009 NCP) Aviation Easement Obtained (2009 NCP) Sound Insulated (2009 NCP) Potentially Eligible (2015 NCP) Acquired (2015 NCP) Aviation Easement Obtained (2015 NCP) 	<p>Existing Land Use</p> <ul style="list-style-type: none"> Commercial Industrial Open/Agriculture Public/Quasi-Public Recreation Residential 	<p>0 825 1,650 3,300 Feet</p> <p>Scale: 1" = 1,650 Feet</p>
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Forecast Conditions (2024) Noise Exposure Map

<ul style="list-style-type: none"> 1 Cemetery 2 Nursing Home 3 Place of Worship 4 School 5 Hospital 	<ul style="list-style-type: none"> — DNL Contour (dB) — Airport Boundary 	<p>Disposition</p> <ul style="list-style-type: none"> Acquired (2009 NCF) Acquisition Easement Obtained (2009 NCF) Sound Insulated (2009 NCF) Potentially Eligible (2015 NCF) Acquired (2015 NCF) Acquisition Easement Obtained (2015 NCF) 	<p>Existing Land Use</p> <ul style="list-style-type: none"> Commercial Industrial Open Agriculture Public/Quasi-Public Recreation Residential 	 <p>0 825 1,650 3,300 Feet</p> <p>Map Scale: 1" = 1,650 Feet</p> <p>Map Date: 10/20/23</p>
--	--	---	--	---



Forecast Conditions (2024) Noise Exposure Map Comparison



Community Feedback

We want your input!

Please submit your ideas, comments and questions for the NEM Update by March 22, 2019 via:

- Comment Card
- E-mail
- Website

Eric J. Billowitz
Airport Manager
413-572-6275

Email:

ebillowitz@barnesairport.com

Website

www.barnesairport.com

Jane Verbeck, Wyle
413-568-2320

Email:

jane.verbeck@wyle.com



Community Workshop – Comment Card



NEM Update Workshop
Idea Card

Name: _____

Contact info (Email or Phone): _____

Comments (Additional Space on back) _____

Community Workshop – Brochure





Appendix B Westfield-Barnes Regional Airport NCP Record of Approval (2017)



Federal Aviation Administration

Memorandum

Date: June 13, 2017

From: Richard Doucette, Manager, Environmental Programs, ANE-610

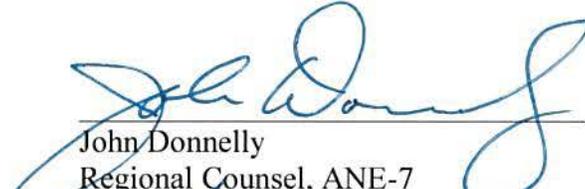
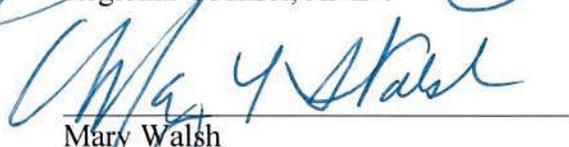
To: Mary Walsh, Manager, Airports Division, ANE-600
John Donnelly, Regional Counsel, ANE-7

Subject: Westfield-Barnes Regional Airport, Part 150 Record of Approval

Attached is the Record of Approval for the Noise Compatibility Program developed by the City of Westfield, Massachusetts for the Westfield-Barnes Regional Airport. One substantive change to the existing Noise Compatibility Program measures is proposed. The Airport Sponsor proposes to expand the noise-land acquisition (LU1) boundary from the 70DNL noise contour, out to the 65DNL noise contour. Four measures (NA4, NA5, LU7, LU13) were recommended to be disapproved, and the FAA concurred. Three other measure (NA1, NA2, NA3) were recommended but not approved.

No written comments were received during the FAA comment period, publicized through the Federal Register.

Upon your concurrence/approval below, the *Federal Register* Notice of FAA's approval of the Noise Compatibility Program can be submitted.

 _____ John Donnelly Regional Counsel, ANE-7	6/14/17 _____ Date	 _____ Concur	_____ Nonconcur
 _____ Mary Walsh Manager, Airports Division, ANE-600	6/14/17 _____ Date	 _____ Approved	_____ Disapproved

RECORD OF APPROVAL

Westfield-Barnes Regional Airport Westfield, Massachusetts

FAR PART 150 NOISE COMPATIBILITY PROGRAM

1.0 Introduction

The City of Westfield sponsored an Airport Noise Compatibility Planning Study under a Federal Aviation Administration (FAA) grant, in compliance with 14 CFR Part 150. The City of Westfield produced a report entitled "*Westfield-Barnes Regional Airport 2016/2021 Noise Compatibility Program Update*." The Final Noise Compatibility Program (NCP) was submitted to FAA for review and approval on February 15, 2017. A prior submittal was found to be insufficient, and was rejected. The NCP was found to be sufficient for consideration by the FAA, and a Federal Register notice was approved on March 13, 2017. The required 60 day public comment period expired on May 12, 2017. The NEM was previously determined to be in compliance on December 22, 2015, and is still valid.

The study provides an overview of all the previously approved noise mitigation measures. One substantive change proposed in this NCP Update is expanding the noise land acquisition boundary from the 70DNL noise contour out to the 65DNL noise contour. All measures were reviewed for their current status, and for consistency with Part 150. As part of this review, the FAA now disapproves noise abatement procedures NA1, NA2 and NA3. These measures would provide no measurable benefit within the 65 DNL contour, and/or be very difficult to implement. Meaningful noise abatement procedures may be designed and recommended under a future NCP update.

These FAA approvals indicate only that the actions would, if implemented, be consistent with the purposes of 14 CFR Part 150. The FAA has provided technical advice and assistance to the airport to ensure that the operational elements are feasible (see 14 CFR 150.23(c)). These approvals do not constitute FAA funding commitments or decisions to implement the actions. The FAA will make funding eligibility determinations as funds are requested. Later decisions concerning possible implementation of measures in this Record of Approval (ROA) will be subject to all applicable environmental compliance or other procedures and requirements, including the National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act (NHPA).

2.0 Noise Mitigation Measures

Implemented and non-implemented measures from the 2009 NCP were re-evaluated for applicability in the current NCP. Table 4-1 below, from the NCP document, lists the measures analyzed and whether they are recommended for the 2017 NCP. Consistent with the NCP Checklist (FAA regulations), the 2017 NCP also considers a preferential runway system. Other than the preferential runway system, no new measures were identified, relative to the 2009 NCP.

Noise Mitigation Measures Analyzed for 2017 NCP

		Recommended for approval in the 2017 NCP?
Noise Abatement Alternatives		
NA1	Noise Abatement Departure Procedures for Runways 15 and 33	YES
NA2	Noise Abatement Departure Procedures for Runways 02 and 20	YES
NA3	Continue to Encourage the Use of GPS, RNAV, WAAS, and FMS Equipment to Enhance Noise Abatement Navigation	YES
NA4	Preferential Runway System for Arrivals and Closed Patterns	no
NA5	Perform a Site Selection/Feasibility Study for a Noise Barrier south of Runway 02	no
Land Use Management Alternatives		
LU1	Voluntary Acquisition of Eligible Residential Structures	YES
LU2	Residential Sound Insulation Program	YES
LU3	Remedial Easement Acquisition	YES
LU4	Sound Insulate Place of Worship	YES
LU5	Preventive Easement Acquisition	YES
LU6	Modify Existing Zoning	YES
LU7	Voluntary Acquisition of Undeveloped Land	no
LU8	Airport Noise Overlay District	YES
LU9	Environmental Review	YES
LU10	Real Estate Disclosure	YES
LU11	Modify Subdivision Regulations	YES
LU12	Building Code Modifications	YES
LU13	Acquire the Arbor Mobil Home Park and Relocate the Residents	no
Program Management Alternatives		
P1	Re-Establish a Noise Mitigation Advisory Committee	YES
P2	Community Awareness Program	YES
P3	Expand the Fly Quiet Program	YES
P4	Periodic Evaluation of Noise Exposure	YES

2.1 Noise Abatement Measures

NA1 –Noise Abatement Departure Procedures for Runways 15 and 33

Description: NA1 continues the portion of Measure N1 from the 2009 NCP which dealt with departure procedures for Runways 15 and 33. Measure NA1 calls for:

- VFR departures on Runway 15 to be directed to maintain runway heading until crossing the ridgeline (unless otherwise directed by ATC), and
- Runway 33 departures prohibited from beginning their takeoff roll at the intersection of Runways 02/20 and 33, in order to maximize aircraft altitudes at the Heritage Mobile Home Park located along the extended centerline of Runway 33.

Benefits: NA1 provides single-event noise benefits to dwellings immediately adjacent to the airport and along the extended runway centerlines.

Disadvantages: NA1 does not provide measurable DNL benefit. Furthermore, in some cases, the use of noise abatement departure procedures can slightly increase aircraft travel time and fuel costs. Based on ATC workload, some aircraft may not utilize the voluntary procedures of NA1. Additionally, military aircraft are not subject to the specified procedures.

Recommendation: NA1 is recommended for the NCP.

FAA Determination: NA1 is not approved for purposes of Part 150, as it does not provide a measureable DNL benefit. Also, the Air Traffic Control Tower (ATCT) indicates they do not provide noise abatement instructions, but they already prohibit intersection takeoffs. This measure cannot be approved for purposes of Part 150, but Westfield and the ATCT may take location actions they deem appropriate.

NA2 –Noise Abatement Departure Procedures for Runways 02 and 20

Description: Similar to measure N1 from the 2009 NCP, measure NA2 calls for the modification of departure procedures for Runways 02 and 20. Measure NA2 calls for:

- Departures on Runway 02 to be directed to turn left to a 360-degree (magnetic) heading upon crossing the airport's northern boundary, until clear of noise-sensitive facilities, after which the aircraft can proceed on-course (unless otherwise directed by ATC), and
- Departures on Runway 20 to be directed to maintain runway heading until 3 miles south of the southern airport boundary (unless otherwise directed by ATC).

The change in DNL only occurs north of the airport. The proposed measure would decrease the number of affected homes potentially eligible for mitigation by 14, or 6%.

Benefits: NA2 decreases the number of dwelling units exposed to DNL of at least 65 dB, albeit a relatively small decrease. The measure would also have single-event noise benefits to currently affected dwellings.

Disadvantages: NA2 would slightly increase aircraft travel time and fuel costs for most destinations. Based on ATC workload and since NA2 is voluntary, some aircraft may not utilize NA2.

Recommendation: NA2 is recommended in the NCP for possible future implementation.

FAA Determination: NA2 is not approved. Additional discussions with Air Traffic Control indicate these procedures would be difficult to implement and unlikely to alleviate noise.

NA3 – Continue to Encourage the Use of GPS, RNAV, WAAS, and FMS Equipment to Enhance Noise Abatement Navigation

Description: NA3 is a continuation of measure N3 from the 2009 NCP and recommends continued use of advanced navigation techniques already in place at BAF. The use of RNAV, GPS, FMS, and WAAS systems collectively allow the better utilization of noise abatement departure procedures and more accurate approaches, with the benefit of reducing noise exposure over noise-sensitive land uses around an airport. No further action would be required, and the recommendation of NA3 would be a policy statement as opposed to a statement of immediate action.

Benefits: The use of the advanced navigation techniques has the potential to more accurately define arrival and departure procedures at the airport, while the compatible land use corridor to the north of the airport would be maximized, thereby minimizing the level of noise exposure in the more densely populated residential areas immediately south of Runway 20.

Disadvantages: Improvements in the availability of advanced avionics in aircraft may be slow and occur over a period of many years. However, it is assumed that a portion of the aircraft fleet mix may be able to utilize new procedures as they are developed and approved. Each

new procedure may be subject to review by FAA Flight Standards and is also subject to environmental approval.

Recommendation: NA3 is recommended for implementation in the NCP.

FAA Determination: NA3 is not approved, as it does not appear this would result in a change in DNL noise exposure. But this does not preclude the City from working with airport users and the air traffic control tower to encourage the use of advanced navigation techniques, which may minimize noise impacts on airport neighbors.

NA4 – Preferential Runway System for Arrivals and Closed Patterns

Description: NA4 recommends a preferential runway use system favoring the use of Runway 02 for both arrivals and departures for the noisiest of aircraft. The noisiest aircraft are the F-15 aircraft. Currently, a preferential runway system is implemented (and modeled for the 2016/2021 NEMs) for departures as 90% of the F-15 departures utilize Runway 02. For arrivals and closed patterns, 90% of F-15 operations (were modeled to) utilize Runway 20. These operations are more sensitive to prevailing winds, from a safety of flight perspective, which means ATC cannot switch them to Runway 02. Prevailing winds are out of the south/southwest most of the time.

If NA4 was further focused to target times of calm wind. Calm wind does not apply to more than 25% of the operations. Thus, NA4 would not make a significant difference in the DNL.

Benefits: NA4 would provide single-event noise benefits to dwellings immediately adjacent to the airport and along the extended runway centerlines. NA4 has the potential of providing a decrease in DNL if closed patterns could apply.

Disadvantages: In some cases, the use of Runway 02 for arrivals and closed patterns can slightly increase aircraft travel time and fuel costs. Based on ATC workload, some aircraft may not utilize the voluntary procedures of NA4.

Recommendation: NA4 is not recommended for the NCP because of prevailing winds.

FAA Determination: NA4 is not approved, as it does not provide a measureable DNL benefit; and for the other reasons cited.

NA5 – Perform a Site Selection/Feasibility Study for a Noise Barrier South of Runway 02

Description: NA5 recommends a Site Selection/Feasibility Study for a noise barrier south of runway 02.

Benefits: To provide relief to airport neighbors from noise created by aircraft while on the ground, such as the use of reverse thrust and initial departure roll.

Disadvantages: Numerous sites were evaluated but no site was deemed appropriate for construction of a barrier.

Recommendation: NA5 is not recommended because of site location problems. Properties on Dry Bridge Road and Deepwoods Drive were eligible for land acquisition and relocation. However, the homeowners at the end of these roads chose to be sound insulated. Therefore land where a noise barrier could have been constructed has become unavailable.

FAA Determination: NA5 is not approved, for the reasons cited.

2.2 Land Use Mitigation Measures

LU1 –Voluntary Acquisition of Eligible Residential Structures

Description: LU1 would offer voluntary acquisition to the residential land uses exposed to 65 dB DNL or greater. Six of these dwellings are exposed to DNL of 70 dB or greater. The remainder of these homes are exposed to DNL between 65 and 70 dB. The program is voluntary, and would be subject to the provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act (49 CFR Part 24) (Uniform Act). LU1 is an expansion of the 2009 NCP's Measure L1. The 2009 NCP, like most airports' acquisition programs, sought to acquire parcels exposed to 70 dB DNL or greater. LU1 is offering the acquisition program to residences exposed to at least 65 dB DNL.

Benefits: An acquisition program would result in the compatible reuse of residences exposed to DNL greater than or equal to 65 dB. As such, the land uses would be considered compatible with aircraft noise.

Disadvantages: The voluntary participation of homeowners exposed to 65 dB DNL or greater, or contiguous to the criterion contour, would result in the removal of those properties from the local tax roll. Additionally, it is expected that not all homeowners would participate in the acquisition program, thus contiguous neighborhoods may be broken up resulting in vacated space. The City of Westfield would be responsible for the maintenance of the properties acquired under this program.

Recommendation: LU1 is recommended for implementation in the NCP.

FAA Determination: LU1 is approved. The FAA notes that land acquisition down to the lower 65DNL noise levels can lead to neighborhoods with numerous vacant lots. This can be a negative impact on the community, and it can be difficult to reuse these land areas for other purposes, such as commercial land use. Westfield is cautioned that this recommendation can have an unintended, negative results in terms of neighborhood continuity and land use.

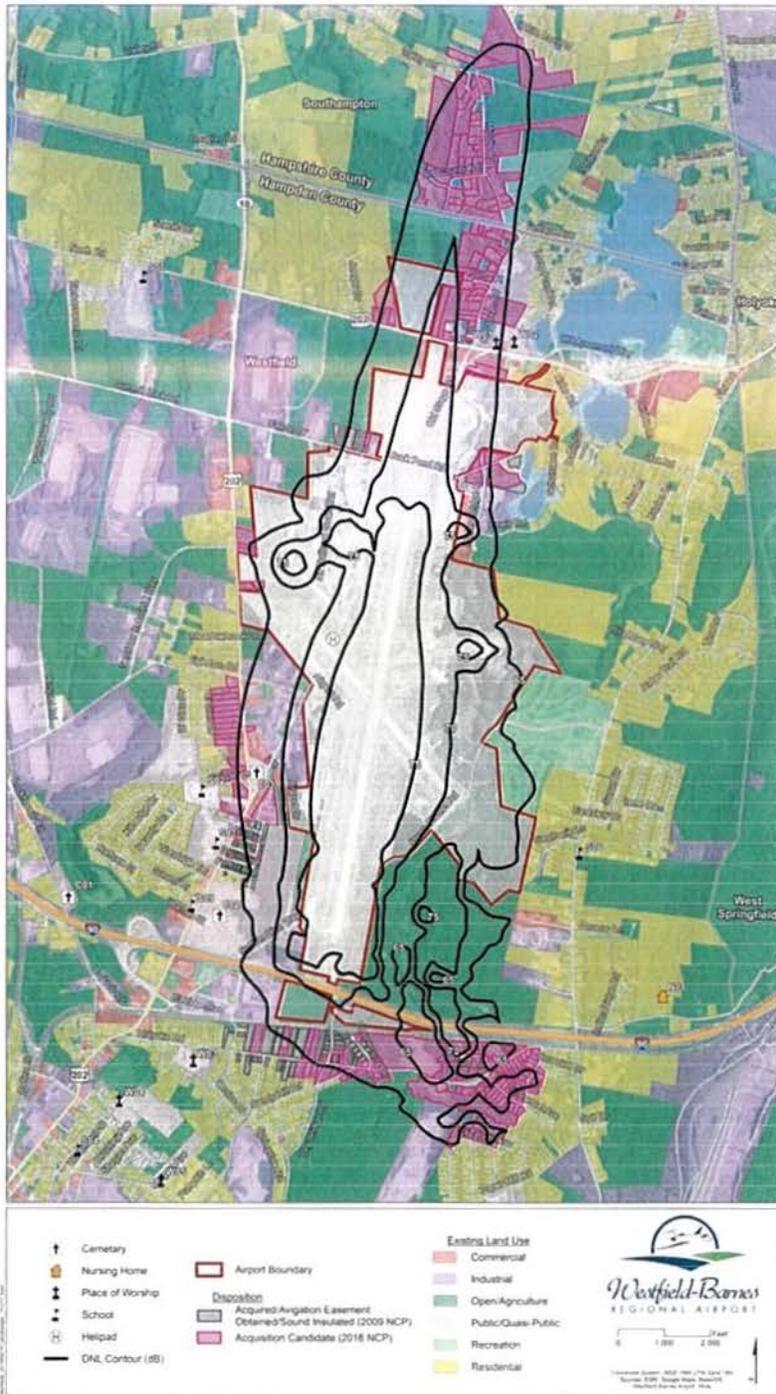


Figure 4-3. Candidate Properties for Acquisition and Sound Insulation

LU2 –Residential Sound Insulation Program

Description: AIP Handbook (FAA 2014), and Program Guidance Letter (PGL) 12-09 (FAA 2012), requires that eligible properties must be (1) built prior to October 1, 1998, and (2) be exposed to DNL of at least 65 dB, with an interior noise level equal to or greater than 45 dB DNL. Determining the interior noise level of a structure would require additional steps, in addition to locating a parcel on a noise contour map, as explained in the following paragraph. The FAA also requires that noise insulation efforts be designed to achieve interior noise levels of 45 dB in habitable rooms, with a minimum improvement in Noise Level Reduction (NLR) of 5 dB.

The sound insulation program will follow the seven tasks described in the BAF Acoustical Test Plan (BAF 2016). These tasks include:

- 1) Windshield Survey -- to inventory and categorize the buildings based on acoustically significant physical elements;
- 2) Site Assessment -- to assess existing conditions;
- 3) Acoustical Testing -- to quantify the acoustic environment of structures;
- 4) Acoustical Analysis -- to determine the level of interior noise of structures;
- 5) Determining Eligibility -- as recommended by the FAA guidelines;
- 6) Design for Eligible Dwellings and
- 7) Determining Secondary Treatments -- if the acoustical testing deemed the structures not qualified to receive the standard sound insulation package.

Figure 4-3 depicts the 217 units potentially eligible for sound insulation. A total of 6 properties are expected to be affected by noise levels of 70 dB DNL or greater (or comprise a contiguous area), while the remaining residences are expected to be affected by DNL between 65 and 70 dB or represent contiguous areas adjacent to the 65 dB DNL contour. Although attempts have been made through the Part 150 process to identify all residential structures exposed to DNL greater than or equal to 65 dB, it is possible that some may not have been identified.

LU2 is a continuation of measure L3 from the 2009 NCP.

Benefits: Property owners benefit by reduced aircraft noise levels inside their residence. Additionally, acoustic treatments have the potential to increase the value of the residence, as compared to similar structures which have not been treated.

Disadvantages: Following completion of the program, aircraft may be audible inside the structure, even after meeting FAA guidelines. Sound insulation modifications are not very effective if windows are open, nor does sound insulation mitigate *outdoor* noise levels. Individuals who are particularly sensitive to aircraft noise may still experience annoying levels after their home has been treated. In cases where air conditioning units are installed, the recipients are responsible for any increased utility costs, as well as potentially increased costs associated with an increase in assessed value and taxes associated with the improvements.

Recommendation: LU2 is recommended for implementation in the NCP.

FAA Determination: LU2 is approved.

LU3--Remedial Easement Acquisition

Description: Easements are typically acquired during sound insulation programs, but in some cases, as described in Section 3, easements are also purchased from homeowners in lieu of other forms of mitigation. With the signing of an aviation easement, a property owner gives the airport the right of flight over the property, and also, in some cases, a property owner agrees to a restriction of future modifications or changes of land use. An airport will then hold the easement until sold or released. The aviation easement, as a legal document, would be attached to the property deed and, in the case of sale of the property, would be transferred to any future owners.

LU3 is a continuation of measure L4 from the 2009 NCP.

Benefits: Aviation easements can assist in the reduction and prevention of existing and future incompatible development surrounding the airport. Although not a preferred method of mitigation by itself, easements can be effective when combined with other recommended mitigation options.

LU3 is a continuation of measure L4 from the 2009 NCP.

Disadvantages: An easement does not offer actual mitigation for homeowners from noise of aircraft overflights.

Recommendation: LU3 is recommended for implementation in the NCP.

FAA Determination: LU3 is approved.

LU4 – Sound Insulate Place of Worship

Description: Eligibility for sound insulation of noise sensitive facilities is determined not only by the building being exposed to DNL of at least 65 dB, but also on the use of the facility. Usually, schools and places of worship are eligible for sound insulation treatments. In this NCP, one place of worship, World of Grace Church, located to the north of BAF along North Road, is exposed to DNL greater than 65 dB as shown on Figure 4-3 in the NCP document. There is no school associated with this place of worship. The design phase, which identifies the type of modifications needed to meet FAA guidelines, would begin after initial acoustical testing and would be followed by construction and post-construction/modification acoustical testing.

LU4 is a continuation of measure L5 from the 2009 NCP but without educational facilities.

Benefits: Sound insulation could provide relief from the noise of aircraft overflights inside the Church.

Disadvantages: May be subject to limited availability of funds, based on the timing of other mitigation programs. Sound insulation materials do not mitigate outdoor sound levels.

Recommendation: LU4 is recommended for implementation in the NCP.

FAA Determination: LU4 is approved.

LU5 - Preventive Easement Acquisition

Description: As explained in Section 3, easements can be acquired in order to prevent future incompatible development in specified areas. LU5 would allow BAF and the City of Westfield to prevent future incompatible development for lands exposed to DNL greater than or equal to 65 dB without proper sound attenuation materials or other development controls.

LU5 is a continuation of measure L6 from the 2009 NCP. The limited undeveloped residential land exposed to DNL of at least 65 dB was a factor in BAF not being able to implement L6.

Benefits: Preventive easement acquisition would allow BAF to ensure some level of compatibility for development in potentially noise-sensitive areas.

Disadvantages: The acquisition of easements may be subject to limited availability of funding, based on the priority of previously mentioned mitigation programs.

Recommendation: LU5 is recommended for implementation in the NCP.

FAA Determination: LU5 is approved.

LU6 – Modify Existing Zoning

Description: LU6 is a continuation of 2009 measure L7 which recommended modifying the existing zoning code of undeveloped land exposed to DNL of at least 65 dB to ensure compatible development in areas of significant noise exposure. Modifications to existing zoning are authorized by the City Planning Board and City Council. Table 4-3 in the NCP document outlines the zoning classifications and acres located in each noise zone for the 2021 NEM. There are approximately 491 acres of incompatibly-zoned land.

Table 4-3. Zoning Classifications and the Incompatible Acreage for the 2021 NEM

Generalized Zoning Category	Band of DNL (dBA)			Total
	65-70	70-75	75+	
Airport District	351	293	386	1,030
Business	113	20	1	134
Commercial	-	-	-	-
Industrial	231	168	16	415
Residential	461	30	-	491
Total	1,156	511	403	2,070

Note: Zoning acrages are only approximate due to overlaps and gaps in zoning data sets.

Analysis of the land use and zoning data revealed there are 46 acres of developable residentially-zoned land exposed to 65 DNL or higher. A majority of the incompatibly zoned land is already developed, and is being addressed by the mitigation plan in the NCP.

Following the completion of the NCP, the City of Westfield should evaluate those parcels of land which, although currently undeveloped, have the potential to be developed as a non-compatible land use exposed to 65 DNL or greater. Where the possibility of development exists, the City should attempt to work with the landowner to change the zoning of the land to avoid future incompatibilities. Alternatively, the City could evaluate the zoning requirements of the Rural Residential (RR) district in order to address the potential impact of aircraft overflights and noise.

LU6 is a continuation of measure L7 from the 2009 NCP.

Benefits: Modifying the zoning of undeveloped land exposed to DNL of at least 65 dB would ensure future compatible development in areas of significant noise exposure.

Disadvantages: Landowners subject to zoning changes may dispute the issue with the City.

Recommendation: LU6 is recommended for implementation in the NCP.

FAA Determination: LU6 is approved.

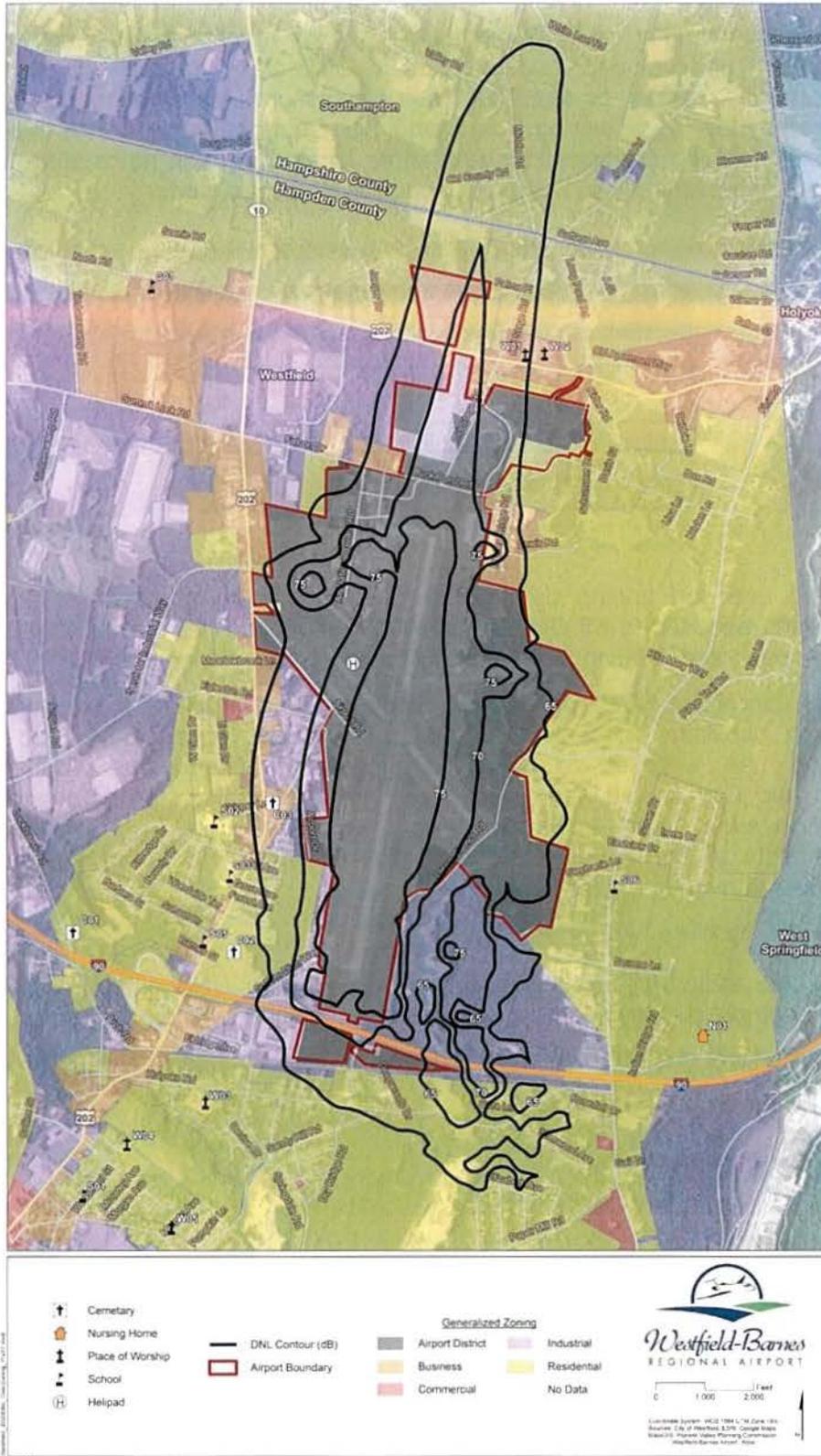


Figure 4-4. Generalized Zoning and the 2021 NEM

LU7- Voluntary Acquisition of Undeveloped Land

Description: Preventive land acquisition works in a manner similar to preventive easement acquisition (LU5), and the two are often paired prior to resale or development of potentially incompatible land. Factors to consider in LU7 include the amount of available land, the ability of an airport or jurisdiction to make available the funds required to purchase the land, and the development potential of the land in question. Land uses that are generally compatible with airport options may not need to be purchased, as their non-compatible development potential is low.

LU7 is a continuation of 2009 NCP measure L8.

Benefits: Preventive undeveloped land acquisition would allow the airport and City of Westfield to ensure some level of compatibility for development in potentially noise-sensitive areas, assuming the proper development controls (such as zoning) are instituted.

Disadvantages: The acquisition of undeveloped property may be subject to limited availability of funding, based on the priority of previously mentioned mitigation measures.

Recommendation: LU7 is not recommended for implementation in the NCP because of the measure's financial impact to the City.

FAA Determination: LU7 is not approved.

LU8 - Airport Noise Overlay District

Description: LU8 recommends that the City of Westfield pursue the development of an ANOD based on the 2021 NEM. Typical elements of an ANOD include a statement of purpose and intent, definitions of common terms, applicability, permitted uses as well as exemptions and nonconforming structures, a permitted use table, and NLR requirements. The Westfield Airport Commission (WAC) and Airport Staff will need to work in conjunction with City of Westfield officials and staff, and ultimately, the public in order to define the goals, restrictions, and boundaries of an ANOD.

LU8 is a continuation of measure L7 from the 2009 NCP.

Benefits: The implementation of an ANOD can provide an additional land use control for potentially incompatible development within a specified boundary around the airport.

Disadvantages: Noise contours at an airport change over time. As such, the boundaries of an ANOD may, if directly tied to the Airport's current NEMs, be subject to revision when new noise contours are identified.

Recommendation: LU8 is recommended for implementation in the NCP.

FAA Determination: LU8 is approved.

LU9 – Environmental Review

Description: LU9 recommends the City of Westfield continue including airport staff during the course of administrative review of proposals for land use development in areas either exposed to DNL of at least 65 dB or in another defined boundary, such as an ANOD. As is currently the practice in the City of Westfield, the airport manager participates in a weekly round table discussion of development that is located in the vicinity of the airport, and may be affected by aircraft overflights.

LU9 is a continuation of measure L10 from the 2009 NCP.

Benefits: Participation by airport staff in the administrative review of development proposals in the vicinity of the airport is one method of minimizing the potential of incompatible land uses which may be subject to aircraft overflights.

Disadvantages: The identification of potential compatibility issues by airport staff may be only one consideration in the decision to grant development approvals, and is not a guarantee that proper noise level reduction or appropriate mitigation would be required. The implementation of other recommended measures may assist in the effectiveness of LU9.

Recommendation: LU9 is recommended for implementation in the NCP.

FAA Determination: LU9 is approved.

LU10 - Real Estate Disclosure

Description: Measure LU10 is a continuation of measure L11 from the 2009 NCP. LU10 directs the Airport Manager to continue pursuing the implementation of real estate disclosure through both coordination with local real estate professionals to include information about airport noise and overflights, and through the inclusion of a noise disclosure ordinance attached to a property deed.

Real estate notices are an effective means of acknowledgement of potential effects of aircraft overflights in an area surrounding an airport to perspective property owners. Real estate disclosure notices, if implemented by local or State real estate associations, can effectively incorporate information about aircraft overflights, the location of the property in relation to the airport or flight patterns, and potential effects in either a legal document (through an easement) or in real estate marketing materials.

Benefits: Real estate disclosure notices, conveyed either through disclosure by real estate professionals or legal notice attached to property deeds, can provide an effective means of potential aircraft overflight disclosure.

Disadvantages: Real estate professionals may be hesitant to include additional information that may be viewed as potentially negative. Without a legal requirement on behalf of the Commonwealth of Massachusetts, it may be difficult to achieve voluntary compliance.

Recommendation: LU10 is recommended for implementation in the NCP.

FAA Determination: LU10 is approved.

LU11 – Modify Subdivision Regulation

Description: As described in Section 3, the Rules and Regulations Governing the Subdivision of Land in Westfield to ensure an orderly and efficient layout of the subdivision. LU11 directs the Airport Manager to continue pursuing the inclusion of methods such as the incorporation of noise attenuating standards, noise disclosure, or the dedication of easements in the regulation of proposed subdivisions that may be affected by aircraft noise as promulgated by the City of Westfield.

LU11 is a continuation of measure L12 from the 2009 NCP.

Benefits: LU11 could reduce the potential for incompatible land use development approved as a new subdivision in the vicinity of the airport.

Disadvantages: This type of regulation is only effective in cases where land may be replatted or not yet developed.

Recommendation: LU11 is recommended for implementation in the NCP.

FAA Determination: LU11 is approved.

LU12 – Building Code Modifications

Description: Modifications to building codes can include elements to address the inclusion of sound insulation materials, such as windows and doors with higher Sound Transmission Class (STC) ratings and other elements designed to reduce the transmission of sound from the exterior environment to the interior of a structure. Building code revisions only address new construction and significant modifications to existing structures.

LU12 directs the Airport Manager to encourage changes in the Commonwealth building code that include requirements to address noise effects from aircraft sources. While changes to the Commonwealth building code are outside of the scope of Part 150, it is recommended that the airport, in conjunction with other airports around the Commonwealth, further investigate the feasibility and practicality of suggesting these revisions.

LU12 is a continuation of measure L13 from the 2009 NCP.

Benefits: LU12 could reduce the potential for incompatible land use development in the vicinity of the airport.

Disadvantages: LU12 would require a statewide change in the building code, which may be beyond the ability of the Airport Manager to address.

Recommendation: LU12 is recommended for implementation in the NCP.

FAA Determination: LU12 is approved.

LU13 – Acquire the Arbor Mobile Home Park and Relocate the Resident

Description: Measure LU13 Acquire the Arbor Mobile Home Park and relocate the resident.

Benefits: To relieve the Mobil Home Park Resident from incompatible noise. Mobil homes are not eligible under sound mitigation under AIP guidelines.

Disadvantages: Homeowners in the Mobil Home Park are not interested in relocation.

Recommendation: LU13 is not recommended for implementation in the NCP. Landowner and Mobil home owners are not interested in being acquired or relocated. Homeowners have constructed illegal additions to the Mobil homes violating local codes. In most cases public transportation is a must. Costs are too high for families to relocate and afford other types of homes.

FAA Determination: LU13 is not approved.

2.3 Program Management Measures

P1 – Re-Establish a Noise Mitigation Advisory Committee

Description: P1 encourages the airport and WAC to re-establish a Noise Mitigation Advisory Committee (NMAC) to assist with the management and communication of noise issues. NMAC is proposed to be consisting of the Airport Manager, the Airport's Acoustical Consultants, the City Councilor from Ward 6, and an Airport Commissioner to meet twice a year. NMAC will provide an ongoing dialog that links the City of Westfield and surrounding communities with BAF. It is anticipated that the NMAC would meet twice per year, depending on the implementation of the mitigation measures recommended in the NCP.

Benefits: The establishment of an advisory committee would assist in the facilitation of information regarding the NCP and additional airport initiatives to elected officials, airport tenants, and members of the public. The NMAC would be charged with assisting in the distribution of information regarding the NCP.

Disadvantages: There are no major disadvantages to P1. The establishment of an NMAC is contingent upon the participation of interested parties from the community and airport tenants.

Recommendation: P1 is recommended for implementation in the NCP. Establishing a NMAC can enhance the dissemination of information to the community along with the established social media outreach, the BAF website and their 'open door' policy (see section 2).

FAA Determination: P1 is approved.

P2 – Community Awareness Program

Description: BAF began a Community Awareness Program via their website [www.barnesairport.com]. It is recommended BAF update the website regularly to communicate various Airport-related facts such as the types of operations flown, and the times of days operations are flown, various noise and land use mitigation projects undertaken by the airport, any anticipated operational changes, information regarding planning and development, and any temporary construction projects that would change the typical operating conditions at the airport.

Social media is an extremely effective tool for communication and reaching out to broad range of users. In addition to its website, BAF has established a Facebook page (<https://www.facebook.com/pages/Westfield-Barnes-Regional-Airport>) which is active in communicating the necessary information. Taking advantage of other media outlets, such as Twitter, is also recommended.

P2 directs the Airport Manager to transmit information, as provided in Measure P1, to the larger public in the City of Westfield.

Benefits: A community awareness program, combined with Measure P1 (NMAC), would assist in the facilitation of information to the public regarding the ongoing mitigation efforts of the airport.

Disadvantages: There are no major disadvantages associated with the implementation of P2.

Recommendation: P2 is recommended for implementation in the NCP.

FAA Determination: P2 is approved.

P3 – Expand the Fly Quiet Program

Description: P3 builds upon measure P3 from the 2009 NCP, recommending the airport expand its Fly Quiet Program to better educate pilots and other aircraft tenants about noise sensitive issues. In addition to BAF continuing to encourage the use of both NBAA noise abatement procedures and AOPA Noise Awareness Steps, a more comprehensive Fly Quiet Program would include:

- Installation of signage at each runway end reminding pilots about the noise abatement procedures,
- The creation of a color-coded map that identifies noise-sensitive land uses in the airport environs, and
- Brochures keeping airport tenants aware of noise-related community concerns.

Benefits: The implementation of P3 would assist in ensuring that the airport tenants maintain awareness regarding the noise-sensitive land uses surrounding the airport.

Disadvantages: There are no major disadvantages associated with the implementation of P3.

Recommendation: P3 is recommended for implementation in the NCP.

FAA Determination: P3 is approved.

P4 – Periodic Evaluation of Noise Exposure and NCP

Description: Continuing from the 2009 NCP's measure P4 with a slight modification, the 2016 NCP's P4 would direct Westfield to continue updating the NEMs and/or NCP at the airport either within a five- year time frame or when operating conditions at the airport change. The implementation of P4 would ensure a continuation of the evaluation of noise exposure, and would also allow for modifications to the boundaries of various land use mitigation programs should the need arise.

Benefits: P4 would ensure that the noise environment surrounding the airport is regularly evaluated, either within a five-year timeframe or when significant changes at the airport occur.

Disadvantages: If noise exposure increases, there are no major disadvantages with the implementation of P4. If noise exposure decreases, reevaluating the NCP could result in less homes being eligible for acquisition or sound insulation.

Recommendation: P4 is recommended for implementation in the NCP.

FAA Determination: P4 is approved.

Appendix C Public Consultation Materials

MEMO

Date: March 11, 2022
To: Westfield-Barnes Regional Airport Noise Compatibility Program Technical Advisory Committee
From: The Jones Payne Group, Inc.; HMMH, Inc.
Subject: **BAF NCP Technical Advisory Committee – Meeting #1**
JPG Job No: 2021.03.02
cc:

Westfield-Barnes Regional Airport (the Airport) is conducting a Noise Compatibility Program (NCP) Update as part of the airport’s ongoing participation in the Federal Aviation Administration’s (FAA’s) Part 150 program¹. The primary objective in the development of an NCP is for the airport sponsor to address incompatible land uses within the area exposed to an annual-average Day-Night Average Sound Level (DNL) of 65 decibels (dB) or higher, as determined by the Airport’s forecast condition Noise Exposure Map (NEM). The ultimate goal of the Part 150 program is to eliminate all incompatible land uses.

The first step in the NCP update process is to review the existing NCP measures, determine the implementation status of each recommended NCP measure, and to determine compliance with the implemented measures. This first step provides the required information to update the NCP through amended and new measures for the airport to consider recommending as part of their NCP update.

NCP measures fall into three categories:

- Noise Abatement – noise reduction at the noise source
- Land Use – noise mitigation for the receivers
- Program Management – means to implement, monitor and/or report on NCP measures

The following table provides a summary of the recommended measures provided in the 2017 NCP for the Airport and an indication as to whether the recommended measure was implemented.

¹ FAA developed the Part 150 Program in response to the federal Aviation Safety and Noise Abatement Act of 1979. The program is codified under Title 14 of the Code of Federal Regulations (CFR) Part 150. Its formal title is “Airport Noise Compatibility Planning,” and its formal citation is “14 CFR Part 150.” The program is informally referred to throughout the industry as “Part 150”.

	RECOMMENDED MEASURE	APPROVED BY FAA (YES/NO)	IMPLEMENTED BY AIRPORT (YES/NO)
	Noise Abatement		
NA1	Runway 15/33 Departure Procedures	No	Yes
NA2	Runway 02/20 Departure Procedures	No	Yes
NA3	Encourage Equipment-Guided Navigation	No	Yes
NA4	Preferential Runway System for Arrivals and Closed Patterns*	No	No
NA5	Site Selection/Feasibility Study for a Noise Barrier south of Runway 02*	No	No
	Land Use Management		
LU1	Voluntary Acquisition of Eligible Residential Structures	Yes	Yes
LU2	Residential Sound Insulation Program	Yes	Yes
LU3	Remedial Easement Acquisition	Yes	Yes
LU4	Sound Insulate Places of Worship	Yes	No
LU5	Preventative Easement Acquisition	Yes	No
LU6	Modify Existing Zoning	Yes	No
LU7	Voluntary Acquisition of Undeveloped Land*	No	No
LU8	Airport Noise Overlay District (ANOD)	Yes	No
LU9	Environmental Review	Yes	Yes
LU10	Real Estate Disclosure	Yes	No
LU11	Modify Subdivision Regulations	Yes	No
LU12	Building Code Modifications	Yes	No
LU13	Acquire the Arbor Mobile Home Park and Relocate the Residents*	No	No
	Program Management		
PM1	Re-Establish a Noise Mitigation Advisory Committee (NMAC)	Yes	No
PM2	Community Awareness Program	Yes	Yes
PM3	Expand the Fly Quiet Program	Yes	No
PM4	Periodic Evaluation of Noise Exposure	Yes	Yes

*This measure was not recommended for FAA approval, but was included in this memo due to its mention in the Record of Approval.

Implementation Status of Noise Abatement Measures

NA 1 – Runway 15/33 Departure Procedures

Visual Flight Rules (VFR) departures from Runway 15 are directed to maintain runway heading until crossing the East Mountain Ridgeline. Intersection takeoffs from Runway 33 are prohibited to maximize the altitude of aircraft as they overfly the Arbor Mobile Home Park, which is located along the extended runway centerline.

Status: Implemented following approval of the 2009 NCP; recommended in 2017 NCP but not approved because there was no evidence of 65 dB DNL benefit. Flight data will be reviewed to determine the extent of compliance.

NA 2 – Runway 02/20 Departure Procedures

Departures from Runway 2 are directed to turn left to a 360-degree heading upon crossing the Airport boundary until clear of noise-sensitive facilities². Departures from Runway 20 are directed to maintain runway heading until 3 miles south of the Airport boundary.

Status: Implemented following approval of the 2009 NCP; recommended in 2017 NCP but not approved because the procedures were deemed difficult to implement and unlikely to alleviate noise.

NA 3 – Encourage Equipment-Guided Navigation

As a policy, the Airport encourages the creation and continued use of advanced navigation techniques such as Global Positioning System (GPS), Area Navigation (RNAV), Wide Area Augmentation System (WAAS) and Flight Management Systems (FMS). The collective use of RNAV, GPS, FMS, and WAAS allows the better utilization of noise abatement departure procedures as well as more accurate approaches, with the benefit of reducing noise exposure over noise-sensitive land uses around the Airport.

Status: Implemented as a policy statement from 2009 NCP, recommended in 2017 NCP but not approved because there was no evidence of the measure affecting 65dB DNL.

NA 4 – Preferential Runway System for Arrivals & Closed Patterns

A preferential runway use system was investigated, favoring the use of Runway 02 for both arrivals and departures for the noisiest of aircraft.

Status: Not implemented. This measure was not recommended in the 2017 NCP because prevailing winds at the Airport are out of the south/southwest and calm wind conditions would only apply to 25 percent of operations; thus, the proposed measure could not be applied often enough to provide a DNL benefit.

NA 5 – Site Selection/Feasibility Study for a Noise Barrier south of Runway 02

² Noise sensitive facilities are defined as places of worship, schools, hospitals, and the like. The Word of Grace Church is the only noise sensitive facility located within the 65 DNL contour.

Construction of a noise barrier on the south side of the Airport near the Runway 02 threshold was considered. The idea was to provide relief to Airport neighbors from noise created by aircraft during on the ground operations, such as the use of reverse thrust upon arrival and the start-of-takeoff roll during initial departure.

Status: Not implemented. A potential noise barrier was approved in the 2009 NCP and numerous sites were evaluated, but no site was deemed appropriate. Thus, this measure was not recommended in the 2017 NCP.

Implementation Status of Land Use Management Measures

LU1 – Voluntary Acquisition of Eligible Residential Structures

Voluntary acquisition is provided for residences within the 65 dB DNL contour.

Status: FAA approved this measure. The City has implemented this program. The City has acquired 24 properties to date. There are 198 properties eligible for acquisition.

LU2 – Residential Sound Insulation Program

Voluntary sound insulation is provided for eligible residential structures between the 65 and 70 dB DNL contours.

Status: FAA approved this measure. The City has implemented this program. The City has sound insulated 49 residential properties to date. Currently, 195 properties remain eligible for sound insulation.

LU3 – Remedial Easement Acquisition

An aviation easement is obtained from a homeowner in lieu of other forms of mitigation.

Status: FAA approved this measure. The City has implemented this program. The City has purchased six aviation easements. There are 195 properties eligible for the Airport to purchase aviation easement.

LU4 – Sound Insulate Places of Worship

Voluntary sound insulation is provided for eligible places of worship within the 65 dB DNL contour. One place of worship, the Word of Grace Church located to the north of BAF along North Road, is located within the 65 DNL contour and would be eligible for insulation.

Status: FAA approved this measure. The City implemented the sound insulation program and to date the priority of the funding was towards the residential land uses. As a result, no places of worship have been sound insulated.

LU5 – Preventive Easement Acquisition

Voluntary acquisition of easements is provided for undeveloped land to prevent future incompatible land use.

Status: FAA approved this measure. The City has not implemented. The 2024 NEM identified approximately 46 acres of developable land that would be potentially eligible for preventive easement acquisition.

LU6 – Modify Existing Zoning

The City of Westfield would evaluate undeveloped land with zoning classifications that are incompatible with the airport. Additionally, the City may explore zoning requirements of a Rural Residential (RR) District in order to address the potential impact of aircraft overflights and noise.

Status: FAA approved this measure. The City has not implemented.

LU7 – Voluntary Acquisition of Undeveloped Land

The City of Westfield would undertake the acquisition of incompatible undeveloped land to prevent future incompatible development. The land could be rezoned to a compatible land use and sold by the City. The City did not recommend this measure for implementation.

Status: FAA did not approve this measure. The City has not implemented this measure.

LU8 – Airport Noise Overlay District (ANOD)

The City of Westfield would develop and implement a comprehensive zoning overlay district known as the “Airport Noise Overlay District” (ANOD) as part of the City’s zoning ordinance. The ANOD would be comprised of the 65 DNL contour and could include elements such as buffer zones between compatible and incompatible areas, permitted uses and development, and noise level reduction requirements for new residential and noise sensitive buildings.

Status: FAA approved this measure. The City has not implemented.

LU9 – Environmental Review

Airport staff will continue participating in the administrative review of proposed land use development within the 65 dB and higher DNL contours or the City of Westfield implemented ANOD.

Status: FAA approved this measure. The City has implemented this program. The Airport manager routinely coordinates with City staff regarding potential development located within the 65 DNL and higher contours as the basis for the area of administrative reviews.

LU10 – Real Estate Disclosure

The City of Westfield would require real estate disclosures to prospective buyers of noise-sensitive parcels within the 65 DNL and higher contours, the City of Westfield implemented ANOD or other area as agreed upon between the City of Westfield, State of Massachusetts, or other responsible entity and the Airport.

Status: FAA approved this measure. The City has not implemented.

LU11 – Modify Subdivision Regulations

The City of Westfield would pursue the inclusion of noise disclosures, sound attenuation standards, and/or avigation easements to prevent new incompatible land use when a new subdivision is approved in proximity to the Airport.

Status: FAA approved this measure. The City has not implemented.

LU12 – Building Code Modifications

The City of Westfield would work with the appropriate entities to modify building codes, such as the inclusion of sound insulation materials, to prevent the introduction of new incompatible land uses. These code modifications would apply to new construction or major changes to existing structures.

Status: FAA approved this measure. The City has not implemented. This measure would require statewide change to the building code.

LU13 – Acquire the Arbor Mobile Home Park and Relocate the Residents

To relieve the mobile home park residents from aircraft noise the City would acquire the mobile home park and relocate the residents. Since mobile homes cannot be adequately sound insulated, acquisition would be an option to mitigate the incompatible land use. The City did not recommend implementation of this measure. The landowner and mobile home owners were not interested in selling or relocating.

Status: FAA did not approve this measure. The City has not implemented this measure.

Implementation Status of Program Management Measures

PM1³ – Re-Establish a Noise Mitigation Advisory Committee (NMAC)

A Noise Mitigation Advisory Committee (NMAC) would be established to advise and assist with the management of aircraft noise-related issues. The previous NMAC was disbanded due to lack of interest by the public.

Status: FAA approved this measure. The City has not implemented this measure.

PM2 – Community Awareness Program

A Community Awareness Program (CAP) would be established and maintained to communicate Airport and aircraft noise updates that will potentially affect the public, such as changes in operations and land use projects.

Status: FAA approved this measure. The City has implemented this measure. The Airport continues its Community Awareness Program via its website (www.barnesairport.com) and its Facebook page (<https://www.facebook.com/westfielddairport/>).

³ In the previous NCPs, Program measures in this category were numbered P1, P2, etc., but here we use the more prevalent industry notation PM1, PM2, etc.

PM3 – Expand the Fly Quiet Program

The City would expand the Fly Quiet Program, which educates pilots on aircraft noise and mitigation, with the goal of increasing awareness of noise effects on the surrounding community.

Status: FAA approved this measure. The City has partially implemented and continues to work on the implementation of the program. The Airport continues to recommend the use of NBAA noise abatement procedures and AOPA Noise Awareness Steps.

PM4 – Periodic Evaluation of Noise Exposure

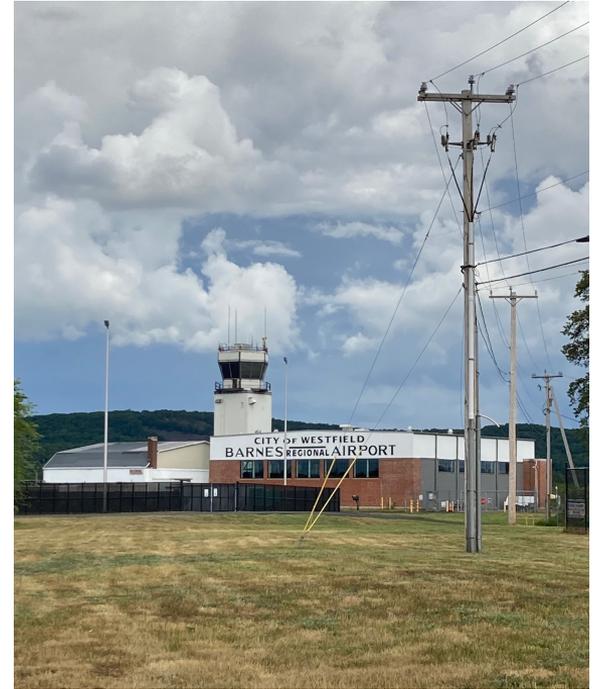
The Airport's operations are regularly monitored to assess noise exposure and update the Noise Exposure Map every five years or when a change of 1.5 dB DNL or greater occurs to noise-sensitive land uses.

Status: FAA approved this measure. The City has implemented this measure. The evaluation of noise exposure at the Airport is ongoing. The City of Westfield first generated an NEM in 1990. The NEM was subsequently updated in 2009 and 2015. The most recent NEM Update was conducted in 2018, to model civilian aircraft using the FAA's new Aviation Environmental Design Tool (AEDT). The most recent NEM update was approved by the FAA in 2019 for the years 2019 and 2024.

NOISE COMPATIBILITY PROGRAM UPDATE Technical Advisory Committee Meeting #1

March 16, 2022

- Introductions
- Part 150 Overview
- Existing Noise Exposure Map (NEM)
- Land Use Compatibility Guidelines
- Existing Noise Compatibility Program (NCP)





Diane Carter, Principal-in-Charge
Brianna Whiteman, Assistant Project Manager
Christina Mastrantonio, Consultant

Responsible for:

- Overall Project Management/Client/Agency Coordination
- Community Outreach
- Land Use Measures
- Noise Implementation Plan



Gene Reindel, Principal-in-Charge
Kate Larson, Project Manager
Dominic Scarano, Assistant Project Manager

Responsible for:

- Operational and Administrative Measures
- NCP Documentation
- Compliance with Federal Regulations

- Westfield-Barnes Regional Airport (BAF)
- Westfield Airport Commission
- City of Westfield
- Town of Southampton
- Army National Guard
- Air National Guard
- Ross Aviation
- MassDOT Aeronautics
- Federal Aviation Administration (FAA) - *advisory*

City of Westfield

- As airport owner and operator, the City is responsible for conducting the Noise Compatibility Program (NCP) analysis, submitting the study for approval, and implementing approved measures
- Consulting team is retained to conduct technical work and prepare documentation related to the NCP process

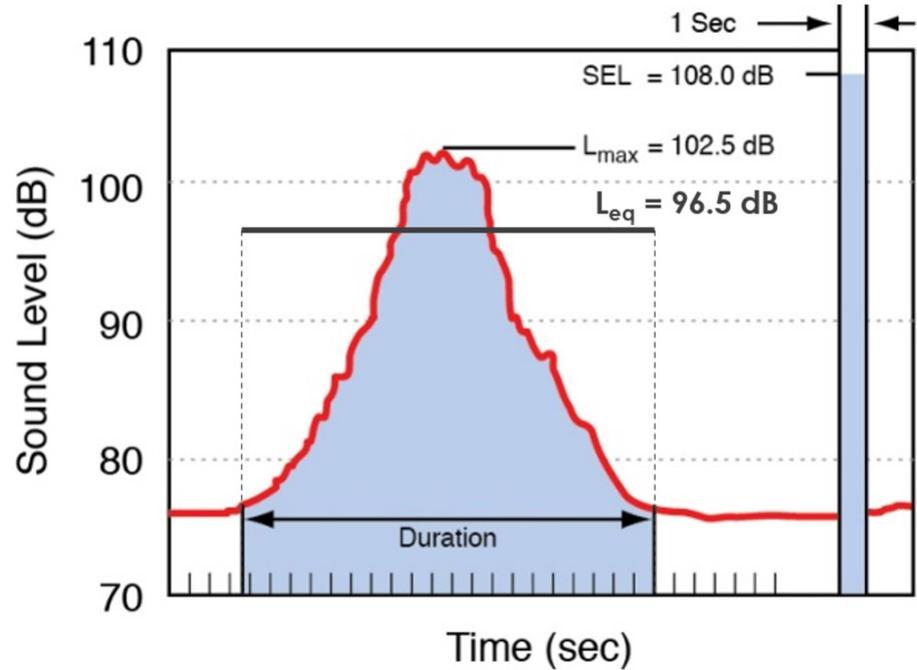
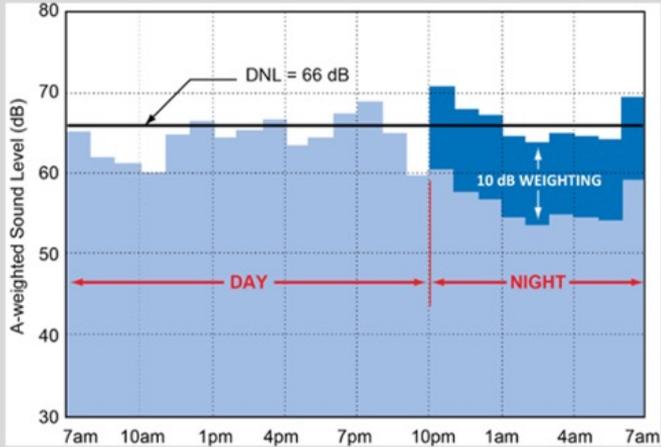
Federal Aviation Administration (FAA)

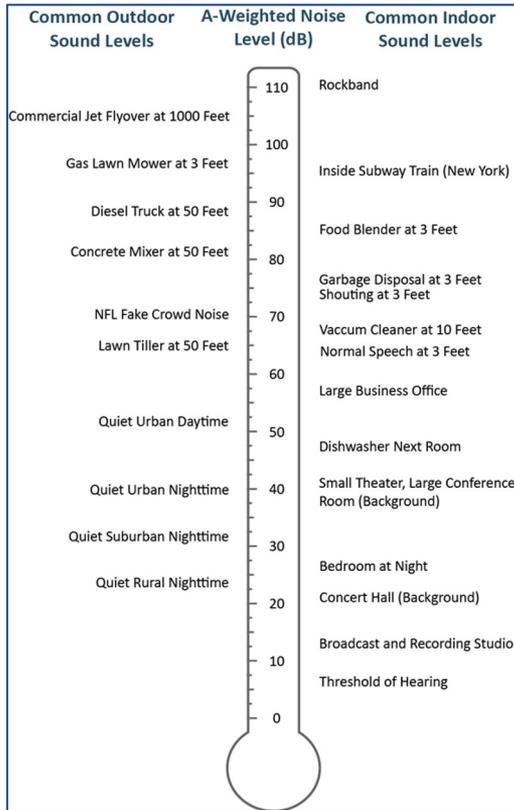
- Determines whether the NCP process has met Part 150 requirements and approves individual noise mitigation measures

Technical Advisory Committee (TAC)

- Provides representation for stakeholder organizations, including local jurisdictions, airlines, local business interests

- Maximum Noise Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Hourly Noise Level (HNL or L_{eq1h})
- Day Night Average Sound Level (DNL)



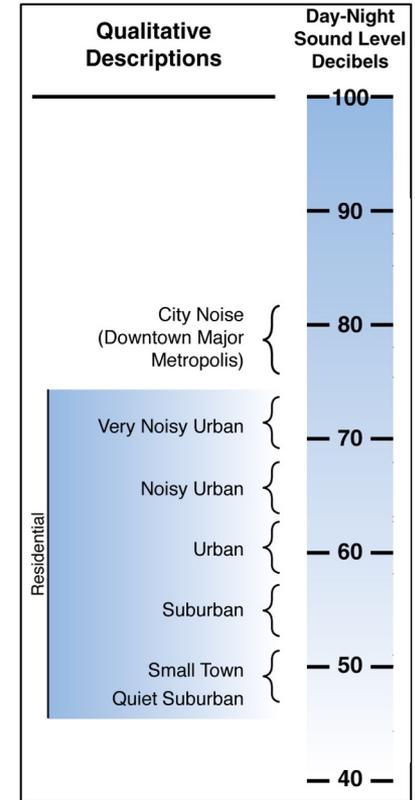


- **A-weighted decibel (dBA)**

- Reflects the manner humans hear different pitches of sound
- All federal agencies have adopted dBA for environmental studies
- dBA is the basis for different noise metrics, including maximum (Lmax) and energy averages

- **Day–Night Average Sound Level (DNL or Ldn)**

- Cumulative sound measure
- Applies a 10-fold weighting to nighttime noise (from 10pm to 7am)
- Used by all federal agencies that deal with aviation noise



The Federal Aviation Administration (FAA) developed the Part 150 Program in response to the federal Aviation Safety and Noise Abatement Act of 1979 (“ASNA”)

- Codified under Title 14 of the Code of Federal Regulations (CFR) Part 150
- Formal citation is “14 CFR Part 150,” informal is “Part 150”
- Formal title is “Airport Noise Compatibility Planning”

Voluntary FAA-defined process for airport noise studies

- 250+ airports have participated

Why do airports participate? Primary reasons include:

- Access to FAA funding of some approved measures
- Process is comprehensive, well-established, and understood

Part 150 prescribes standards and systems for:

- Measuring noise
- Estimating cumulative noise exposure using computer modeling
- Describing noise exposure
- Coordinating with local land use agencies
- Documenting the analytical process
- Submitting the documentation to FAA
- FAA and public review processes
- FAA approval or disapproval process

Consultation required with:

- All local, state, and federal entities with control over land use within DNL 65+ dB
- FAA regional officials
- Regular aeronautical users of the airport
- All parties interested in reviewing and commenting on the draft reports

Two primary elements:

- Noise Exposure Map (NEM)
- Noise Compatibility Program (NCP)

Detailed FAA guidance at:

www.faa.gov/airports/environmental/airport_noise/

- FAA “accepts” NEM as compliant with Part 150 standards
- NEM must include detailed description of:
 - Airport layout, aircraft operations, and other inputs to noise model
 - Aircraft noise exposure in terms of Day-Night Average Sound Level (DNL)
 - Land uses within DNL 65+ decibel (dB) contours
 - Noise / land use compatibility statistics within DNL 65+ dB contours
- NEM must address two calendar years
 - Year of submission
 - Forecast (at least five years from year of submission)
 - FAA reviews forecasts for consistency with Terminal Area Forecast (TAF)

BAF NEM Update completed in 2019

- 2019 (Existing Condition) and 2024 (Forecast) NEMs
- Within 65 dB DNL contour
 - Generalized land use categories
 - Historic properties, schools, places of worship, health care facilities, other “discrete” sensitive uses

DNL Band (dBA)	Program to date with 2024 NEM					2019 Newly Incompatible Properties*	GRAND TOTAL	Potential Properties to be Addressed **
	Acquired Properties	Avigation Easement	Sound Insulated Properties	Not Addressed	Total			
65-70	19	4	49	49	121	150	271	199
70-75	1	2	-	2	5	1	6	3
75+	-	-	-	-	-	-	-	-
Total ≥ 65	20	6	49	51	126	151	277	202

Notes: property was counted if any portion of the parcel is within the DNL band; Arbor Mobile Home Park located on Southampton Rd is excused.

* includes some parcels located outside of the DNL 65 dB.

** equals those not addressed in the current Program plus those newly incompatible

Land Use	DNL <65 dB	DNL 65-70 dB	DNL 70-75 dB	DNL > 75 dB
Residential	Compatible	Incompatible ⁽¹⁾	Incompatible ⁽¹⁾	Incompatible
Mobile home park	Compatible	Incompatible	Incompatible	Incompatible
Transient lodgings	Compatible	Incompatible ⁽²⁾	Incompatible ⁽²⁾	Incompatible ⁽²⁾
Schools	Compatible	Incompatible ⁽³⁾	Incompatible ⁽³⁾	Incompatible
Hospitals and nursing homes	Compatible	25 ⁽⁴⁾	30 ⁽⁴⁾	Incompatible
Churches, auditoriums and concert halls	Compatible	25 ⁽⁴⁾	30 ⁽⁴⁾	Incompatible

⁽¹⁾ Measures are required to achieve 25 to 30 dB of noise level reduction for aircraft noise from outside to inside.

⁽²⁾ "Transient lodgings" include, but are not limited to, hotels and motels.

⁽³⁾ Measures are required to achieve 25 to 30 dB of noise level reduction for aircraft noise from outside to inside.

⁽⁴⁾ The measures to achieve NLR of 25 or 30 dB must be incorporated into design and construction of structure.

•Airport recommends NCP measures

•FAA approves or disapproves each recommended measure

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective “package” of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

1990 – NEM & NCP are Produced by the City,
Receive FAA Approval

2009 – The City Updates the NEM & NCP

2015 – NEM is Updated and Receives FAA
Approval

2016 – NCP is Updated; Receives FAA
Approval in 2017

2019 – NEM is Updated to Model Civilian
Aircraft with AEDT, Receives FAA Approval

2021 – The City Begins the NCP Update Process

Noise Abatement Measures*:

- Runway 15/33 Departure Procedures
- Runway 02/20 Departure Procedures
- Encourage Equipment-Guided Navigation

*Implemented but not FAA-approved measures in current NCP

Administrative Measures:

- Noise Mitigation Advisory Committee
- Periodic Evaluation of NEM/NCP
- Fly Quiet Program
- Community Awareness Program

Land Use Measures:

- Land Acquisition
- Residential Sound Insulation
- Place of Worship Sound Insulation
- Remedial Easement Acquisition
- Land Use Zoning
- Airport Noise Overlay District
- Building Code Modifications



	2022												2023								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul		
1 Public Information Meeting			◆																		
2 Evaluate & Recommend Compatibility Measures	■																				
3 Advisory Committee Meetings			◆	◆	◆	◆															
4 Prepare Draft NCP						■															
5 FAA & City Review								■													
6 Prepare Public Draft NCP									■												
7 Publish/Distribute Draft NCP											◆										
8 Public Review Period											■										
9 Public Hearing											◆										
10 Respond to Comments & Finalize NCP											■		■								
11 Submit Final NCP / Public Comments to FAA													◆								
12 FAA Review Period													■								
<p>Legend:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> Consultant Task </div> <div style="text-align: center;"> Public Involvement </div> <div style="text-align: center;"> FAA Review </div> </div>																					

Public Involvement

- Public Informational Meeting
- Advisory Committee (local jurisdictions, neighborhood organizations, etc.)
- Public Hearing and Comment Period

TAC Meeting 2

Wednesday April 27, 2022

- Airport Operational Measures

TAC Meeting 3

Wednesday May 25, 2022

- Land Use Measures
- Administrative Measures

TAC Meeting 4

Wednesday June 29, 2022

- Finalize Recommendations

TAC MEMBER DISCUSSION



MEMO

Date: April 25, 2022
To: Westfield-Barnes Regional Airport Noise Compatibility Program Technical Advisory Committee
From: The Jones Payne Group, Inc.; HMMH, Inc.
Subject: BAF NCP Technical Advisory Committee – Meeting #2
JPG Job No: 2021.03.02
cc:

On March 16, 2022, Westfield-Barnes Regional Airport (the Airport) held the first Technical Advisory Committee (TAC) meeting as part of its current Noise Compatibility Program (NCP) Update project. As discussed at that meeting and in the corresponding technical memorandum, the primary objective in the development of an NCP is for the airport sponsor to address incompatible land uses within the area exposed to an annual-average Day-Night Average Sound Level (DNL) of 65 decibels (dB) or higher, as determined by the Airport's forecast condition Noise Exposure Map (NEM). The study team provided an overview of the Airport's existing NCP and identified each of the measures that comprise the program.

NCP measures fall into three categories:

- Noise Abatement – noise reduction at the noise source
- Land Use – noise mitigation for the receivers
- Program Management – means to implement, monitor and/or report on NCP measures

The focus of this technical memorandum (which will be discussed at the upcoming TAC meeting on April 27, 2022) is the first of the three NCP categories: Noise Abatement. The following two TAC meetings/technical memoranda will focus on Land Use measures and Program Management measures, respectively.

Noise Abatement Measures Included in the Existing or Prior NCP

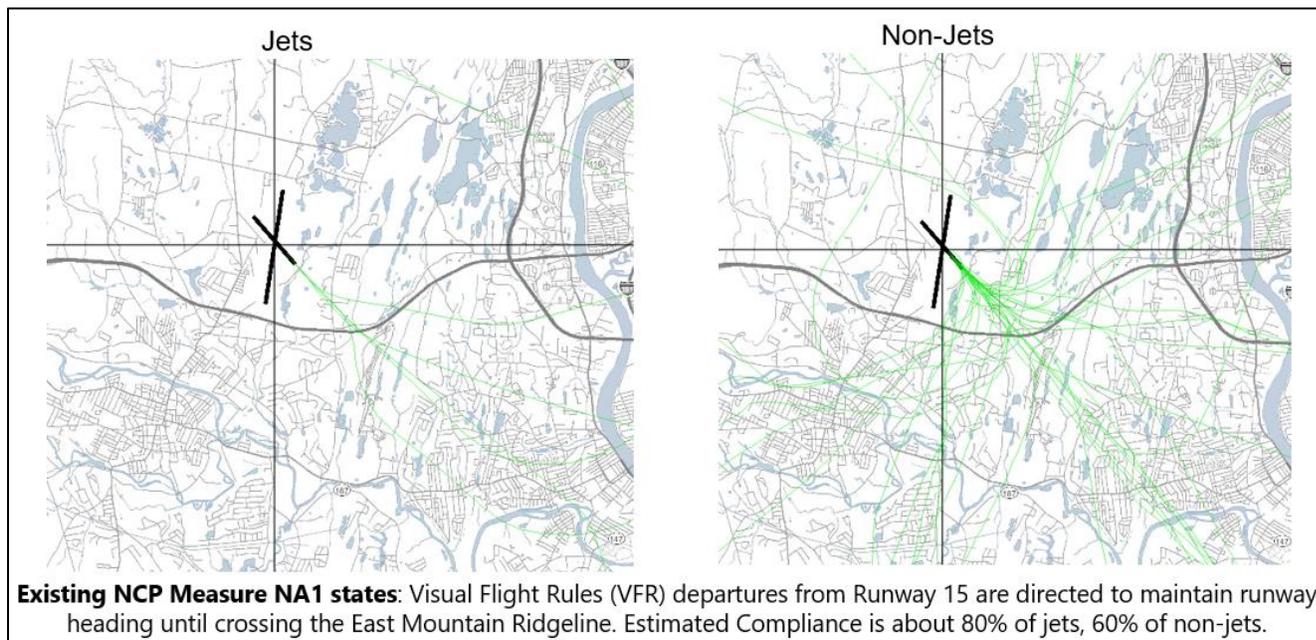
The Airport evaluated five noise abatement measures in its 2017 NCP and recommended three of them for FAA approval. All three of the recommended measures continued processes that were included in the 2009 NCP. As documented in the June 13, 2017 Record of Approval (ROA), the FAA deemed each of the three Airport-recommended noise abatement measures as unlikely to provide measurable DNL benefit and disapproved them. FAA disapproval of measures in a Part 150 process simply implies the Airport cannot seek federal funds to assist with implementation. The measures may be implemented without federal assistance. This NCP Update includes evaluations of the degree of compliance for each

of the three Airport-recommended measures as they continue to be included as part of the BAF NCP.

The first of the three noise abatement measures, NA1, concerned departure procedures from Runways 15 and 33. The second measure, NA2, concerned departure procedures from Runways 2 and 20. For clarity, we will discuss departure procedures from each runway separately in this memorandum. The third noise abatement measure, NA3, was to continue the policy of encouraging aircraft operators to use equipment-guided navigation techniques.

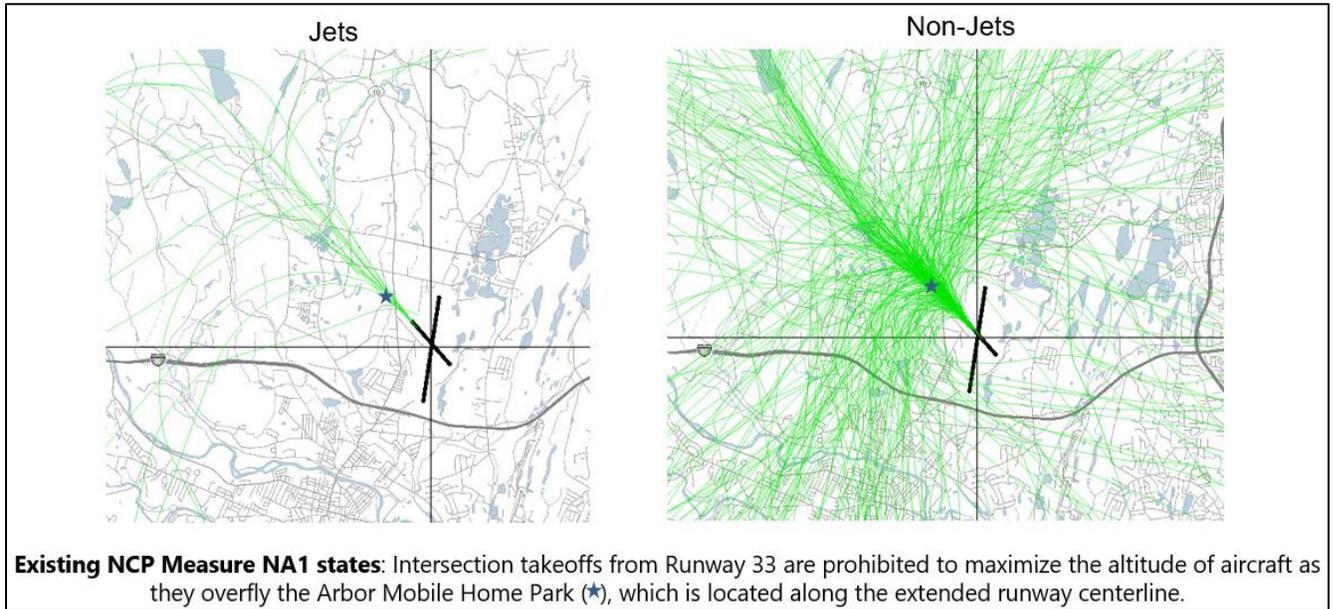
HMMH obtained and analyzed 13 months of radar flight data from the FAA’s National Offload Program (NOP). Military aircraft flights were not included in the data set. About 6,800 civilian aircraft flights¹ make up the set of available operations for the analysis. For each of the four runway ends, the flight track analysis described below provides an indication of the existing compliance with the noise abatement procedures NA1 and NA2.

Departures from Runway 15 (NA1): five jet departures and 36 non-jet departures were included in the flight track sample. Assuming that the cited “East Mountain Ridgeline” is close to the Mass Pike, we estimate that just under 80 percent of jets and just under 60 percent of non-jets currently comply with the noise abatement measure.

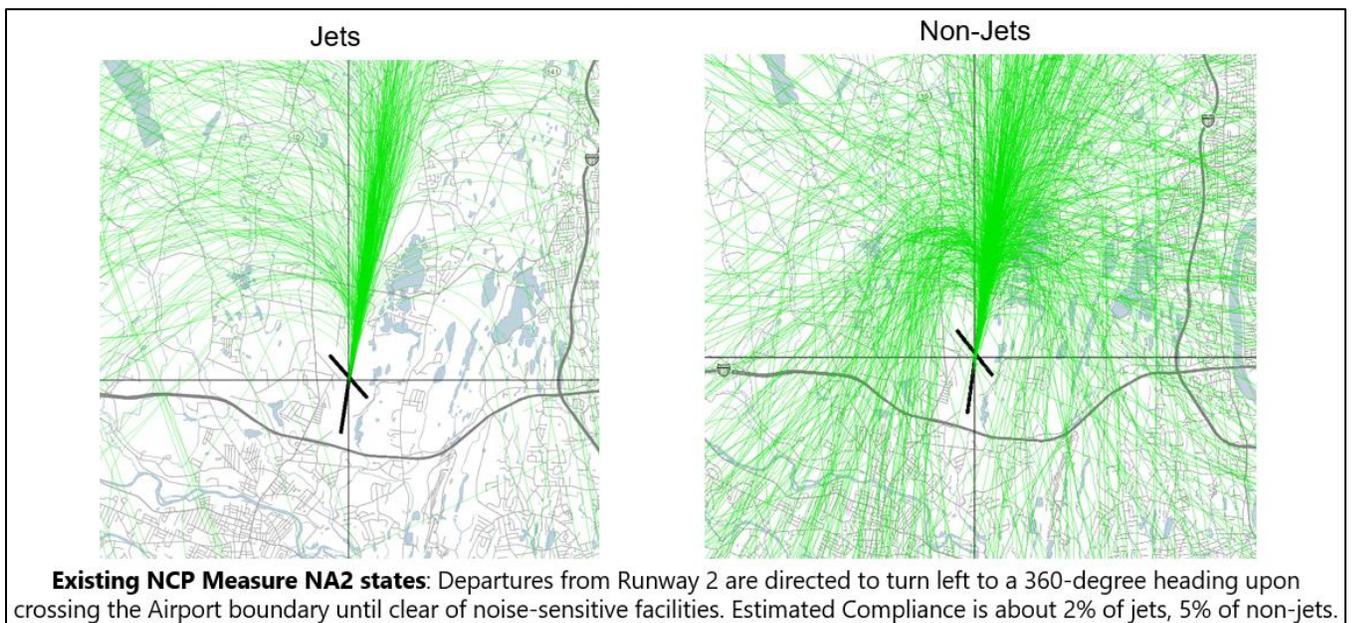


¹ For the same 13-month period, the FAA OPSNET report included 47,845 civilian operations (21,806 itinerant and 26,039 local). In that same OPSNET report, 6,245 military operations (4,034 itinerant and 2,211 local) are listed.

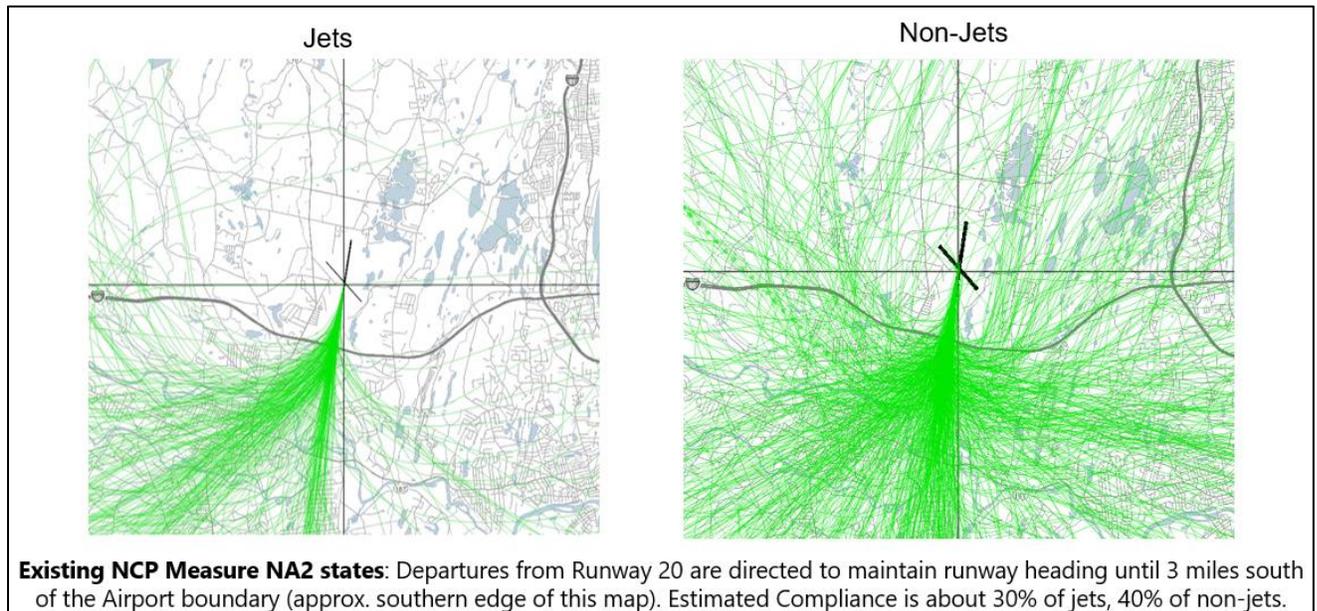
Departures from Runway 33 (NA1): 17 jet departures and 309 non-jet departures were included in the flight track sample. The noise abatement measure prohibits intersection takeoffs, which are not detectable from the radar data plots. However, the 2017 NCP Record of Approval states that such intersection takeoffs are not allowed anyway. Therefore, it can be stated that the measure has 100% compliance.



Departures from Runway 2 (NA2): 295 jet departures and 615 non-jet departures were included in the radar flight sample. Apparent compliance with the noise abatement is judged by the percentage of aircraft heading straight north for the first few miles north of the Airport boundary; this appears to be less than 2 percent of jets and less than 5 percent of non-jets.



Departures from Runway 20 (NA2): 287 jet departures and 705 non-jet departures were included in the radar flight sample. Apparent compliance is judged by the percentage of aircraft maintaining runway heading for the first few miles south of the Airport boundary; this appears to be less than 30 percent of jets and less than 40 percent of non-jets.



The third noise abatement measure, NA3, was to continue the policy of encouraging aircraft operators to use equipment-guided navigation techniques such as Global Positioning System (GPS), Area Navigation (RNAV), Wide Area Augmentation System (WAAS) and Flight Management Systems (FMS). The idea is that the higher-precision navigation allows for better adherence to recommended noise abatement procedures, with the benefit of reducing noise exposure over noise-sensitive land uses around the Airport. No data has been collected to assess the equipment-guided navigation capabilities of aircraft using BAF, so compliance with the measure is not known.

Potential New Noise Abatement Measures

The Part 150 process requires that the full range of noise abatement actions be reviewed in the development of a Noise Compatibility Program:

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

In addition to revisiting the noise abatement departure flight tracks and the equipment-guided navigation procedures recommended previously, the Airport may want to consider other noise abatement measures during the process of this NCP Update. Measures dealing with arrival or practice pattern flight tracks may offer noise abatement to specific neighborhoods. The military units using the airport may be able to contribute to noise abatement efforts by altering some standard flight procedures; that potential can be reviewed in the TAC meeting discussions. Preferential runway use options also should be evaluated for feasibility. For completeness, airport layout modifications and potential use restrictions should be discussed in the course of the NCP review.

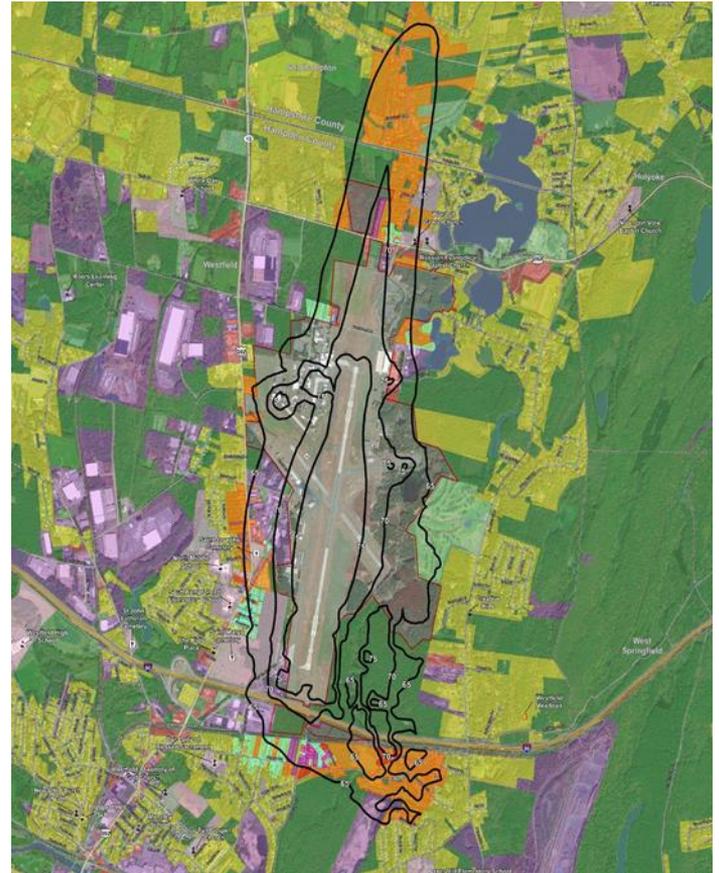
While each of the above-mentioned strategies for noise abatement needs to be reviewed in the course of the NCP Update, each potential measure must be assessed on its ability to reduce incompatible land use. Because the dominant noise source at BAF is military aircraft, it is highly likely that only changes to military operations (ANG, specifically) will affect the compatible land use within the noise exposure area.

The Airport and study team welcome TAC member input on the noise abatement measures that are discussed above as well as suggestions for potential new noise abatement measures.

NOISE COMPATIBILITY PROGRAM UPDATE Technical Advisory Committee Meeting #2

April 27, 2022

- Noise Compatibility Program Overview
- Airport Recommended Noise Abatement Measures from 2017 NCP (and implementation/compliance status)
- Noise Abatement Strategies to Consider
 - Flight Tracks
 - Runway Use
 - Airport Layout
 - Airport Use Restrictions
- Project Schedule
- TAC Member Discussion



• Airport recommends NCP measures

• FAA approves or disapproves each recommended measure

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective “package” of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

Airport recommended three noise abatement measures*:

*implemented but not FAA-approved

1. Runway 2/20 Departure Procedures

- Departures from Runway 2 to turn to 360-degree heading at airport boundary
- Departures from Runway 20 are to maintain Runway heading for 3 miles

2. Runway 15/33 Departure Procedures

- Departures from Runway 15 are to maintain Runway heading until beyond East Mountain Ridgeline
- Runway 33 departures prohibited from departing from Runway intersections

3. Continue to encourage aircraft operators to use equipment-guided navigation techniques such as:

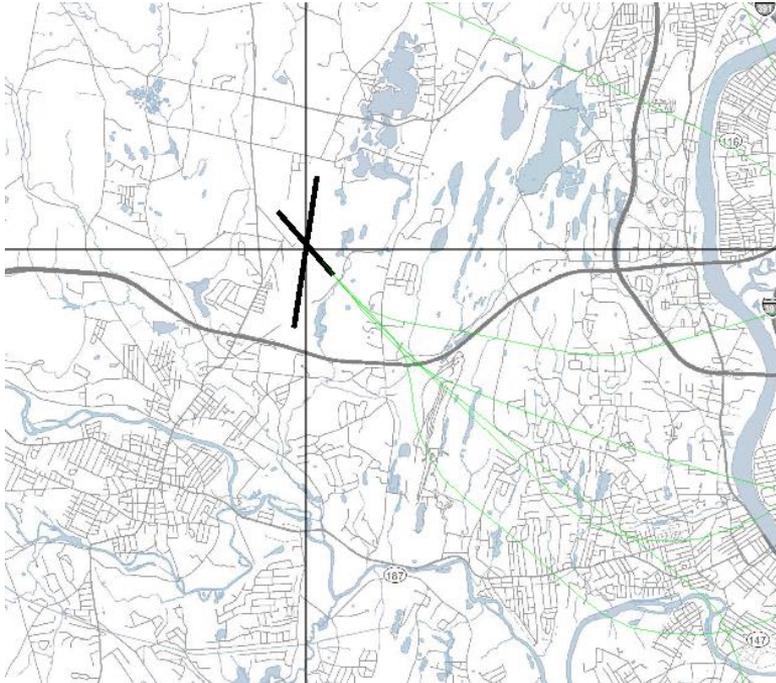
- Global Positioning System (GPS)
- Area Navigation (RNAV)
- Wide Area Augmentation System (WAAS)
- Flight Management Systems (FMS)



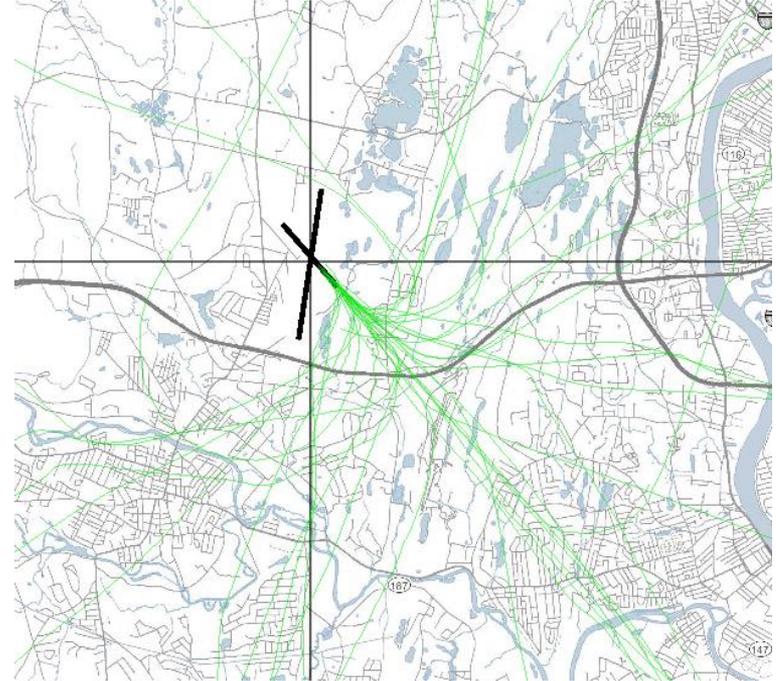
2017 NCP included a measure (NA3) to continue the policy of encouraging aircraft operators to use equipment-guided navigation techniques

- Techniques mentioned include Global Positioning System (GPS), Area Navigation (RNAV), Wide Area Augmentation System (WAAS) and Flight Management Systems (FMS).
- Rationale is that higher-precision navigation allows for better utilization of noise abatement departure procedures as well as more accurate approaches, with the benefit of reducing noise exposure over noise-sensitive land uses around the Airport.

Jets

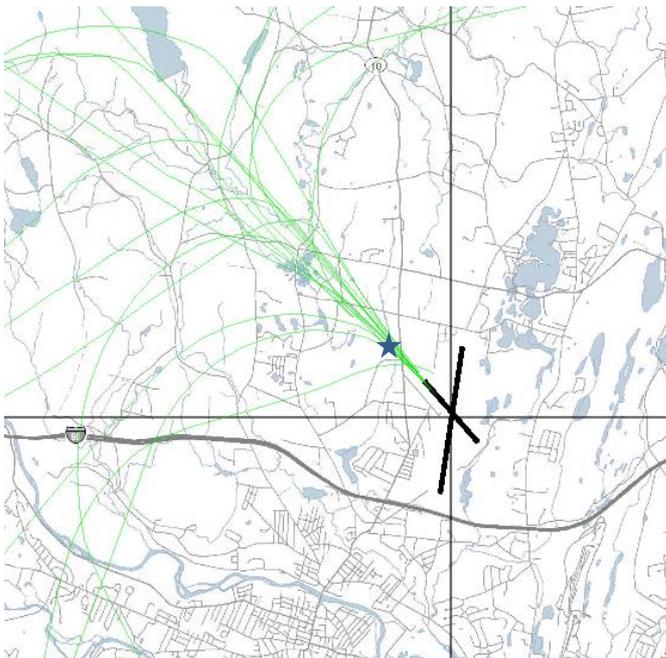


Non-Jets

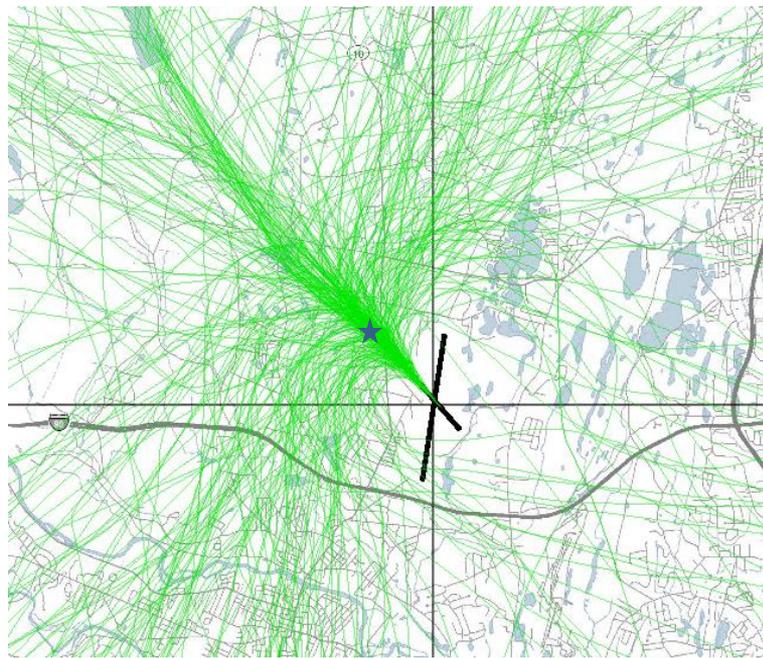


Existing NCP Measure NA1 states: Visual Flight Rules (VFR) departures from Runway 15 are directed to maintain runway heading until crossing the East Mountain Ridgeline. Estimated Compliance is about 80% of jets, 60% of non-jets.

Jets

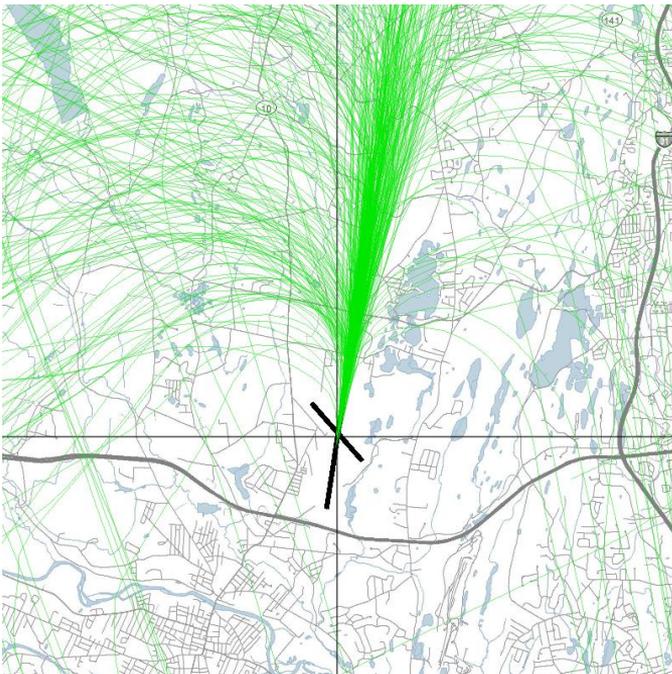


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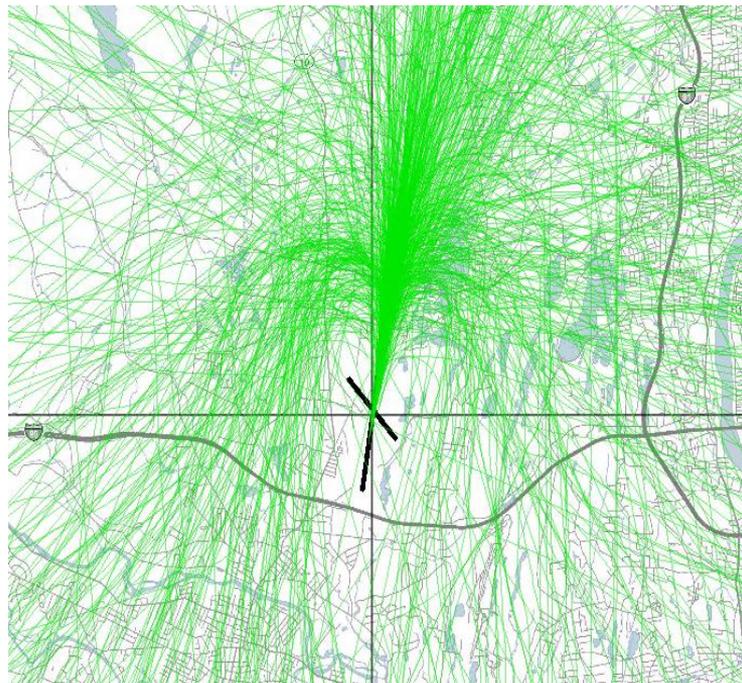


Existing NCP Measure NA1 states: Intersection takeoffs from Runway 33 are prohibited to maximize the altitude of aircraft as they overfly the Arbor Mobile Home Park (★), which is located along the extended runway centerline.

Jets

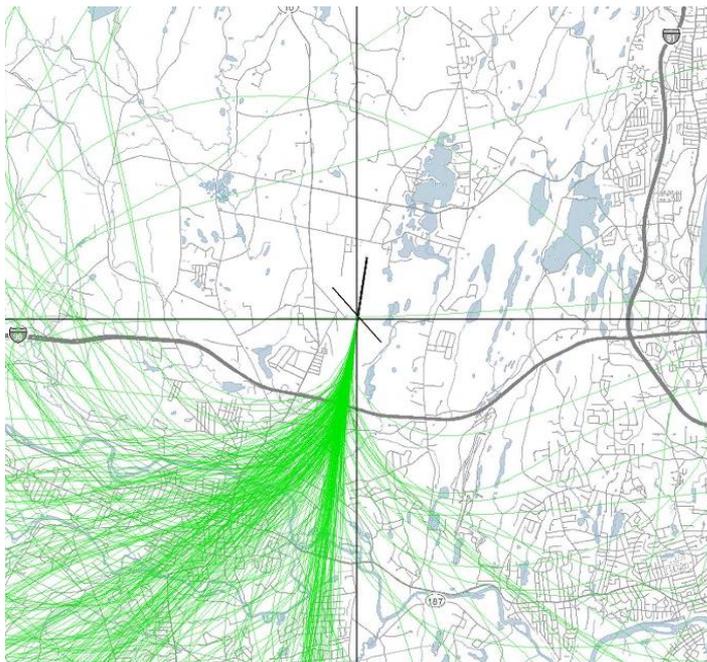


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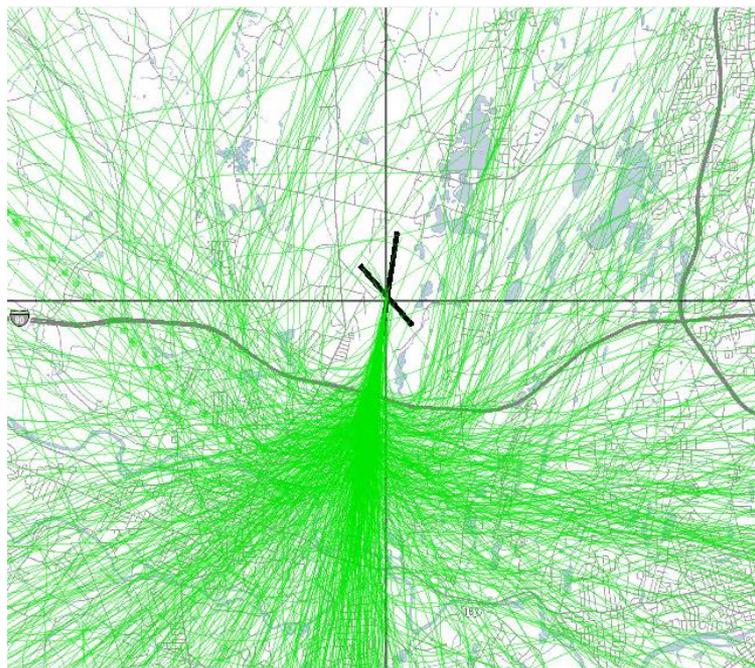


Existing NCP Measure NA2 states: Departures from Runway 2 are directed to turn left to a 360-degree heading upon crossing the Airport boundary until clear of noise-sensitive facilities. Estimated Compliance is about 2% of jets, 5% of non-jets.

Jets



Non-Jets

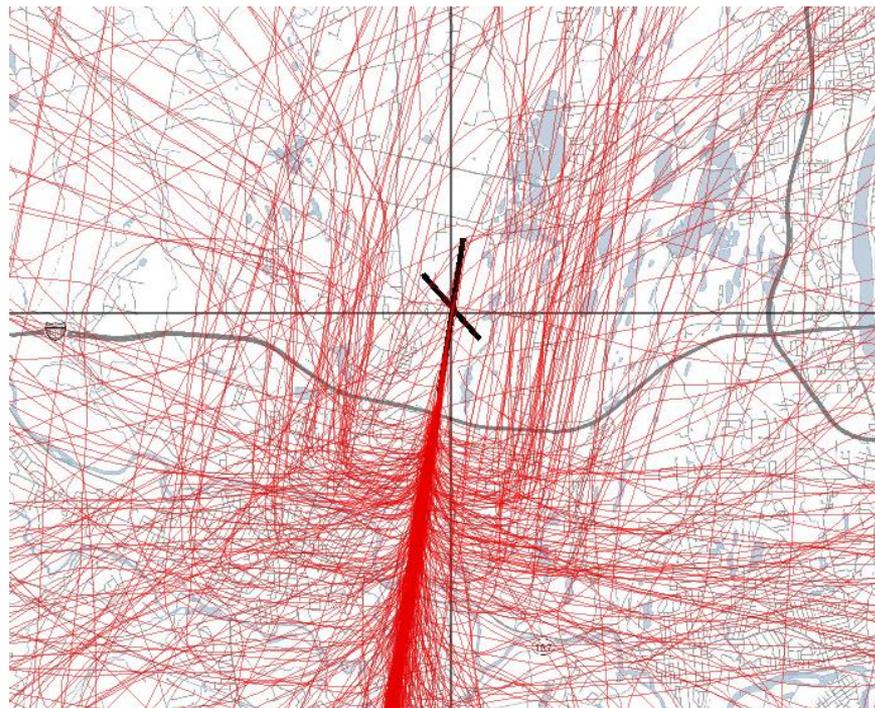


Existing NCP Measure NA2 states: Departures from Runway 20 are directed to maintain runway heading until 3 miles south of the Airport boundary (approx. southern edge of this map). Estimated Compliance is about 30% of jets, 40% of non-jets.

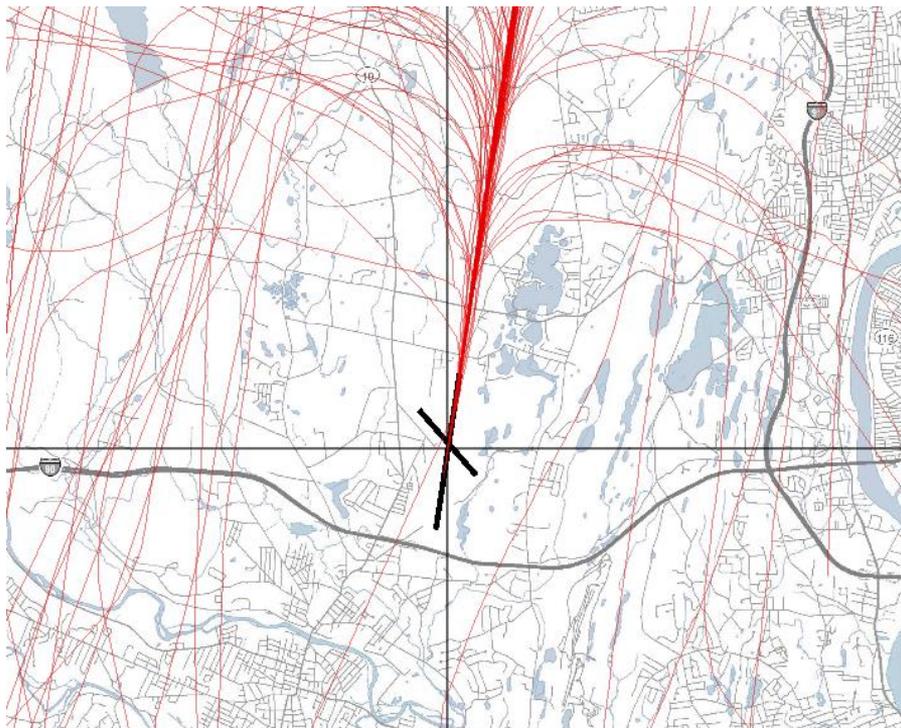
Jets



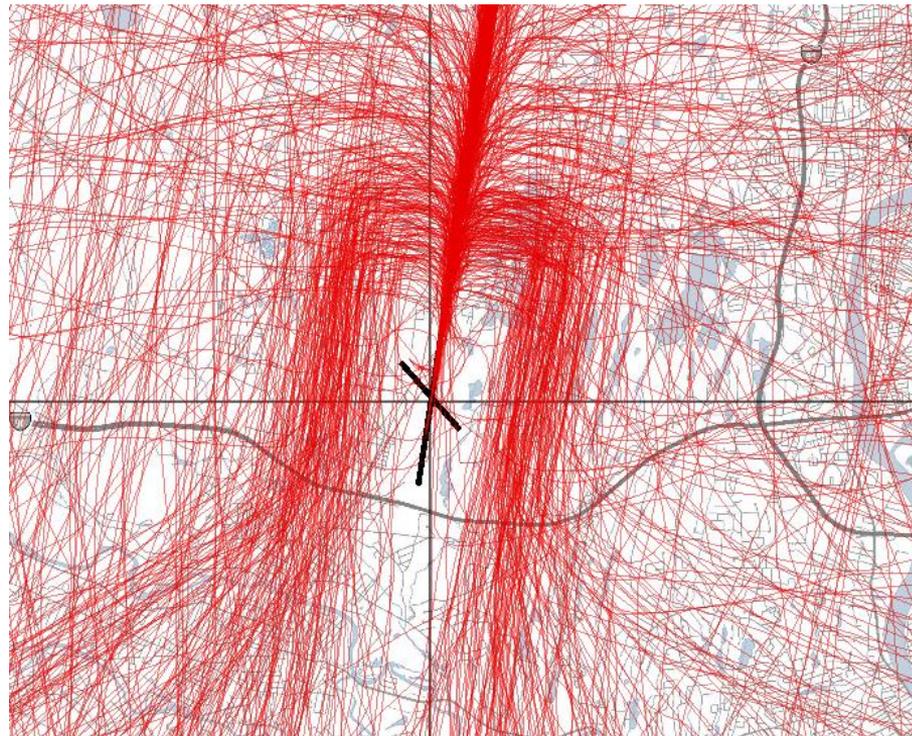
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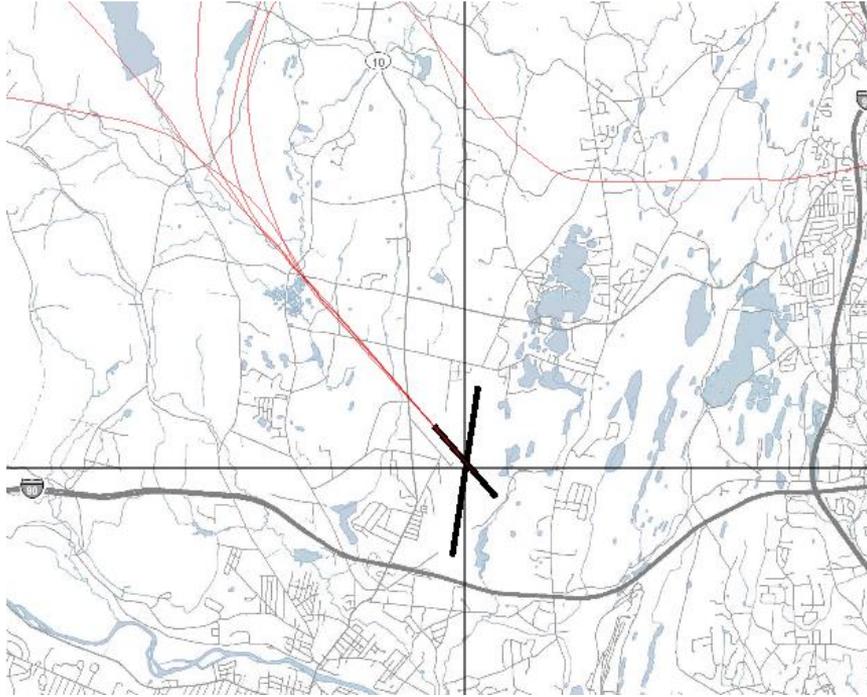
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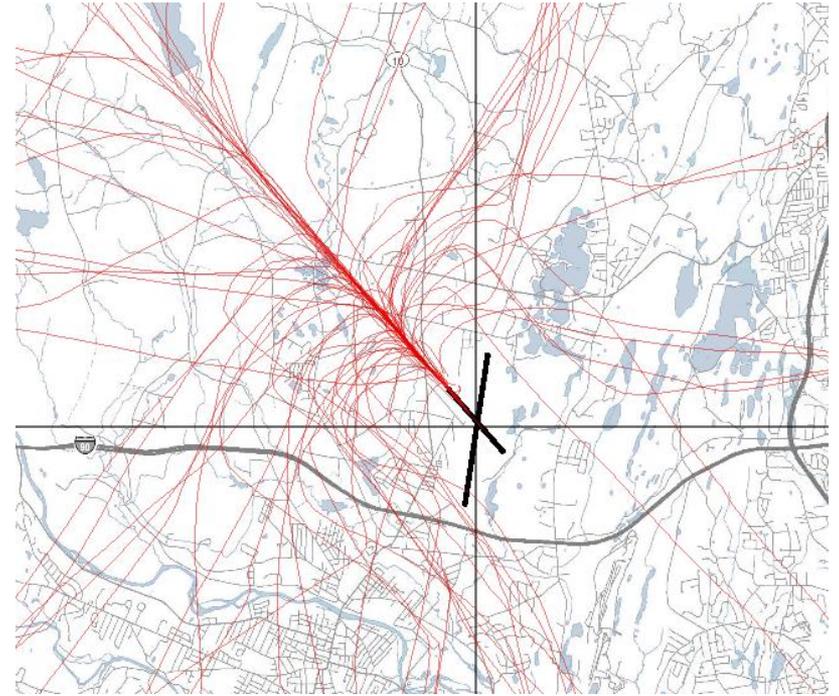
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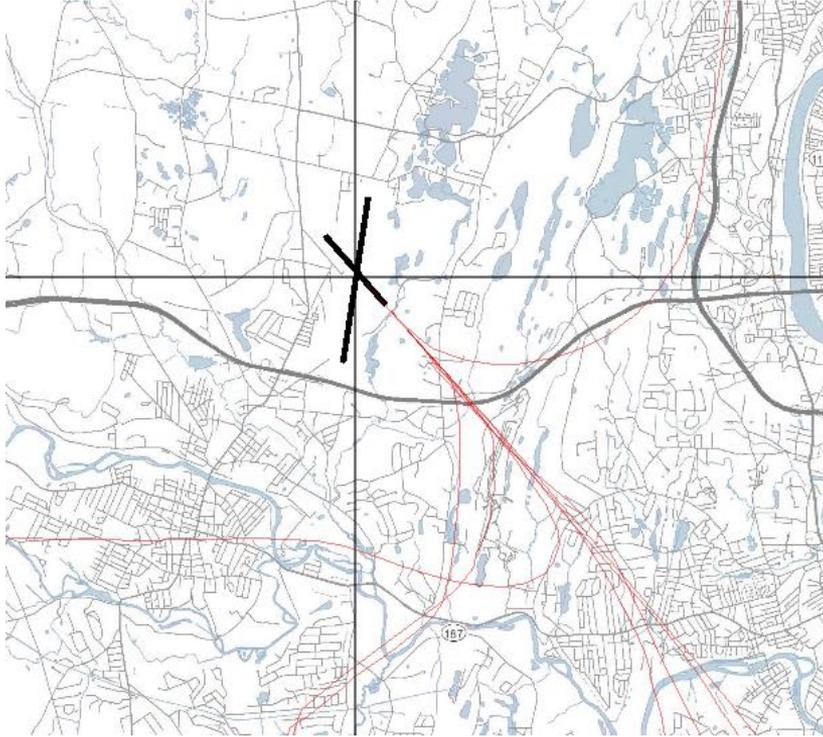
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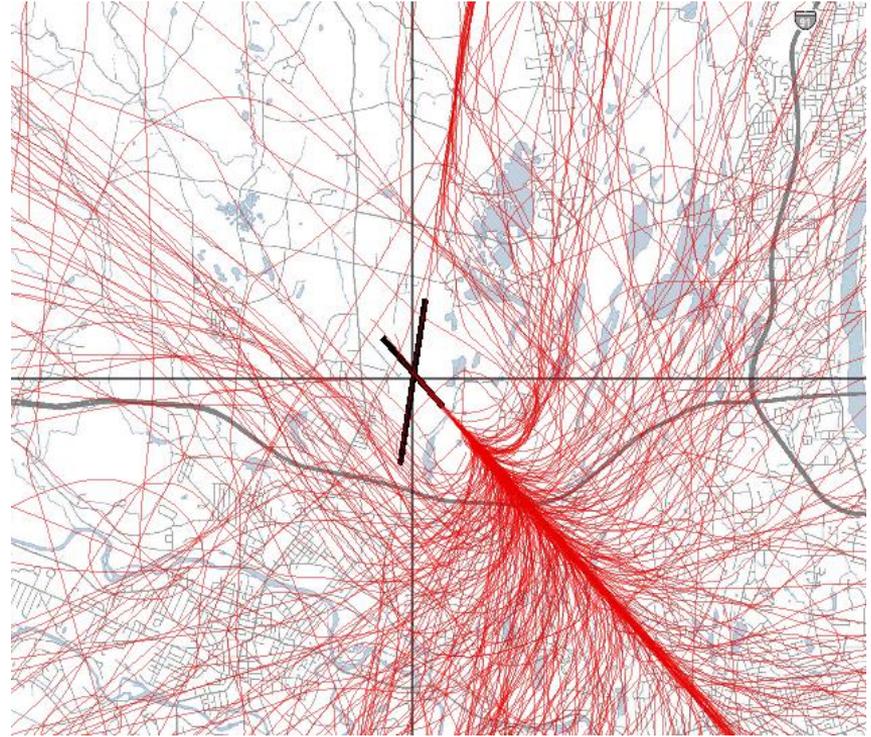
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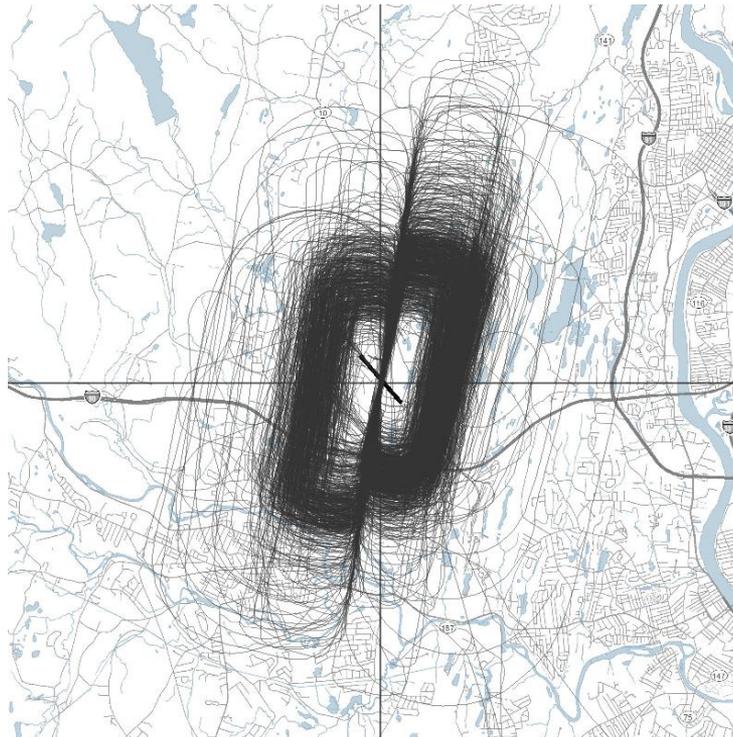
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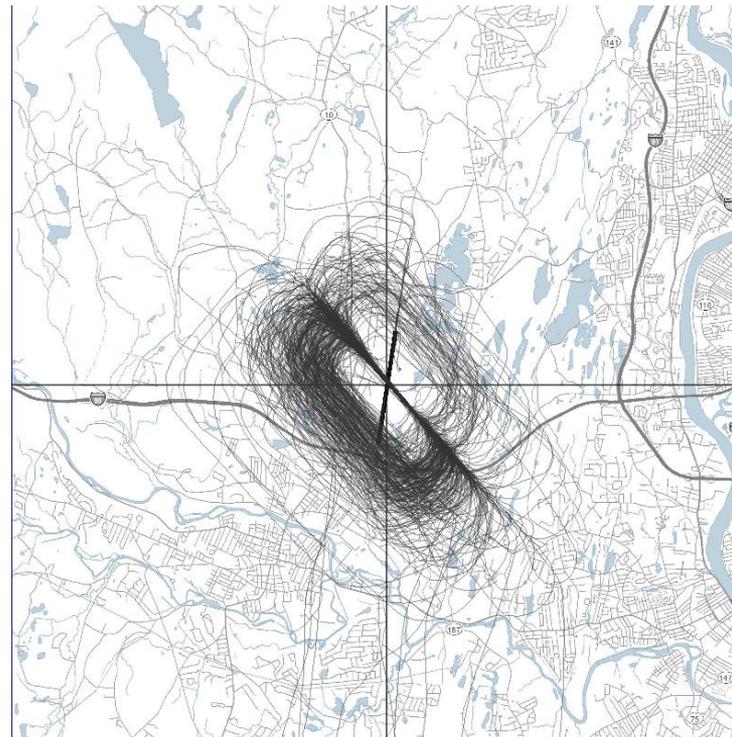
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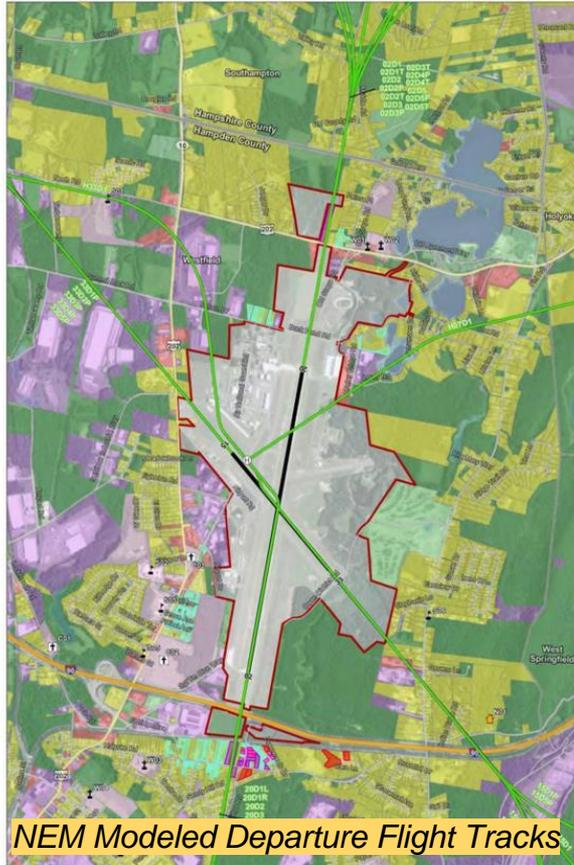


Runway 2/20



Runway 15/33





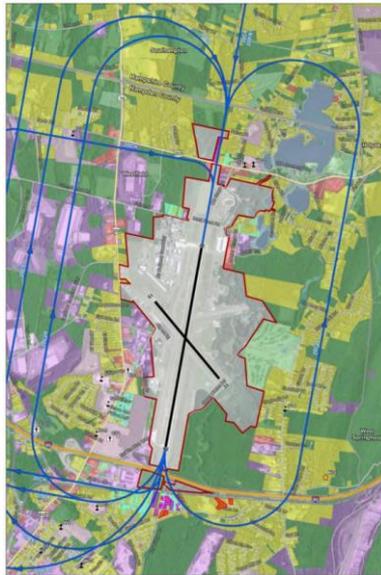
Previous NEM: modeled military Runway Use

Runway	Departures	Arrivals
ANG F-15E		
2	90%	10%
20	10%	90%
Heavy Cargo/Tanker (C-5M, KC-135R)		
2	60%	60%
20	40%	40%
4-engine turboprop (C-130J)		
2	40%	40%
20	60%	60%
2-engine turboprop (C-12)		
2	45%	45%
15	5%	5%
20	45%	45%
33	5%	5%





Runway 2



Runway 20



Runway 15



Runway 33

Previous NEM: modeled military Runway Use

Runway	Patterns	Runway	Patterns
ANG F-15E		4-engine turboprop (C-130J)	
2	10%	2	45%
20	90%	20	30%
15	0%	15	1%
33	0%	33	24%

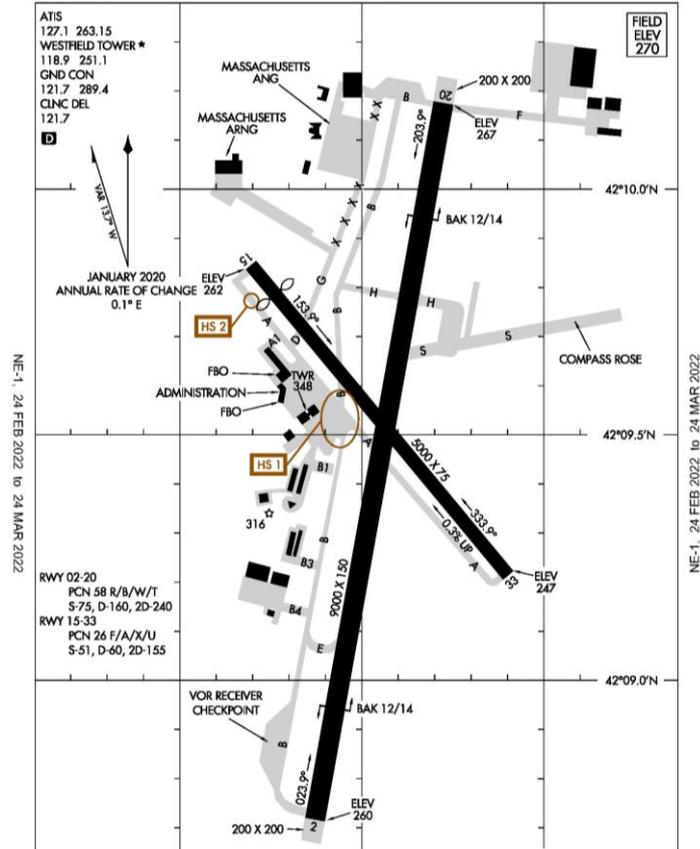
Civilian Aircraft Runway Use (observed in radar sample)

Runway	Departures	Arrivals	Patterns
2	39%	38%	27%
20	46%	43%	53%
15	2%	3%	4%
33	13%	16%	17%
	100%	100%	100%
number in sample	2014	1704	1328

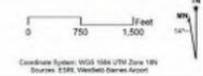
Previous NEM: modeled civilian Runway Use

Runway	Departures	Arrivals	Patterns
737700			
2	60%	60%	
20	40%	40%	
Small Jet (GIV, Lear 35)			
2	32%	32%	32%
20	59%	59%	59%
15	1%	1%	1%
33	9%	9%	9%
2-engine turboprop (Cessna 441)			
2	28%	28%	
20	42%	42%	
15	6%	6%	
33	24%	24%	
1-engine prop (GASEPF)			
2	22%	22%	22%
20	33%	33%	33%
15	11%	11%	11%
33	34%	34%	34%

Airport Layout Strategies



 Run-Up Location
 Airport Boundary



Airport Noise and Capacity Act of 1990, ANCA

- Required FAA to establish regulations regarding analysis, notice, and approval of airport noise and access restrictions

FAA implemented through 14 CFR Part 161 (1991)

- Establishes the federal program for reviewing noise and access restrictions on the use of Stage 2 and 3 aircraft (and perhaps beyond)
- Requires extensive benefit cost analyses
- Requires extensive notice process
- Requires different level of analysis for Stage 2 and 3
- Requires separate analysis of effects on aircraft less than 75,000 pounds
- Encourages voluntary agreements
- Last resort for noise compatibility

TAC Meeting 2 (today) Wednesday April 27, 2022

- Noise Abatement Measures

TAC Meeting 3 Wednesday May 25, 2022

- Land Use Measures
- Programmatic/Administrative Measures

TAC Meeting 4 Wednesday June 29, 2022

- Finalize Recommendations

	2022												2023						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 Public Information Meeting			◆																
2 Evaluate & Recommend Compatibility Measures																			
3 Advisory Committee Meetings			◆	◆	◆	◆													
4 Prepare Draft NCP																			
5 FAA & City Review																			
6 Prepare Public Draft NCP																			
7 Publish/Distribute Draft NCP																			
8 Public Review Period																			
9 Public Hearing																			
10 Respond to Comments & Finalize NCP																			
11 Submit Final NCP / Public Comments to FAA																			
12 FAA Review Period																			
<p>Legend:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Consultant Task </div> <div style="text-align: center;">  Public Involvement </div> <div style="text-align: center;">  FAA Review </div> </div>																			

Public Involvement

- Public Informational Meeting
- Advisory Committee (local jurisdictions, neighborhood organizations, etc.)
- Public Hearing and Comment Period

TAC MEMBER DISCUSSION

Additional Ideas/Thoughts for Noise Abatement Measures?



MEMO

Date: May 25, 2022
To: Westfield-Barnes Regional Airport Noise Compatibility Program Technical Advisory Committee
From: The Jones Payne Group, Inc.; HMMH, Inc.
Subject: **BAF NCP Technical Advisory Committee – Meeting #3**
JPG Job No: 202103.02
cc:

On April 27th, 2022, Westfield-Barnes Regional Airport (the Airport) conducted its second Technical Advisory Committee (TAC) meeting as part of its current Noise Compatibility Program (NCP) Update. As discussed in the previous TAC meetings and their corresponding technical memoranda, the primary objective in the development of an NCP is for the airport sponsor to address incompatible land uses within the area exposed to an annual-average Day-Night Average Sound Level (DNL) of 65 decibels (dB) or higher, as determined by the Airport’s forecast condition Noise Exposure Map (NEM). The ultimate goal of the Part 150 program is to eliminate all incompatible land uses through the implementation of NCP measures.

NCP measures fall into three categories:

- Noise Abatement – noise reduction at the noise source
- Land Use – noise mitigation for the receivers
- Program Management – means to implement, monitor and/or report on NCP measures

At the April 27th meeting, the TAC discussed the first category of NCP measures, noise abatement. The following technical memorandum has been prepared to address the remaining two NCP measure categories, land use and program management.

Land Use Measures in Existing NCP

In its 2017 NCP, the Airport analyzed thirteen land use measures and recommended eleven of those measures for Federal Aviation Administration (FAA) approval. In the June 13, 2017, Record of Approval (ROA), the FAA approved each of the eleven recommended measures. FAA approval indicates that the Airport may seek federal funds to aid in implementation; the decision to implement is at the discretion of the Airport.

The following analysis of implementation is based on Airport records, City of Westfield (the City) records, and information contained in three documents: the 2019/2024 NEM, the 2017 NCP, and the corresponding 2017 NCP ROA. The City may recommend including any of these measures as part of the Airport’s Updated Noise Compatibility Program, and may also recommend other measures.

Provided for reference is the current status of the non-compatible properties, as identified by the 2024 Forecast NEM¹.

DNL Band (dBA)	Non-Compatible Properties	Acquired Properties	Avigation Easement	Sound Insulated Properties	Total Addressed to Date	Potential Properties to be Addressed
65-70	271	23	4	49	76	195
70-75	6	1	2	-	3	3
75+	0	0	0	0	0	0
Total	277	24*	6	49	79	198

*The 2019/2024 NEM noted the City acquired 20 properties. Since 2019 the Airport has acquired an additional 4 properties for a total of 24 properties.

LU1 – Voluntary Acquisition of Eligible Residential Structures

The first land use measure provides for voluntary land acquisition of residences within the 65 DNL contour. Following acquisition, a Land Reuse study determines how the land can be reused in a manner that would render the properties compatible with aircraft operations. The program is voluntary, but any acquisitions must follow the provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act (49 CFR Part 24) (Uniform Act).

LU 1 was recommended by the City and approved by the FAA. To date, the City has acquired 24 residences, with 198 properties potentially eligible for this measure. The 2017 ROA noted that while this is a voluntary program that provides a benefit to current homeowners, land acquisition can result both in neighborhood discontinuity and reduction of taxable property for the City.

The City has indicated it wishes to discontinue this measure in favor of sound insulation. However, the City may wish to consider retaining this measure as part of the NCP so that it can be utilized to provide block

¹ Property count does not include the Arbor Mobile Home Park located on Southampton Rd.

rounding of the previous acquisition area to create a contiguous area located along Holyoke Rd and Dry Bridge Rd which can be rezoned to a compatible land use.

A Land Reuse study is forthcoming to determine the appropriate use for the properties that have been acquired thus far.

LU2 – Residential Sound Insulation Program

Under this measure, voluntary sound insulation is provided for eligible residential structures between the 65 and 70 dB DNL contours, with interior noise levels of 45 dB DNL or higher. Typically, an avigation easement (described under LU3, below) is provided in exchange for sound insulation treatment.

The City recommended measure LU2 and it was approved by the FAA. The City has sound-insulated 49 residential properties to date. Currently, 195 properties remain potentially eligible for this measure. Properties located in the 70-75 DNL are not eligible for sound insulation.

The City has expressed the use of sound insulation as the preferred noise mitigation measure for non-compatible properties.

LU3 – Remedial Easement Acquisition

An avigation easement grants airspace rights to the City. If/when a property with an easement is sold, the easement is maintained on the property deed and would be applicable to any future owners. While it is preferred that an easement be combined with other forms of noise mitigation, it can be effective in eliminating incompatible land uses if a homeowner declines other forms of program participation.

LU3 was recommended by the City and approved by the FAA. The City has purchased six avigation easements. There are 198 properties potentially eligible for this measure, however, with the City's preferred mitigation measure of sound insulation, we anticipate the actual number of easements to be acquired will be significantly less.

LU4 – Sound Insulate Places of Worship

Similar to LU2, this measure provides sound insulation for eligible places of worship within the 65 dB DNL contour. One place of worship, the Word of Grace Church, located to the north of the Airport along North Road, is located within the 65 DNL contour and is potentially eligible for sound insulation.

LU4 was City-recommended and FAA-approved. While the City has implemented its residential sound insulation program, there has been no activity towards this specific measure to date. Thus far, the City has directed its sound insulation funding toward residential structures.

LU5 – Preventive Easement Acquisition

This measure provides for the voluntary acquisition of aviation easements for undeveloped land; easement acquisition would provide some prevention of future incompatible land use, such as the development of new residential structures.

LU5 was recommended by the City and received FAA approval. The measure has not yet been implemented by the City. As detailed in the 2024 forecast NEM, there are approximately 46 acres of developable land that could potentially be eligible for preventative easement acquisition following the NCP Update. A review of the potential for residential development within the noise contour should be conducted to determine whether this measure is still recommended.

LU6 – Modify Existing Zoning

Under this measure, the City would evaluate undeveloped land with zoning classifications that are incompatible with aircraft noise and propose compatible zoning. Additionally, the City could explore modifying the zoning requirements of a Rural Residential (RR) District in order to address potential incompatibility resulting from the noise of aircraft overflights.

LU6 was City-recommended and FAA-approved. There has been no action taken to implement the measure.

LU7 – Voluntary Acquisition of Undeveloped Land

Under measure LU7, the City of Westfield would acquire incompatible undeveloped land to prevent future incompatible development. The land could then be rezoned to a compatible land use and be sold. The City did not recommend this measure for implementation due to its potential financial impact on the City, and so the measure has not been implemented.

LU8 – Airport Noise Overlay District (ANOD)

This measure provides for the development and implementation of a comprehensive zoning overlay district known as an Airport Noise Overlay District (ANOD), which would be included as part of the City's zoning ordinance. The ANOD would be based on the NEM 65 DNL contour and could include elements such as buffer zones between compatible and incompatible areas, permitted uses and development, and noise level reduction requirements in the building codes for new residential and other noise-sensitive-use buildings.

LU8 was recommended by the City and received FAA approval. To date, the measure has not been implemented.

The City should consider expanding the area defined in the ANOD to include Part 77 surfaces or a buffer to ensure future protection of land near the airport.

LU9 – Environmental Review

Under this measure, Airport staff participates in the administrative review of proposed land use development within the 65 dB and higher DNL contours or within the City of Westfield-implemented ANOD, in order to ensure future land use is compatible with aircraft noise.

LU9 was City-recommended and FAA-approved. The Airport is fully compliant with this measure as the Airport manager participates in administrative reviews of land use development through coordination with City staff when potential development is located within the NEM 65 DNL and higher contours.

The City should consider expanding the area reviewed by the Airport staff in conjunction with the development of Airport Noise Overlay District to provide further protection for the airport.

LU10 – Real Estate Disclosure

This measure asks the City to pursue that a real estate disclosure be provided to prospective buyers of noise-sensitive parcels within the 65 DNL and higher contours, within the City of Westfield-implemented ANOD or within other area boundaries as agreed upon between the City of Westfield, the State of Massachusetts, or another responsible entity and the Airport.

Measure LU10 was recommended by the City and received FAA approval. The City has not implemented the measure.

LU11 – Modify Subdivision Regulations

As a continuation of the afore-mentioned easement and disclosure-related measures, the City of Westfield may pursue the inclusion of noise disclosures, sound attenuation standards, and/or aviation easements to prevent new incompatible land use when a new subdivision is approved in proximity to the Airport.

Measure LU11 was recommended by the City and received FAA approval. To date, the measure has not been implemented.

LU12 – Building Code Modifications

The City of Westfield would work with the appropriate entities to modify building codes to prevent the introduction of new incompatible land uses, through requirements such as the inclusion of sound insulation materials. These code modifications would apply to new construction or to major changes made to existing structures.

LU12 was recommended by the City and approved by the FAA. The measure has not yet been implemented. Successful implementation of this measure would require statewide change to the building code.

LU13 – Acquire the Arbor Mobile Home Park and Relocate the Residents

Under this measure, the City would acquire the mobile home park and relocate the residents in order to relieve the residents from aircraft noise. Mobile homes cannot be adequately sound insulated, so those homes are not eligible for inclusion under LU2.

As the landowner and mobile-home owners were not interested in selling or relocating, the City did not recommend implementation of this measure.

Potential New Land Use Measures for Consideration

There are two additional types of land use mitigation to be considered by the City which involve the acquisition of a home and is sold to a new owner with an avigation easement attached to the property. These measures are typically considered where there are property owners who wish to sell their property and relocate but the airport sponsor desires to retain the residential neighborhoods within the noise contour.

Sales Assistance Program²

Objective

The objective of a Sales Assistance Program is to provide eligible property owners who wish to relocate outside the noise impact area with technical and financial assistance in the sale of their home on the open market. The Airport sponsor will not acquire the property and is responsible for closing costs. The property owner is not eligible for relocation benefits. There will not be any change to the underlying land use zoning.

Implementation

The property owner(s) will enter into an agreement with the Airport sponsor, agreeing to participate in the voluntary Sales Assistance Program. The property owner(s) will be responsible for the marketing and selling their home through a licensed real estate agent, including listing the property on the open market. The listing price will be based on the Fair Market Value (FMV) as established by appraisal following federal

² FAA Order 5100.38D Appendix R, Table R-6 “Noise Compatibility Planning/Project Requirements”, f. “Acquire Easement for Noise Compatibility”

appraisal guidelines³. If the property does not sell at the FMV within a reasonable timeframe, the Airport sponsor may provide a differential payment that shall not exceed a specified percentage of the FMV. Prior to the sale of the home, the owner will record an avigation easement in exchange for sales assistance. It is typical for these programs to pay the realtor commission on the sale of the property. This will encourage the local realtors to participate in the program and help to ensure that the market remains stable. Policies regarding length of time on market, appraisals, and market absorptions will be developed as part of the program's policy and procedures process.

Once a property sells through the Sales Assistance Program, the property is then considered noise compatible under FAA criteria and a subsequent property owner will not be eligible for any of the other programs under the Noise Compatibility Program.

Typical Appraisal Process

The appraisal process shall follow federal guidelines. FMV of a property shall be determined by an appraisal of the property by a certified appraiser. This appraisal will be reviewed by another certified appraiser ("review appraiser") and the FMV will be determined⁴. The FMV will be used as the sale price for the home on the open market.

Neighborhood Stability

To maintain neighborhood stability, the airport sponsor will conduct a market absorption study during program implementation to determine the expected rate at which homes can be sold without affecting the pricing of the housing market in the area.

³ 49 CFR part 24, the current version of FAA Order 5100.37, Land Acquisition and Relocation Assistance for Airport Projects, and the current version of Advisory Circular 150/5100-17, Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects.

⁴ Appraisals and review's determinations must be prepared and performed in accordance with the following: 42 USC Chapter 61, "Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs; 49 CFR Part 24, "Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs"; the Uniform Standards of Professional Appraisal Practice ("USPAP"); and all state, local and FAA standards.

Avigation Easement

An avigation easement is required in exchange for assisting in the sale of the property. This easement will run with the property. Once easement is recorded, the property is then considered noise compatible under FAA criteria.

Advantages

- Allows the property owner to relocate outside the project area
- Maintains the residential neighborhood
- Stabilizes market by limiting sales to market absorption
- Airport sponsor obtains an easement which makes the property noise compatible
- Owner is guaranteed fair market value for property
- Avoids vacant properties
- Maintains the jurisdiction's tax base
- Is an alternative for owners of structures that do not qualify for sound insulation

Disadvantages

- Does not guarantee sale of home
- Depending on market conditions, process can be slow
- Typically, there is very low participation in this type of program
- Developing policies regarding differential payment to ensure market stability can be difficult

Purchase Assurance Program⁵

Objective

The objective of a purchase assurance program is to provide property owners who wish to relocate outside the noise impact area with the ability to sell their property directly to the Airport sponsor in exchange for an avigation easement. Homeowners will not be eligible for relocation benefits. Funds received from the sale of the property must be reinvested in the noise mitigation program. There is no change to the underlying land use.

Implementation

The Airport sponsor will purchase an eligible property from the owner in exchange for an avigation easement. The home is purchased based upon the FMV as established through the FAA's appraisal

⁵ FAA Order 5100.38D Appendix R, Table R-6 "Noise Compatibility Planning/Project Requirements", f. "Acquire Easement for Noise Compatibility"

process⁶. Upon sale and recording of the easement, the Airport sponsor will sound-insulate the home and then sell it on the open market. The Airport sponsor will be responsible for closing costs associated with the acquisition of the property.

Avigation Easement

An avigation easement is required in exchange for purchasing the property. This easement will run with the property. Once the easement is recorded, the property is then considered noise compatible under FAA criteria.

Advantages

- Allows property owners to sell to the sponsor and move from neighborhood immediately, pending available funding
- Allows for sound-insulation of property

Disadvantages

- Depending on how long it takes to sell the property, maintenance and protection costs could be excessive
- The jurisdiction(s) would lose proportionate tax revenue during Airport sponsor ownership of property
- The Airport sponsor obtains ownership of the property, which could result in costly maintenance to prevent deterioration including: lawn maintenance, securing from vandalism and theft, ensuring that buildings remain mold-free, securing and maintaining swimming pools, and providing routine inspections.
- The market absorption and foreclosure market may result in long term vacancies, destabilize the neighborhood, and reduce property values for remaining residents.
- The Program has excessive costs and timeline which will detract funding from strategies such as Sound Insulation and Sales Assistance
- The Airport sponsor absorbs all the risk

⁶ Appraisals and review's determinations must be prepared and performed in accordance with: 42 USC Chapter 61, "Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs; 49 CFR Part 24, "Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs"; the Uniform Standards of Professional Appraisal Practice ("USPAP"); and all state, local and FAA standards.

Program Management Measures in Current NCP

PM1 – Re-Establish a Noise Mitigation Advisory Committee (NMAC)

This measure calls for the re-establishment of a Noise Mitigation Advisory Committee (NMAC); the purpose of this committee is to advise and assist the City and Airport with the management of aircraft noise-related issues. The previous NMAC was disbanded due to lack of interest by the public.

Measure PM1 was recommended by the City and received FAA-approval. There is no current action as the City has not implemented the measure.

PM2 – Community Awareness Program

Under this measure, a Community Awareness Program (CAP) is established and maintained to communicate Airport and aircraft noise updates that could potentially affect the public, such as changes in operations and updates to land use projects.

PM2 was recommended by the City and approved by the FAA. The Airport primarily conducts the CAP through its website (www.barnesairport.com) and its Facebook page (<https://www.facebook.com/westfieldairport/>). The City is fully compliant with PM2.

PM3 – Expand the Fly Quiet Program

This measure entails the expansion of the Fly Quiet Program, which educates pilots on aircraft noise and mitigation, with the goal of increasing awareness of noise effects on the surrounding community.

The City recommended PM3, and it was approved by the FAA. The City is partially compliant; while the Airport continues to recommend the use of NBAA noise abatement procedures and AOPA Noise Awareness Steps, there has not been any expansion of the program in the years following the 2017 NCP Update.

PM4 – Periodic Evaluation of Noise Exposure

Under this measure, the Airport's operations are regularly monitored to assess noise exposure and update the Noise Exposure Map every five years or more frequent if a potential change of 1.5 dB DNL or greater has occurred to noise-sensitive land uses.

Measure PM4 was City-recommended and FAA-approved. The City is found to be fully compliant with this measure. As noted in previous TAC memoranda, the evaluation of noise exposure at the Airport is ongoing. The City of Westfield first generated an NEM in 1990. The NEM was subsequently updated in 2009 and 2015. The most recent NEM Update was initiated in 2018, to model civilian aircraft noise using the FAA's new Aviation Environmental Design Tool (AEDT). That most recent NEM update was accepted by the FAA

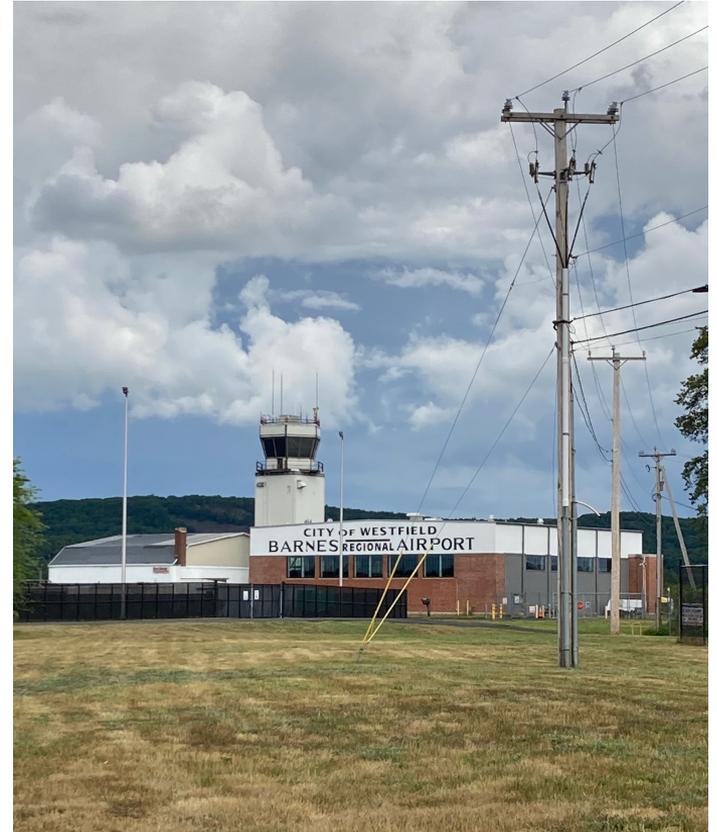
in 2019, representing the years 2019 and 2024. The next update would be in 2023 or 2024 or sooner if something causes a significant change (1.5 dB or greater) to noise-sensitive land uses.

We welcome TAC member questions and feedback at our upcoming meeting, as the TAC considers which measures to recommend for FAA approval.

NOISE COMPATIBILITY PROGRAM UPDATE Technical Advisory Committee Meeting #3

May 25, 2022

- Noise Compatibility Program Overview
- Land Use Measures from 2017 NCP
- Additional Land Use Measures for Consideration
- Program Management Measures from 2017 NCP
- Project Schedule
- TAC Member Discussion



Noise Compatibility Program Overview

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

•Airport recommends NCP measures

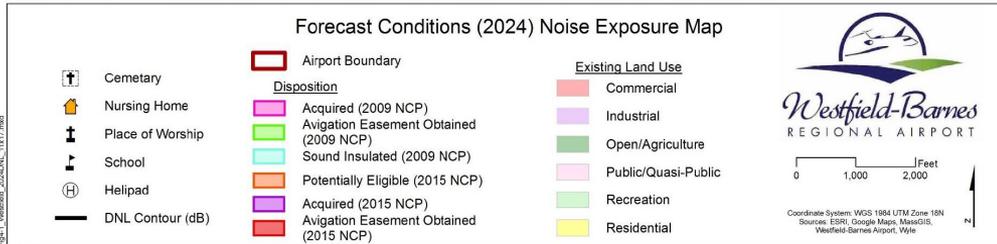
•FAA approves or disapproves each recommended measure

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective “package” of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

DNL Band (dBA)	Non-Compatible Properties	Acquired Properties	Avigation Easement	Sound Insulated Properties	Total Addressed to Date	Potential Properties to be Addressed
65-70	271	23	4	49	76	195
70-75	6	1	2	-	3	3
75+	0	0	0	0	0	0
Total	277	24*	6	49	79	198

*The 2019/2024 NEM noted the City acquired 20 properties. Since 2019 the Airport has acquired an additional 4 properties for a total of 24 properties.



Key for 2024 Noise Exposure Map, right



LU1 - Voluntary Acquisition of Eligible Residential Structures

- Land acquisition of residences within the 65+ DNL contour
- Measure was recommended by the City and approved by the FAA
- 24 residences have been acquired to date
- City prefers to limit acquisition moving forward
- Recommend measure could be modified to purchase properties near Holyoke Rd if needed for block rounding of this area



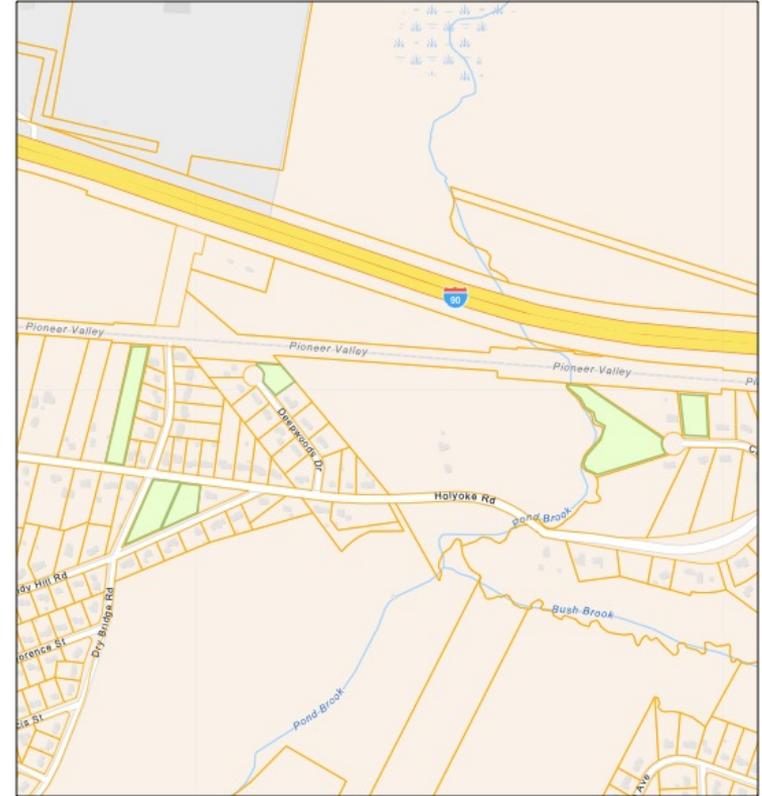


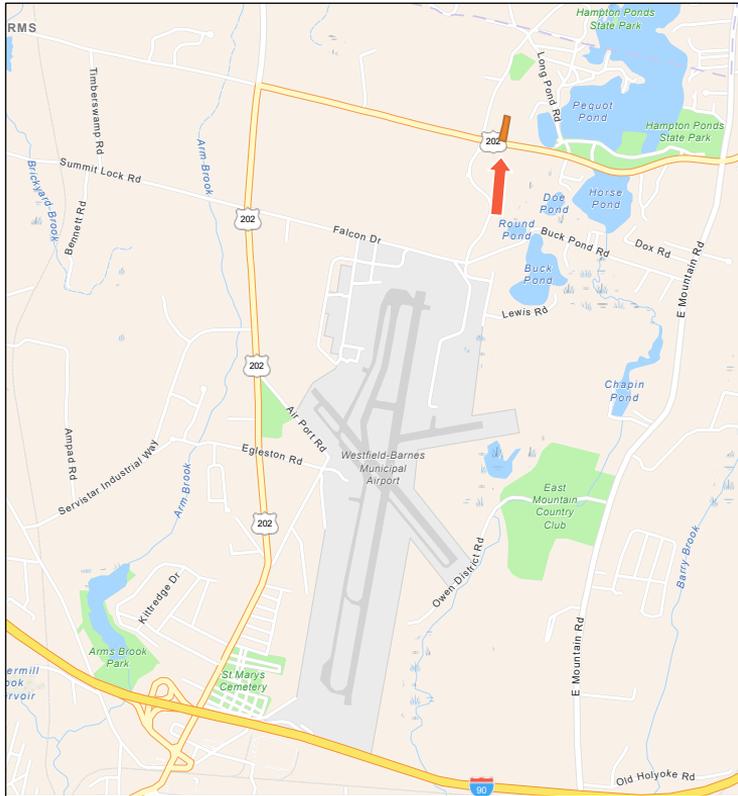
LU2 – Residential Sound Insulation Program

- Voluntary sound insulation in exchange for an easement is provided for eligible residential structures between the 65 and 70 dB DNL contours, with interior noise levels of 45 dB DNL or higher
- 49 homes have been sound insulated to date, with 195 remaining eligible properties
- City's preferred mitigation measure for homes located between the **65-75 DNL**

LU3 – Remedial Easement Acquisition

- Avigation easement is conveyed in exchange for a cash payment
- If/when a property with an easement is sold, the easement is maintained on the property deed
- Measure was recommended and approved; six avigation easements have been purchased to date
- While 198 homes are eligible, this measure is not preferred because noise mitigation is not provided to the receiver





LU4 – Sound Insulate Places of Worship

- One place of worship, Word of Grace Church, is within the 65+ dB DNL contour
- Similar to LU2, sound insulation treatments would be provided in exchange for an aviation easement
- Measure was recommended by the City and FAA-approved
- No activity to date, as the City has directed funding toward residential structures

LU5 – Preventative Easement Acquisition

- Voluntary acquisition of aviation easements for undeveloped land
- Would provide prevention of future incompatible land use, such as the development of new residential structures
- 46 acres of potentially eligible land were identified, and the measure was recommended and approved
- The measure has not yet been implemented

LU7 - Voluntary Acquisition of Undeveloped Land

- The City would purchase incompatibly-zoned undeveloped land, and rezone to a compatible use
- This measure was *not* recommended for FAA-approval due to the financial impact on the City, and it has not been implemented

LU6 – Modify Existing Zoning

- The City would evaluate undeveloped land with incompatible zoning classifications, and propose rezoning that would be compatible with aircraft noise
- The City could also evaluate the zoning requirements of the Rural Residential district (RR)
- This measure was City-recommended and FAA-approved; not implemented

LU8 – Airport Noise Overlay District (ANOD)

- A comprehensive zoning overlay district, to be included as part of the City's zoning ordinance
- Based on 65 DNL contour, or larger
- Can include elements such as buffers zones, permitted uses, and building code requirements
- Measure was recommended and approved; there has been no action to date

LU9 – Environmental Review

- Airport staff is to participate in administrative review of proposed land uses within the 65+ DNL contours or within the ANOD
- Measure was recommended, approved, and implemented
- It is recommended that the City expands the area that is reviewed under this measure

LU10 – Real Estate Disclosure

- A real estate disclosure would be developed and provided to prospective buyers of noise-sensitive parcels within the 65+ DNL contour, the ANOD, or other area boundaries as agreed by all responsible entities
- The measure was recommended and approved; the City has not implemented

LU11 – Modify Subdivision Regulations

- The City may pursue the inclusion of noise disclosures, sound attenuation standards, and/or aviation easements if a new subdivision is approved in proximity to the Airport
- Recommended and approved; no implementation to date

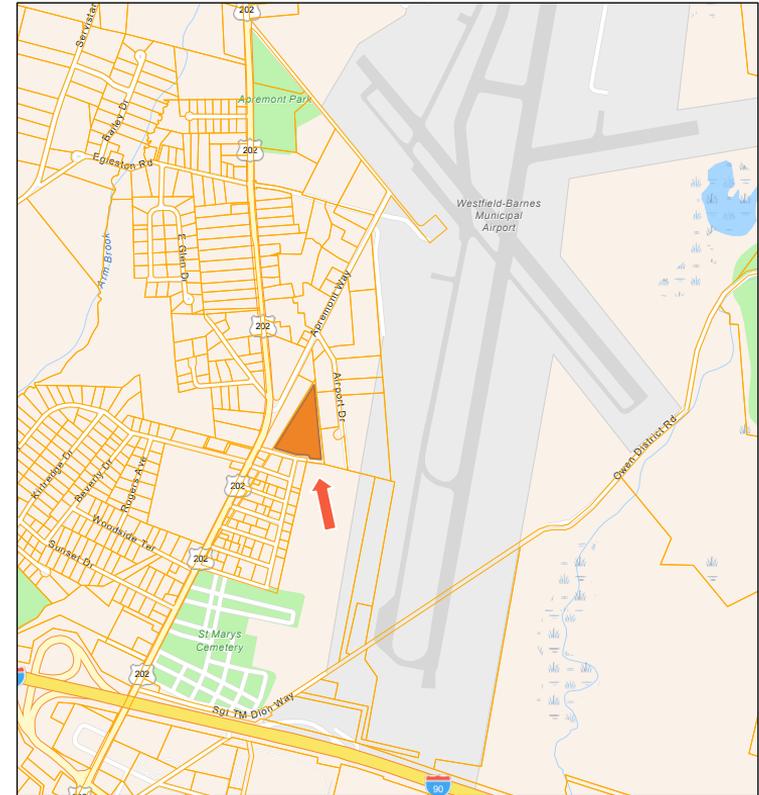


LU12 – Building Code Modifications

- The City would work with appropriate entities to modify building code requirements, such as the use of sound insulation materials
- Code modifications would apply to new construction and major changes to existing structures
- Recommended and approved; no implementation to date
- Successful implementation would require change of state-wide building code

LU13 – Acquire Heritage Mobile Home Park and Relocate the Residents

- While Heritage MHP is within the 65 db DNL contour, mobile homes cannot be adequately sound insulated
- As a result, the City would acquire the property and relocate the residents
- Landowner and mobile-home owners were not interested; the measure was not recommended for approval and has not been implemented



Sales Assistance Program

- Owners wishing to relocate outside the noise impact area are provided with technical and financial assistance in the sale of their home, in exchange for an aviation easement
- Home is appraised and sold on open market
- No change in land use

Purchase Assurance Program

- Owners wishing to relocate outside the noise impact area are able to sell their property directly to the City, in exchange for an aviation easement
- Home is sound insulated and resold on open market
- No change in land use



PM1 – Re-Establish a Noise

Mitigation Advisory Committee (NMAC)

- The committee would advise and assist the City and Airport with the management of aircraft noise-related issues
- The previous NMAC was disbanded due to lack of interest by the public
- The measure was recommended and approved, but not yet implemented

PM2 – Community Awareness

Program (CAP)

- A CAP would be established and maintained to communicate Airport and aircraft noise updates that could affect the public, such as changes in operations and updates to land use projects
- This measure was recommended, approved, and implemented
- The CAP is primarily conducted through the Airport website and Facebook page

PM3 – Expand the Fly Quiet Program

- Educates pilots on aircraft noise and mitigation, with the goal of increasing awareness of noise effects on the surrounding community
- Measure was recommended by the City and approved by the FAA
- The Airport continues to recommend the use of NBAA noise abatement procedures and AOPA Noise Awareness Steps; there has not been any expansion of the program

PM4 – Periodic Evaluation of Noise Exposure

- Airport operations are to be regularly monitored to assess noise exposure and update the Noise Exposure Map every five years or more frequent if a potential change of 1.5 dB DNL or greater has occurred to noise-sensitive land uses
- The evaluation of noise exposure is ongoing; the NEM was last updated in 2019, and an NCP update is in process

TAC Meeting 3 (today) Wednesday May 25, 2022

- Land Use Measures
- Program Management Measures

TAC Meeting 4 Wednesday July 27, 2022

- Noise Abatement, Land Use Measures continued

TAC Meeting 5 Wednesday August 17, 2022

- Finalize Recommendations

		2022												2023										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul				
1	Public Information Meeting			◆																				
2	Evaluate & Recommend Compatibility Measures	■																						
3	Advisory Committee Meetings			◆	◆	◆	◆		◆															
4	Prepare Draft NCP						■																	
5	FAA & City Review							■																
6	Prepare Public Draft NCP								■															
7	Publish/Distribute Draft NCP														◆									
8	Public Review Period														■									
9	Public Hearing														◆									
10	Respond to Comments & Finalize NCP													■										
11	Submit Final NCP / Public Comments to FAA																			◆				
12	FAA Review Period																	■						
		Legend: Consultant Task Public Involvement FAA Review																						

- Advisory Committee (local jurisdictions, neighborhood organizations, etc.)
- Public Hearing and Comment Period

TAC MEMBER DISCUSSION

Additional Thoughts on Land Use or Program Management Measures?



MEMO

Date: July 27, 2022
To: Westfield-Barnes Regional Airport Noise Compatibility Program Technical Advisory Committee
From: The Jones Payne Group, Inc.; HMMH, Inc.
Subject: **BAF NCP Technical Advisory Committee – Meeting #4**
JPG Job No: 202103.02
cc:

On May 25th, 2022, Westfield-Barnes Regional Airport (the Airport) conducted its third Technical Advisory Committee (TAC) meeting as part of its current Noise Compatibility Program (NCP) Update. As discussed in the previous TAC meetings and their corresponding technical memoranda, the primary objective in the development of an NCP is for the airport sponsor to address incompatible land uses within the area exposed to an annual-average Day-Night Average Sound Level (DNL) of 65 decibels (dB) or higher, as determined by the Airport's forecast condition Noise Exposure Map (NEM). The ultimate goal of the Part 150 program is to eliminate all incompatible land uses through the implementation of NCP measures.

NCP measures fall into three categories:

- Noise Abatement – noise reduction at the noise source
- Land Use – noise mitigation for the receivers
- Program Management – means to implement, monitor and/or report on NCP measures

At the May 25th meeting, the TAC discussed the existing land use and program management measures. At the previous meeting, on April 27th, the TAC discussed existing noise abatement measures and identified some potential additions for inclusion in the NCP update. This technical memorandum has been prepared to summarize the discussions to date, with the goal of finalizing the TAC's NCP measure recommendations for the Airport at the July 27th meeting.

Noise Abatement Measures

The TAC reviewed the noise abatement measures that were recommended in the 2017 NCP and examined civilian radar flight data to assess whether the measures were implemented. TAC members identified formal Air National Guard noise abatement procedures and helicopter noise abatement procedures that were not documented in the previous NCP, but which are currently in place at the Airport; these should be

acknowledged as part of the Airport’s existing program. The group discussion also produced some ideas warranting noise model investigation to determine potential effectiveness.

Table 1 summarizes the four specific noise abatement departure procedures recommended in BAF’s prior NCPs. Current HMMH analysis and TAC discussion confirm that two of those measures appear to be implemented, and two are not.

Table 1: Summary of Noise Abatement Measures from previous NCPs

Operations Addressed	Description of Measure	Implementation Status
Departures from Runway 15	VFR departures maintain runway heading until crossing the East Mountain Ridgeline.	Measure is in place. Estimated compliance is about 80% of jets, 60 % of non-jets.
Departures from Runway 33	Intersection takeoffs are prohibited (to maximize altitude of aircraft overflying the Arbor Mobile Home Park)	Measure is in place.
Departures from Runway 2	Aircraft should turn left to a 360-degree heading upon crossing the airport boundary.	Not implemented. Analysis of civilian radar flight track data indicate that less than 5 percent of aircraft made that turn.
Departures from Runway 20	Aircraft should maintain runway heading until 3 miles south of the Airport boundary.	Not implemented. Analysis of civilian radar flight track data indicate about one-third of civilian aircraft maintain heading.

In the discussion of Runway 2 departures, Col. Jacob, Commander of the ANG unit, indicated that military aircraft could adopt the 360-degree heading procedure (one of the measures not currently implemented) for routine, non-scramble, departures. HMMH completed noise modeling to determine the potential noise benefit of both civilian and military compliance with the noise abatement measure. The analysis shows that up to 33 residential properties could be removed from the 65 DNL contour. The noise modeling results for this measure are attached to this memo as Appendix A.

Col. Jacob also suggested that a “high initial” overhead approach for F-15 arrivals could provide a noise benefit as compared to the standard pattern altitude in overhead break landing maneuvers. HMMH also modeled the effects of implementing a “high initial” overhead approach to compare to the standard procedure. The analysis shows that although the procedure could reduce noise levels on an individual

event basis, it would have no discernible effect on DNL. The noise modeling results for this procedure are attached to this memo as Appendix B.

In the discussion of Runway 20 departures, it was noted that air traffic concerns regarding Bradley International Airport to the south may be the reason aircraft do not maintain runway heading. The TAC recommends removing this measure in the NCP update.

Air National Guard Noise Abatement Measures: the following excerpt from the 104th Fighter Wing's local flying regulation (dated 15 June 2015 and subtitled "F-15 Local Operating Procedures") specifically addresses noise abatement:

8.27.4. (Added) Noise Abatement during daily flying operations. These procedures are established in the interest of community relations to reduce flight disturbances as much as practical and will be in accordance with the following:

- 8.27.4.1. (Added) Runway 02 is the preferred runway for takeoff at Barnes ANGB and will be used when the tailwind is 10kts or less on a dry runway (RCR = 23).
- 8.27.4.2. (Added) Takeoffs will normally be made at Military power. Max power (afterburner) takeoffs will be made when TOLD requires Max power.
- 8.27.4.3. (Added) Afterburner will be terminated prior to the end of the airfield border. Climb at 350kts in Mil power and accomplish a normal tech order climb.
- 8.27.4.4. (Added) Aircraft will climb straight ahead to 1,300' MSL prior to turnout of traffic.
- 8.27.4.5. (Added) Unrestricted climbs will only be accomplished with SOF approval and prior coordination with Westfield Tower. AFI11-2F-15V3 BANG SUP 15 JUNE 2015 16
- 8.27.4.6. (Added) Noise abatement procedures do not apply for Radar Trail Departures.

It should be noted that the ANG's noise abatement instructions include both a preferential runway use component and noise abatement departure procedures. In the TAC meeting, Col. Jacob also suggested that his unit could execute higher patterns as part of the fast break arrival maneuver. The current pattern is at 1,500 feet AGL (1,800 feet MSL). The higher pattern would be at 4,000 feet MSL over the airfield to an idle power descent before final approach.

Helicopter Noise Abatement Procedures: The following description of rotary wing aircraft procedures has been provided to the study team by the airport.

Helicopter operations over residential areas below 1,300' MSL (1,000' AGL) should be avoided at all times unless directed by Air Traffic Control. Preferred helicopter pattern is RIGHT TRAFFIC to Runway 02. Helicopter traffic pattern altitude (military and civilian) 1,300 MSL (1,000' AGL).

Runway 02

Arrival

- Enter DOWNWIND leg 1,300' MSL (1,000' AGL) remain 2 miles east of airport runway intersection.
- Remain east of East Mountain ridgeline unless otherwise directed by Air Traffic Control.
- Turn RIGHT BASE leg 2 miles south of approach end Runway 02.
- Avoid residential areas.
- Maintain 1,300' MSL (1,000' AGL) until crossing approach end Runway 02.

Departure

- Fly runway heading.
- Expedite climb to 1,300' MSL (1,000' AGL) prior to turning CROSSWIND leg within 1/2 mile from departure end Runway 02.
- Remain south of Route 202 (east-west two-lane paved road) on airport boundary.

Runway 15-33

Arrival

- Helicopter traffic pattern must remain within 1/2 mile of airport runway intersection at all times unless otherwise directed by Air Traffic Control.
- Helicopter traffic pattern altitude 1,300' MSL (1,000' AGL)
- **No STRAIGHT IN ARRIVALS to RWY 33** unless otherwise directed by Air Traffic Control.

Departure

- **No STRAIGHT OUT DEPARTURE from Runway 15** unless otherwise directed by Air Traffic Control.
- Fly runway heading. Expedite climb to 1,300' MSL (1,000' AGL) prior to turning CROSSWIND leg within 1/2 mile of runway intersection.
- Remain west of East Mountain ridgeline at all times unless otherwise directed by Air Traffic Control.

Land Use Measures

The TAC reviewed the eleven FAA-approved land use measures from the 2017 NCP, as well as two measures that were analyzed but not recommended for approval. The TAC also discussed potential new measures that could be recommended for FAA approval, understanding that FAA approval indicates the Airport may seek federal funds to aid in implementation; the decision to implement is at the discretion of the Airport.

Table 2 provides, for reference, the current status of the incompatible properties identified by the 2024 Forecast NEM¹. Properties may be potentially eligible for multiple mitigation measures, but property owners will be able to take advantage of a single measure for mitigation. (i.e., sound insulation treatments or land acquisition, etc.).

DNL Band (dBA)	Incompatible Properties	Acquired Properties	Avigation Easement	Sound Insulated Properties	Total Addressed to Date	Potential Properties to be Addressed
65-70	271	23	4	49	76	195
70-75	6	1	2	-	3	3
75+	0	0	0	0	0	0
Total	277	24*	6	49	79	198

*The 2019/2024 NEM noted that the City acquired 20 properties. Since 2019 the Airport has acquired an additional 4 properties for a total of 24 properties.

LU1 – Voluntary Acquisition of Eligible Residential Properties

This measure provides for acquisition of residential properties within the 65 DNL contour. The program is voluntary, but any acquisitions must follow the provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act (49 CFR Part 24) (Uniform Act). There are currently 198 properties potentially eligible for acquisition.

The TAC recommends that LU1 be included in the NCP update for FAA approval. However, the City strongly prefers sound insulation over land acquisition, because sound insulation allows for neighborhood continuity and the retainment of taxable property. Including voluntary land acquisition in the NCP update would provide program flexibility and the possibility of block rounding in the previous acquisition area of Holyoke Road and Dry Bridge Road. The TAC recommends that future land acquisition be approved by the Airport Commission.

Following the acquisition of property, a Land Reuse study is conducted to determine how the land can be reused in a manner that would render the properties compatible with aircraft operations. A study is forthcoming to determine the appropriate use for the acquired properties depicted on the Airport’s Exhibit A, Airport Property Inventory Map.

LU2 – Residential Sound Insulation Program

¹ Property count does not include the Arbor Mobile Home Park located on Southampton Rd.

Under this measure, voluntary sound insulation is provided for eligible residential structures between the NEM 65 and 75 dB DNL contours, with existing interior noise levels of 45 dB DNL or higher from the Airport's aircraft operations. Typically, an aviation easement (described under LU3, below) is provided in exchange for sound insulation treatment. Properties located inside the 75 DNL contour would not be eligible for sound insulation. There are currently 198 properties potentially eligible for sound insulation.

The TAC recommends that LU2 be included in the NCP update for FAA approval. As noted above, the City prefers residential sound insulation as their primary noise mitigation measure going forward.

LU3 – Remedial Easement Acquisition

An aviation easement grants airspace rights to the City. If/when a property with an easement is sold, the easement is maintained on the property deed and would be applicable to any future owners. While it is preferred that an easement be combined with other forms of noise mitigation, it can be effective in eliminating incompatible land uses if a homeowner declines other forms of program participation. There are 198 properties potentially eligible for this measure.

The TAC recommends that LU3 be included for FAA approval, but given the City's preference for sound insulation, anticipates that the number of remedial easements acquired will be low.

LU4 – Sound Insulate Places of Worship

Similar to LU2, this measure provides sound insulation for eligible places of worship within the 65 dB DNL contour. One place of worship, the Word of Grace Church, located to the north of the Airport along North Road, is located within the NEM 65 DNL contour and is potentially eligible for sound insulation.

The TAC recommends LU4 for FAA approval. This measure will be prioritized after the residential sound insulation program.

LU5 – Preventive Easement Acquisition

This measure provides for the voluntary acquisition of aviation easements for undeveloped land for the purpose of preventing future incompatible land use, such as the development of new residential structures within the NEM 65 DNL contour.

The TAC recommends LU5 for FAA approval. A review of remaining undeveloped land within the noise contour will determine the extent to which this measure is implemented.

LU6 – Modify Existing Zoning

Under this measure, the City would evaluate undeveloped land with zoning classifications that are incompatible with aircraft noise and propose compatible zoning. Additionally, the City could explore

modifying the zoning requirements of a Rural Residential (RR) District in order to address potential incompatibility resulting from the noise of aircraft overflights.

The TAC recommends LU6 for FAA approval, noting that the implementation of this measure would be dependent on City Council review and approval.

LU7 – Voluntary Acquisition of Undeveloped Land

Under this measure, the City of Westfield would acquire incompatible undeveloped land to prevent future incompatible development. The land could then be rezoned to a compatible land use and be sold.

The TAC recommends LU7 for NCP inclusion and FAA approval. While this measure was not recommended for implementation in the 2017 NCP due to the potential cost to the City, the TAC feels there is now a possibility for Airport property expansion.

LU8 – Airport Noise Overlay District (ANOD)

This measure provides for the development and implementation of a comprehensive zoning overlay district known as an Airport Noise Overlay District (ANOD), which would be included as part of the City’s zoning ordinance. The ANOD would be based on the NEM 65 DNL contour and could include elements such as buffer zones between compatible and incompatible areas, permitted uses and development, and noise level reduction requirements in the building codes for new residential and other noise-sensitive-use buildings.

Municipalities surrounding airports such as Dane County Regional Airport and Piedmont Triad International Airport have implemented ANODs or similar zones (see Appendix C). These zones are based on the respective 65 DNL contour or the 60 DNL contour, and establish restrictions such as no new residential development, notification of potential aircraft overflight, etc.

The TAC does not recommend LU8 for approval. While the TAC feels an ANOD would be useful, it was noted that it may be difficult to implement. Property owners may be resistant to being included in the ANOD for fear of reduced property value. Similarly, the TAC feels it would be difficult to implement an ANOD that extends beyond the 65 DNL contour, as this would conflict with the eligibility requirements for noise mitigation.

LU9 – Environmental Review

Under this measure, Airport staff participates in the administrative review of proposed land use development within the 65 dB and higher DNL contours or within the City of Westfield-implemented ANOD, in order to ensure that future land use is compatible with aircraft noise.

The TAC recommends LU9 for FAA approval and continued implementation. If possible, Airport staff should expand the review area beyond the 65 DNL contour in order to further protect the Airport.

LU10 – Real Estate Disclosure

This measure asks the City to pursue a policy of providing a real estate disclosure to prospective buyers of noise-sensitive parcels within the 65 DNL and higher contours, within the City of Westfield-implemented ANOD, or within other area boundaries as agreed upon between the City of Westfield, the State of Massachusetts, or another responsible entity and the Airport.

The TAC requested additional information as to what would be required, as they feel this measure may be difficult to implement. Enforcement of this measure with property sellers and real estate agents would be difficult unless legally required. A sample of the Burlington International Airport, Burlington, VT real estate disclosure is attached.

LU11 – Modify Subdivision Regulations

As a continuation of the afore-mentioned easement and disclosure-related measures, the City of Westfield may pursue the inclusion of noise disclosures, sound attenuation standards, and/or aviation easements to prevent new incompatible land use when a new subdivision is approved in proximity to the Airport.

The TAC recommends LU11 for FAA approval in the forthcoming NCP update.

LU12 – Building Code Modifications

Under this measure, the City of Westfield would work with the appropriate entities to modify building codes to prevent the introduction of new incompatible land uses, through requirements such as the inclusion of sound insulation materials. Such code modifications would apply to new construction or to major changes made to existing structures.

LU12 is not recommended by the TAC due to the extensive effort needed; implementation would require modification to Massachusetts state building code.

LU13 – Acquire the Heritage Mobile Home Park and Relocate the Residents

Under this measure, the City would acquire the mobile home park and relocate the residents in order to relieve the residents from aircraft noise. Mobile homes cannot be adequately sound insulated, so those homes are not eligible for inclusion under LU2.

The TAC does not recommend LU13 for approval, as the landowner and mobile-home owners had previously indicated they were not interested in selling.

Potential New Land Use Measures Considered

Sales Assistance Program²

The objective of a Sales Assistance Program is to provide eligible property owners who wish to relocate outside the noise impact area with technical and financial assistance in the sale of their home on the open market. The Airport sponsor does not acquire the property and would be responsible for closing costs. The property owner is not eligible for relocation benefits. There would not be any change to the underlying land use zoning.

The TAC does not recommend a Sales Assistance Program for approval due to long program duration, risk, and anticipated low participation.

Purchase Assurance Program³

The objective of a purchase assurance program is to provide property owners who wish to relocate outside the noise impact area with the ability to sell their property directly to the Airport sponsor in exchange for an aviation easement. Homeowners would not be eligible for relocation benefits. After the Airport resells the property, funds received from the sale of the property must be reinvested in the noise mitigation program. There would be no change to the underlying land use.

The TAC does not recommend a Purchase Assurance Program for FAA approval due to excessive costs, risk, and long program timeline.

² FAA Order 5100.38D Appendix R, Table R-6 “Noise Compatibility Planning/Project Requirements”, f. “Acquire Easement for Noise Compatibility”

³ FAA Order 5100.38D Appendix R, Table R-6 “Noise Compatibility Planning/Project Requirements”, f. “Acquire Easement for Noise Compatibility”

Program Management Measures

PM1 – Re-Establish a Noise Mitigation Advisory Committee (NMAC)

This measure calls for the re-establishment of a Noise Mitigation Advisory Committee (NMAC); the purpose of this committee is to advise and assist the City and Airport with the management of aircraft noise-related issues. The previous NMAC was disbanded due to lack of interest by the public.

The TAC recommends PM1 for FAA approval and reimplementation. The reestablishment of the NMAC is a priority for the City and the community. It is expected the NMAC would meet biannually.

PM2 – Community Awareness Program

Under this measure, a Community Awareness Program (CAP) is established and maintained to communicate Airport and aircraft noise updates that could potentially affect the public, such as changes in operations and updates to land use projects.

The TAC recommends PM2 for FAA approval and that its implementation continue.

PM3 – Expand the Fly Quiet Program

This measure entails the expansion of the Fly Quiet Program, which educates pilots on aircraft noise and mitigation, with the goal of increasing pilot awareness of noise effects on the surrounding community.

The TAC recommends PM3 for FAA approval, but notes the priority is low. The noise contour is primarily influenced by military operations, whose pilots have limited opportunities to follow the Fly Quiet Program. However, the NMAC could potentially suggest additional items to be included in a Fly Quiet Program.

PM4 – Periodic Evaluation of Noise Exposure

Under this measure, the Airport's operations are regularly monitored to assess noise exposure and the Noise Exposure Map is updated every five years (or more frequent if a potential change of 1.5 dB DNL or greater has occurred to noise-sensitive land uses).

The TAC recommends PM 4 for FAA approval in the forthcoming NCP update. As noted in previous TAC memoranda, the evaluation of noise exposure at the Airport is ongoing. The City of Westfield first generated an NEM in 1990. The NEM was subsequently updated in 2009 and 2015. The most recent NEM Update was initiated in 2018, to model civilian aircraft noise using the FAA's new Aviation Environmental Design Tool (AEDT). That most recent NEM update was accepted by the FAA in 2019, representing the years 2019 and 2024. The next update would be in 2023 or 2024, or sooner if something causes a significant change (1.5 dB or greater) to noise-sensitive land uses.

Potential New Program Management Measures Considered

Noise Monitoring and Periodic Noise Measurements

The TAC does not recommend a noise monitoring system or periodic noise measurements due to cost. Measurement data would also have no influence on the noise contour or on program eligibility, which could cause confusion in the community.

We welcome TAC member questions and feedback at our upcoming meeting, as the TAC finalizes their NCP recommendations.

Appendix A – Noise Modeling Results for Runway 2 Departure Change

Turn to 360-degree heading after departing Runway 2:

In the 2017 NCP, Noise Abatement Measure 2 stated that aircraft departing from Runway 2 should turn left to a 360-degree magnetic heading upon crossing the airport boundary. Analysis of recent⁴ civilian radar flight track data indicate that the measure has not been implemented, as less than 5 percent of aircraft made such a turn. The FAA had not approved measure NA2 in the 2017 NCP, due to lack of evidence that it would reduce the number of residences within the 65 DNL contour. If the measure were applicable only to civilian aircraft, the effect would not be substantial, because the shape and size of the DNL contours are driven by military aircraft.

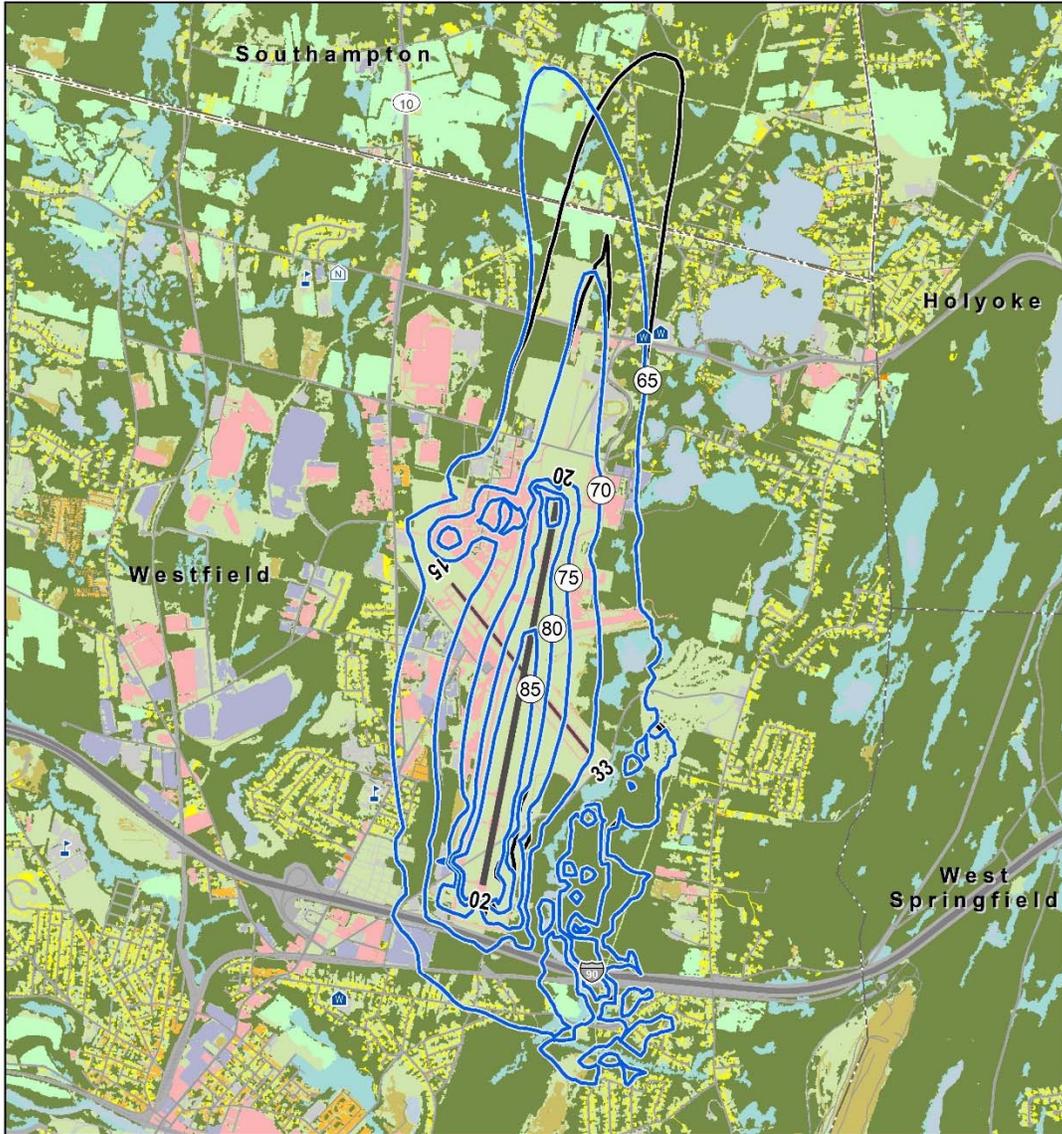
In the TAC discussion of noise abatement measures, Col. Jacob, Commander of the ANG unit, indicated that military aircraft could adopt the 360-degree heading procedure for routine (non-scramble) flights. HMMH performed some noise modeling to determine the potential noise benefit of both civilian and military compliance with the measure. Figure 1 portrays the model flight tracks with and without an Initial left turn to 360 degrees magnetic; the blue tracks include the initial turn, the black tracks do not.



Figure 1 Model Flight Tracks for Runway 2 Departures

Figure 2 shows the 65 dB DNL contour from the 2024 NEM and the 65 dB DNL contour for 100% compliance with the noise abatement procedure, including military aircraft. The change in DNL only occurs north of the airport. If all aircraft used the proposed measure, 35 incompatible land uses (residential properties) would be removed from within the 65 dB DNL contour. However, this measure would add 2 other residential properties not currently within the 65 dB DNL contour. It is important for the TAC to understand that they would be moving the noise (not reducing it) to eliminate a net 33 incompatible land uses. The TAC should determine whether it may be better to not implement this measure and instead mitigate noise at those 35 homes.

⁴ April 30, 2020 to May 31, 2021



Residential - Single Family	Right-of-way	2024 NEM Contours	With Noise Abatement Turn
Residential - Multi-Family	Agriculture	Nursing Homes	Runways
Residential - Other	Open Space	Libraries	Railroads
Commercial	Forest	Hospitals	Major / Minor Roads
Industrial	Bare Land	Schools	County Boundaries
Mixed Use	Wetland	Places of Worship	Town Boundaries
Other Impervious	Water		

Westfield-Barnes Regional Airport

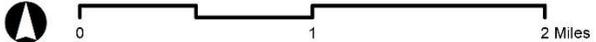


Figure 2 Comparison of NEM DNL Contours to DNL with 100% Implementation of Runway 2 Departure Noise Abatement Turn

Appendix B – Noise Modeling Results for Runway 2 Departure Change

Increase overhead arrival pattern altitude:

As a potential new noise abatement measure, Col. Jacob suggested that a “high initial” overhead approach for F-15 arrivals could provide a noise benefit as compared to the standard pattern altitude in overhead break landing maneuvers. The current approach procedure has the aircraft maintaining an altitude of 1,800 ft. AGL (above ground level) over the runway on the initial arrival pass before circling the airfield to complete the landing. In the proposed alternative approach, aircraft would maintain an altitude of 4,000 ft. MSL over the runway and would turn the aircraft at mid-field. The aircraft would maintain a low power setting as they descend to the Airport on final approach. This could reduce the noise by as much as 3 dB, on a single-event basis, which is noticeable.

HMMH modeled the proposed new procedure for all F-15 overhead break arrivals, using the military noise model, Noisemap, to determine the effect to the 65 dB and higher DNL contours if the measure was implemented. Figure 3 compares the pattern as modeled for the NEM with the modeled parameters of the “High initial” procedure.

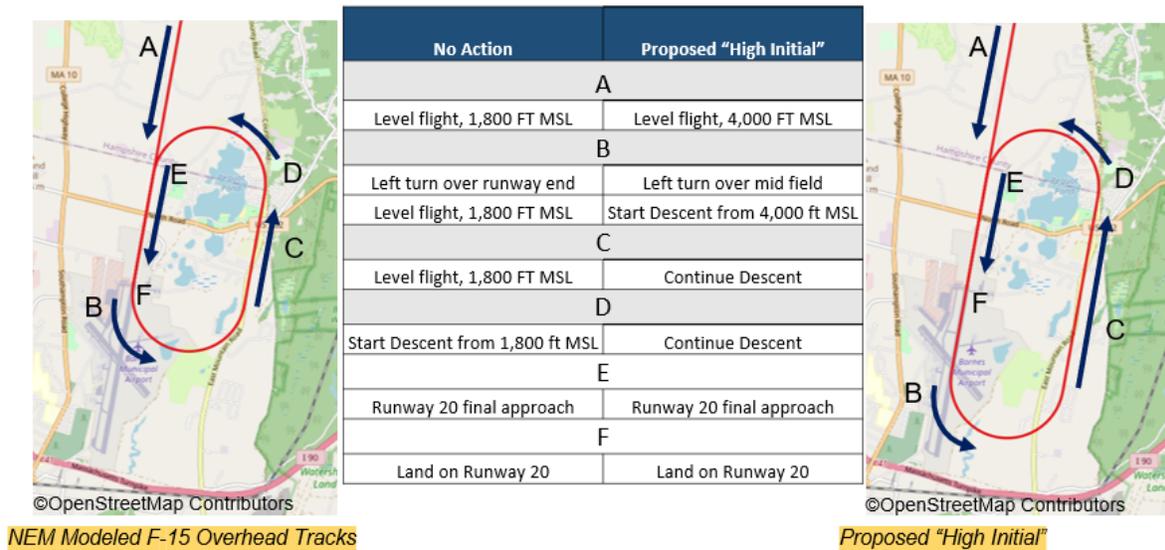


Figure 3 Military overhead break arrival flight tracks

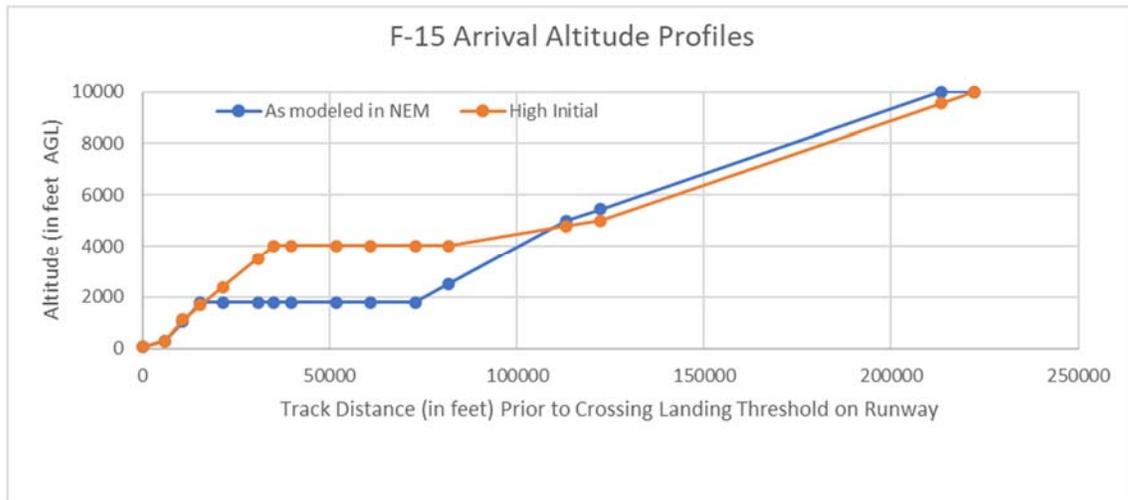


Figure 4 Comparison of Modeled Altitude Profiles

The Proposed F-15 “High Initial” Approach Procedure would have aircraft over the runway at higher altitude, but at same position on final approach. Figure 4 compares the aircraft altitudes along the flight path.

Figure 5 shows the NEM DNL contours overlaid with the DNL contours that include the “high Initial” procedure for 100% of F-15 arrivals. The NEM contours are plotted with black lines, the DNL 65 contour resulting from changing the overhead break procedure for F-15s is plotted in blue. There is no discernible difference to DNL 65.

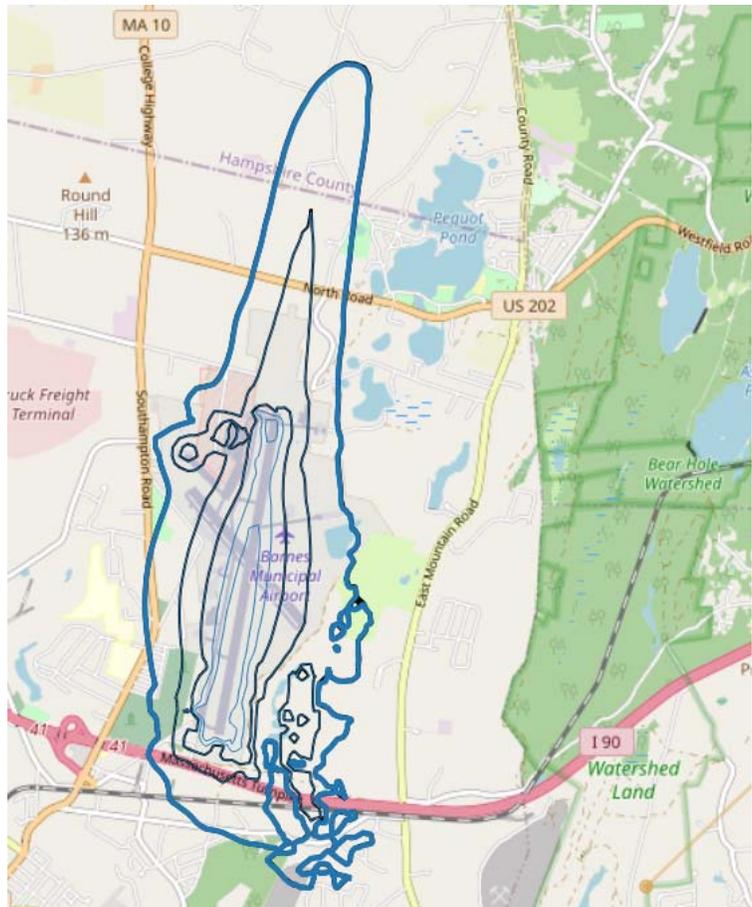


Figure 5 DNL Contour Comparison: No Discernible Difference

Appendix C – Examples of ANOD Implementation

Piedmont Triad International Airport (GSO), City of High Point Airport Overlay Zone excerpt:

Airport Overlay Zones

ZONE	DESCRIPTION
Zone 1	The intent of Zone 1 is to prevent the development of land uses sensitive to objectionable noise resulting from daytime and nighttime aircraft flights and those land uses that could pose safety hazards to aircraft. No new residences are allowed, new daytime noise sensitive uses like schools are prohibited, and certain uses presenting safety concerns are barred. Notification of potential aircraft over-flight noise is required.
Zone 2	The intent of Zone 2 is to prevent the development of land uses sensitive to objectionable noise resulting from nighttime aircraft flights. No new residences are allowed. Notification of potential aircraft over-flight noise is required.
Zone 3	The intent of Zone 3 is to protect residents by reducing the interior level of objectionable noise resulting from nighttime aircraft flights. New residences in new subdivisions are required to meet design standards that reduce interior sound levels by 30 dB. Notification of potential aircraft over-flight noise is required.
Zone 4	The intent of Zone 4, along with the other zones, is to provide public notification of potential nighttime aircraft noise impacts.

Please also see the attached City of Greensboro Airport Overlay District zone descriptions.

Appendix D – Example of Real Estate Disclosure

dotloop signature verification: www.dotloop.com/my/verification/DL-241864027-8-1929

**AIRPORT NOISE DISCLOSURE
BURLINGTON, VERMONT INTERNATIONAL AIRPORT**

Property Address: 24 Beacon Street, South Burlington, VT 05403

Street City/Town

The above Property is in proximity to the Burlington, Vermont International Airport (the Airport). The Airport serves both commercial and military aircraft.

The U.S. Air Force (Air Force) and the Vermont Air National Guard (VTANG) have announced that commencing in the year 2020, 18 F-35 military aircraft will replace the existing 18 F-16 aircraft currently based at the Burlington Vermont International Airport (the Airport).

Information published by the Air Force indicates that the F-35 aircraft generate more noise than the F-16 aircraft. The above Property is located in an area identified by the Air Force as being affected by the increased noise from these F-35 aircraft.

Information published by the Air Force contains charts of noise contour bands imposed upon aerial photographs showing areas where the noise impacts can be expected (attached).

Prospective purchasers are encouraged to review available information regarding any decision to purchase the Property.

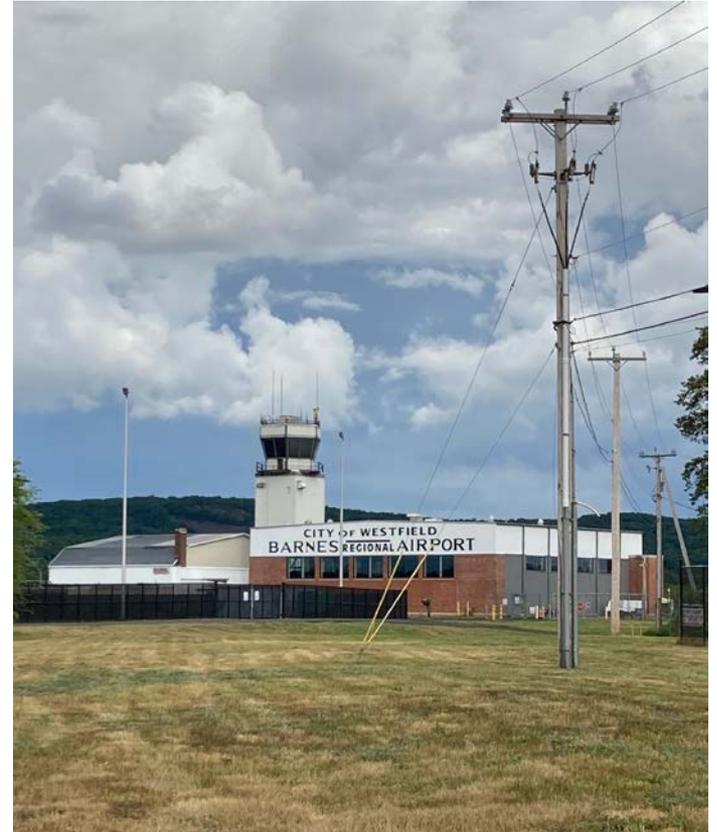
ACKNOWLEDGEMENT OF RECEIPT BY PURCHASER

Seller	<i>Jamie Gough</i> <small>dotloop verified 05/01/17 11:15AM EDT UNK-NUMW-OITL-GARY</small>	Purchaser	<i>Amanda R. Clayton</i> <small>dotloop verified 05/06/17 3:37PM EDT GLRV-9X10-09NK-IAWU</small>
Seller		Purchaser	
Seller		Purchaser	
Seller		Purchaser	

NOISE COMPATIBILITY PROGRAM UPDATE Technical Advisory Committee Meeting #4

July 27, 2022

- Noise Compatibility Program (NCP) Overview
- Supplemental Noise Abatement Analysis
 - Flight Tracks for Runway 2 Departures
 - F-15 “High Initial” Approach procedure
- Finalizing NCP Update Elements
- Project Schedule
- TAC Member Discussion



Noise Compatibility Program Overview

• Airport recommends NCP measures

• FAA approves or disapproves each recommended measure

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

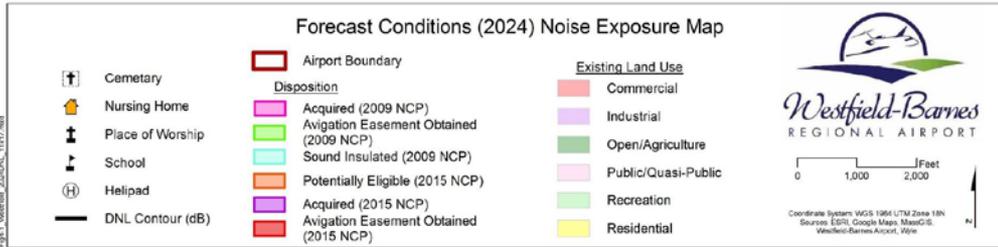
- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective "package" of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

DNL Band (dBA)	Non-Compatible Properties	Acquired Properties	Avigation Easement	Sound Insulated Properties	Total Addressed to Date	Potential Properties to be Addressed
65-70	271	23	4	49	76	195
70-75	6	1	2	-	3	3
75+	0	0	0	0	0	0
Total	277	24*	6	49	79	198

*The 2019/2024 NEM noted the City acquired 20 properties. Since 2019 the Airport has acquired an additional 4 properties for a total of 24 properties.



Key for 2024 Noise Exposure Map (right)



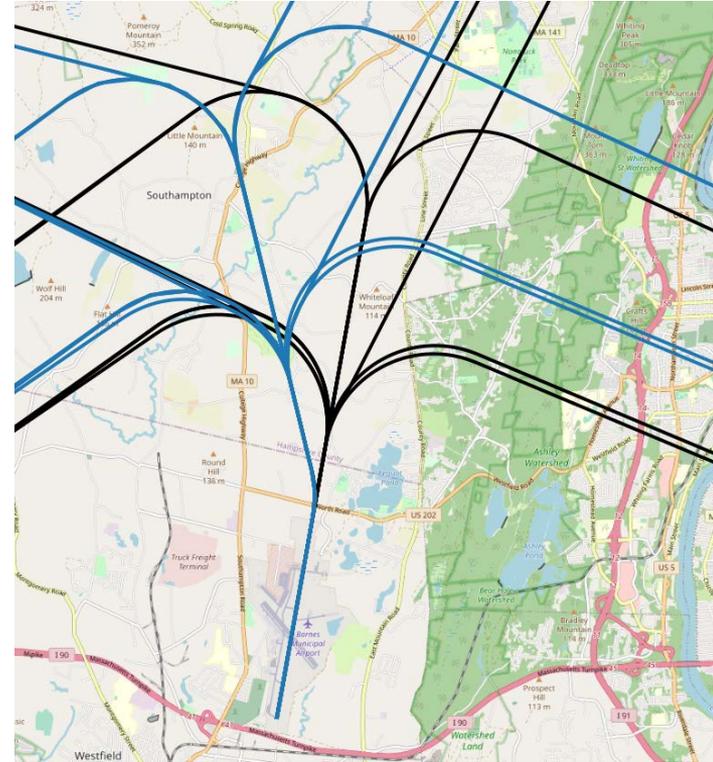
Existing NCP Measure NA2, part 1:

Departures on Runway 2 to be directed to turn left to a 360-degree (magnetic) heading upon crossing the airport's northern boundary, until clear of noise-sensitive facilities, after which the aircraft can proceed on-course (unless otherwise directed by ATC)

HMMH modeled the effect of the Runway 2 Noise Abatement Departure Measure applied to all aircraft.

- Assume all aircraft start their initial turn to 360 magnetic around North Road (US Rt. 202)
- Assume aircraft start their next turns around Valley Road or later

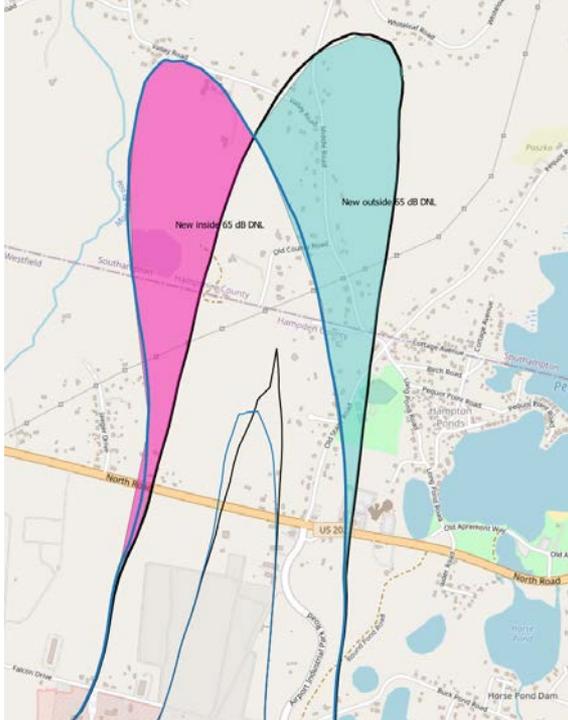
- blue tracks include the initial turn
- black tracks do not



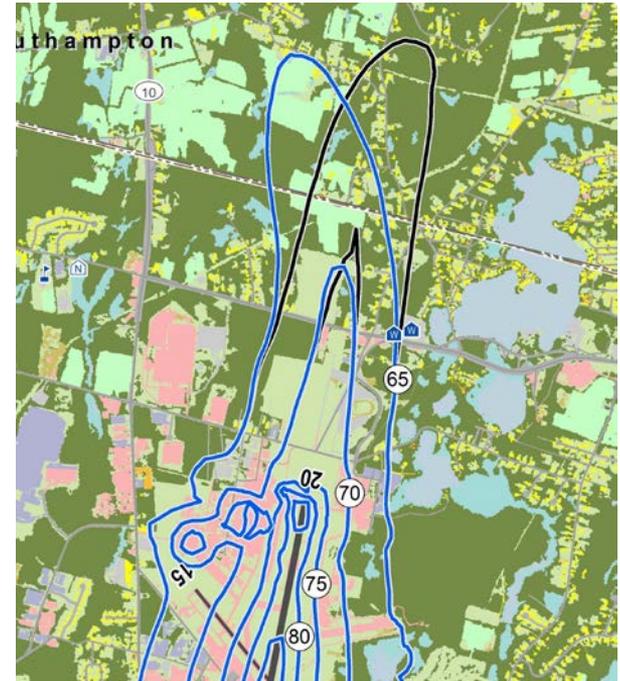
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Results:

- The change in DNL occurs north of the airport
- 35 residential properties may be removed from within the 65 dB DNL contour
- 2 residential properties not currently within the 65 dB DNL contour would be added
- Turn to 360-degrees magnetic results in aircraft overflying more compatible land uses

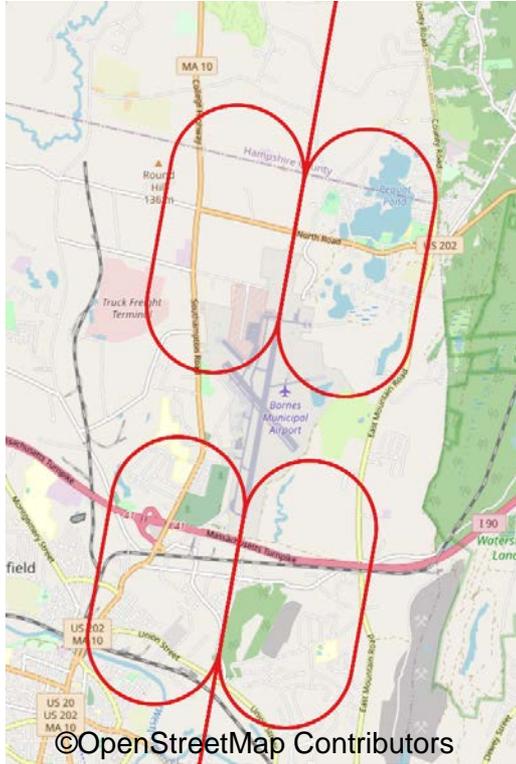


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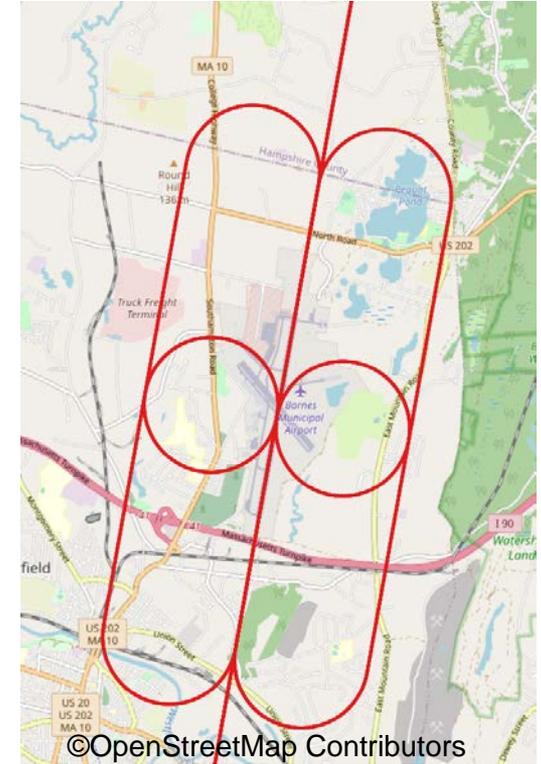
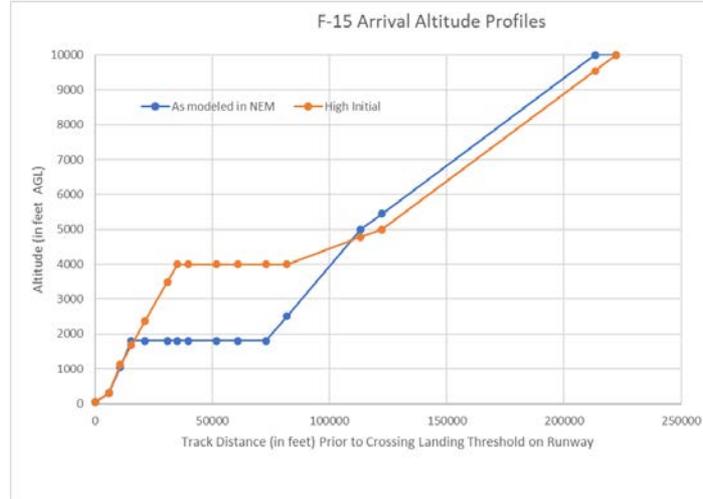


F-15 “High Initial” Approach Procedure

HMMH modeled the effect of all F-15 overhead break arrivals changing to a “High Initial” approach procedure

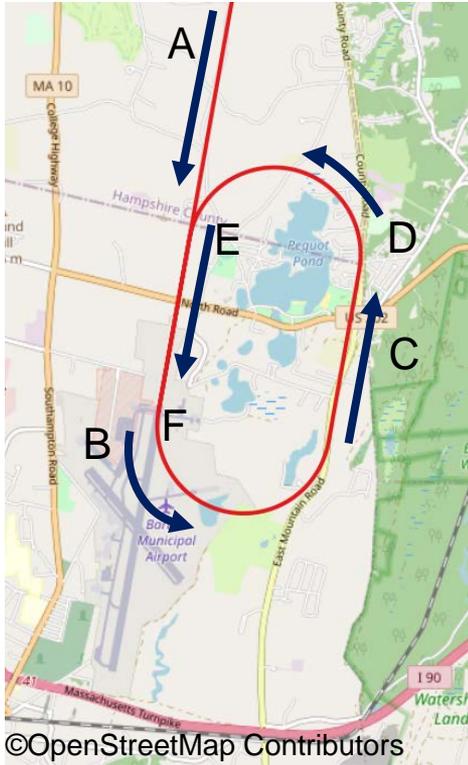


NEM Modeled F-15 Overhead Tracks

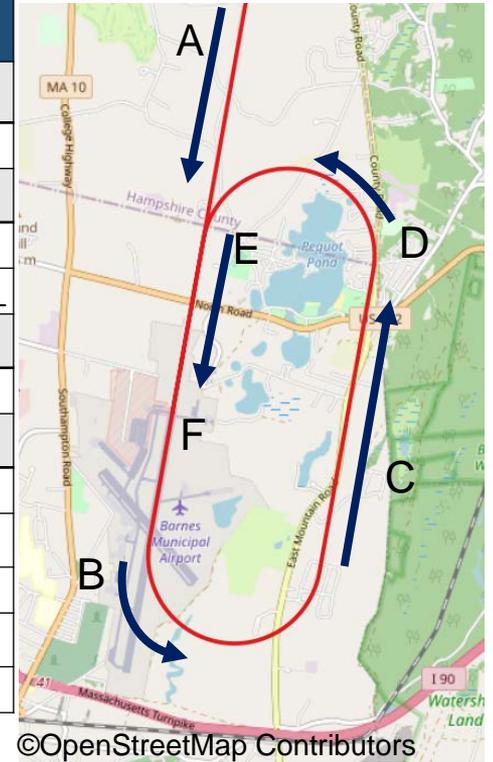


Proposed “High Initial”

F-15 "High Initial" Approach Procedure



No Action	Proposed "High Initial"
	A
Level flight, 1,800 FT MSL	Level flight, 4,000 FT MSL
	B
Left turn over runway end	Left turn over mid field
Level flight, 1,800 FT MSL	Start Descent from 4,000 ft MSL
	C
Level flight, 1,800 FT MSL	Continue Descent
	D
Start Descent from 1,800 ft MSL	Continue Descent
	E
Runway 20 final approach	Runway 20 final approach
	F
Land on Runway 20	Land on Runway 20

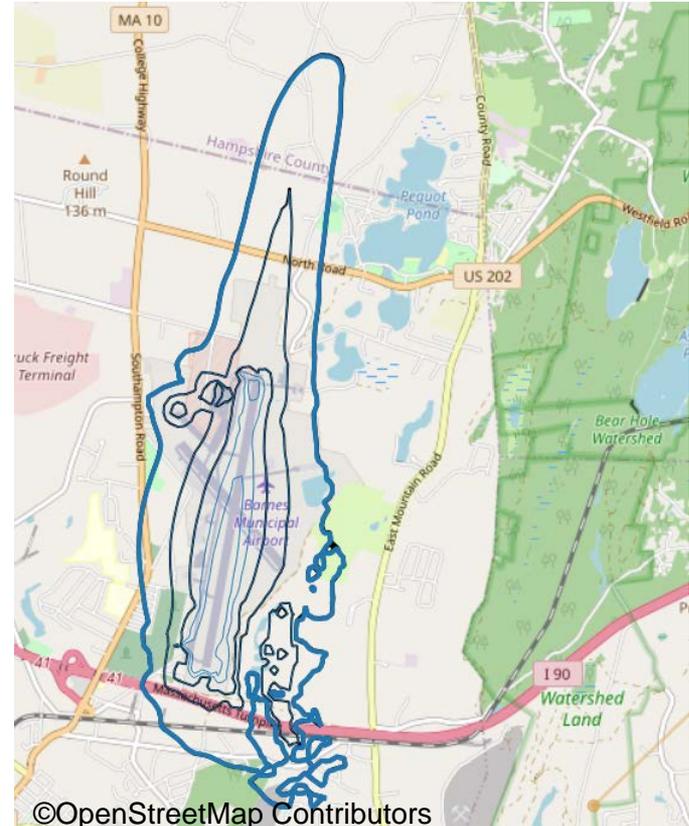


NEM Modeled F-15 Overhead Tracks

Proposed "High Initial"

Analysis results of implementing a “High Initial” approach procedure:

- Up to a 3-dB reduction in single-event noise levels (under sections A through D of the procedure, which includes no noise-sensitive land uses)
- No improvement in compatible land use
- No discernable change to the DNL 65 dB contour



LU1 - Voluntary Acquisition of Eligible Residential Structures

- Acquisition of residential land within the 65+ DNL contour
- The City prefers to limit acquisition and prioritize sound insulation, to allow for neighborhood continuity and to retain taxable property
- The TAC recommends land acquisition for FAA approval

LU2 – Residential Sound Insulation Program

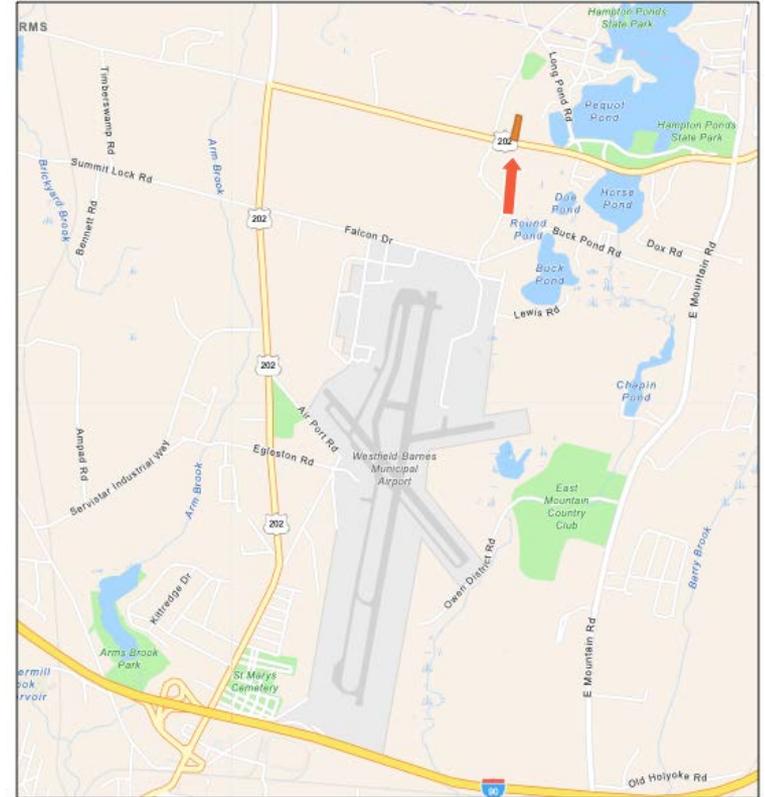
- Voluntary sound insulation of eligible structures in the 65 and 70 dB DNL contours (up to 75 dB DNL) with an avigation easement
- This is the City's preferred noise mitigation measure going forward
- The TAC recommends residential sound insulation for FAA approval

LU3 – Remedial Easement Acquisition

- Avigation easement is conveyed in exchange for a one time cash payment
- The TAC recommends remedial acquisition, but anticipates participation will be low given preference for sound insulation

LU4 – Sound Insulate Places of Worship

- One place of worship, Word of Grace Church, is within the 65+ dB DNL contour
- Sound insulation treatments would be provided in exchange for an aviation easement
- The TAC recommends the measure for FAA approval, but notes the sound insulation of residential structures will take priority over places of worship



LU5 – Preventive Easement Acquisition

- Voluntary acquisition of aviation easements for undeveloped land within the current 65 dB DNL contour
- The TAC recommends the measure for FAA approval. A review of undeveloped land is underway, and will be submitted as part of the NCP Update

LU7 - Voluntary Acquisition of Undeveloped Land

- The City would purchase incompatibly-zoned undeveloped land, and rezone to a compatible use
- The TAC recommends for FAA approval. While not previously recommended in 2017 NCP due to cost, acquiring land adjacent to the Airport would allow for compatible aviation use of the property

LU6 – Modify Existing Zoning

- The City would evaluate undeveloped land with incompatible zoning classifications, and propose rezoning that would be compatible with aircraft noise
- The TAC recommends this measure for FAA approval, noting that any modifications would need to be reviewed and approved by the City Council. A review of potential parcels is ongoing and will be included in the NCP Update

LU8 – Airport Noise Overlay District (ANOD)

- A comprehensive zoning district based on aircraft noise exposure
- Examples of similar zones include Dane County Regional Airport and Piedmont Triad International Airport
- The TAC does not recommend due to difficulty of implementation and possible community confusion & resistance

LU9 – Environmental Review

- Airport staff would continue to participate in administrative review of proposed land uses within the 65+ DNL contours or within the ANOD
- It is recommended that the City expands the area that is reviewed in order to further protect the Airport
- The TAC recommends environmental review for FAA approval

LU10 – Real Estate Disclosure

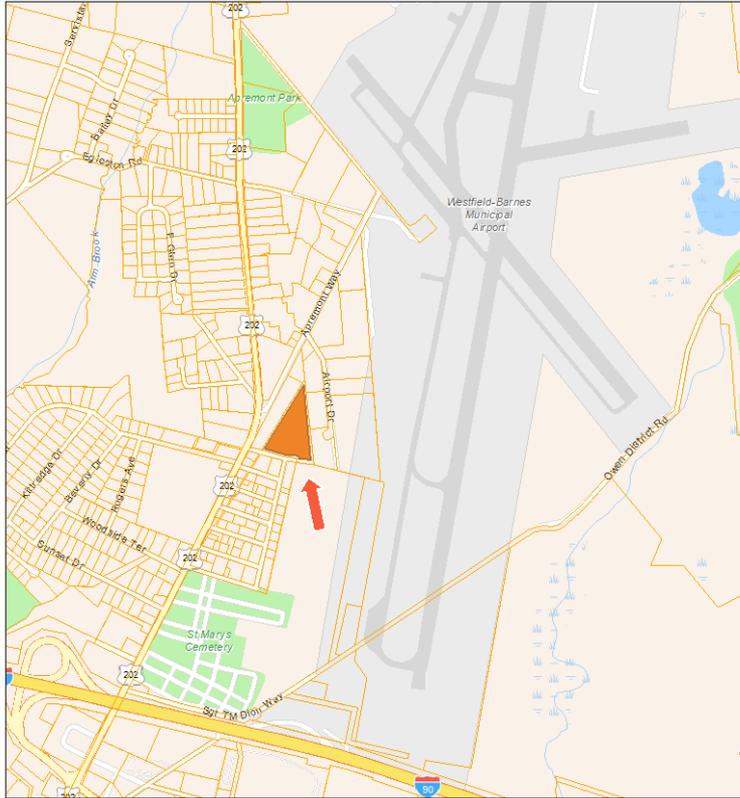
- A disclosure would be developed and provided to prospective buyers of noise-sensitive parcels within the 65+ DNL contour, the ANOD, or other area boundaries
- While potentially useful, the TAC feels enforcement of the measure would be difficult unless legally required. There is little incentive for property sellers or real estate agents to voluntarily implement

LU11 – Modify Subdivision Regulations

- The City would pursue the inclusion of noise disclosures, sound attenuation standards, and/or avigation easements if a new subdivision is approved in proximity to the Airport
- The TAC recommends the measure for FAA approval

LU12 – Building Code Modifications

- The City would work with appropriate entities to modify code requirements, such as the use of sound insulation materials
- Modifications would apply to new construction and major changes to existing structures
- The TAC does not recommend the measure for FAA approval. It would require changes to state-wide building code



- LU13 – Acquire Arbor Mobile Home Park and Relocate the Residents
- The City would acquire the property and relocate the residents
 - Mobile homes cannot be effectively sound insulated
 - The TAC does not recommend this measure for FAA approval. The landowner and mobile-home owners had indicated they are not interested in selling; this will be confirmed as part of the NCP Update

Sales Assistance Program

- Owners wishing to relocate outside the noise impact area are provided with assistance in the sale of their home, in exchange for an aviation easement
- Home is appraised and sold on open market
- The TAC does not recommend the measure for FAA approval due to high cost, risk, long program timeline, and anticipated low participation

Purchase Assurance Program

- Owners wishing to relocate outside the noise impact area are able to sell their property directly to the City, in exchange for an aviation easement
- Home is sound insulated and resold on open market
- The TAC does not recommend the measure for FAA approval due to high cost, risk, long program timeline, and anticipated low participation

- PM1 – Re-Establish a Noise Mitigation Advisory Committee (NMAC)
- The committee would advise and assist the City and Airport with the management of aircraft noise-related issues on a regular basis
 - The TAC recommends the measure for FAA approval

- PM2 – Community Awareness Program (CAP)
- A CAP would be maintained to communicate Airport and aircraft noise updates that could affect the public, such as changes in operations and updates to land use projects
 - The TAC recommends a CAP for FAA approval. The City will continue to implement

PM3 – Expand the Fly Quiet Program

- Would educate general aviation pilots on aircraft noise and mitigation, with the goal of increasing awareness of noise effects on the surrounding community
- The TAC recommends the measure for FAA approval

PM4 – Periodic Evaluation of Noise Exposure

- Airport operations would be regularly monitored to assess noise exposure
- The Noise Exposure Map would be updated every five years or if a potential change of 1.5 dB DNL or greater has occurred to noise-sensitive land uses
- The TAC recommends this measure for FAA approval

Noise Monitoring System and/or Periodic Noise Measurements

- Data from a noise monitoring system has no influence on the noise contour or on program eligibility
- Operation and maintenance of a system is cost prohibitive

- The TAC does not recommend a noise monitoring system or periodic noise measurements

	2022												2023						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 Public Information Meeting			◆																
2 Evaluate & Recommend Compatibility Measures																			
3 Advisory Committee Meetings			◆	◆	◆		◆	◆											
4 Prepare Draft NCP																			
5 FAA & City Review																			
6 Prepare Public Draft NCP																			
7 Publish/Distribute Draft NCP																			
8 Public Review Period																			
9 Public Hearing																			
10 Respond to Comments & Finalize NCP																			
11 Submit Final NCP / Public Comments to FAA																			
12 FAA Review Period																			
Legend:  Consultant Task  Public Involvement  FAA Review																			

Public Involvement

- Public Informational Meeting
- Advisory Committee (local jurisdictions, neighborhood organizations, etc.)
- Public Hearing and Comment Period

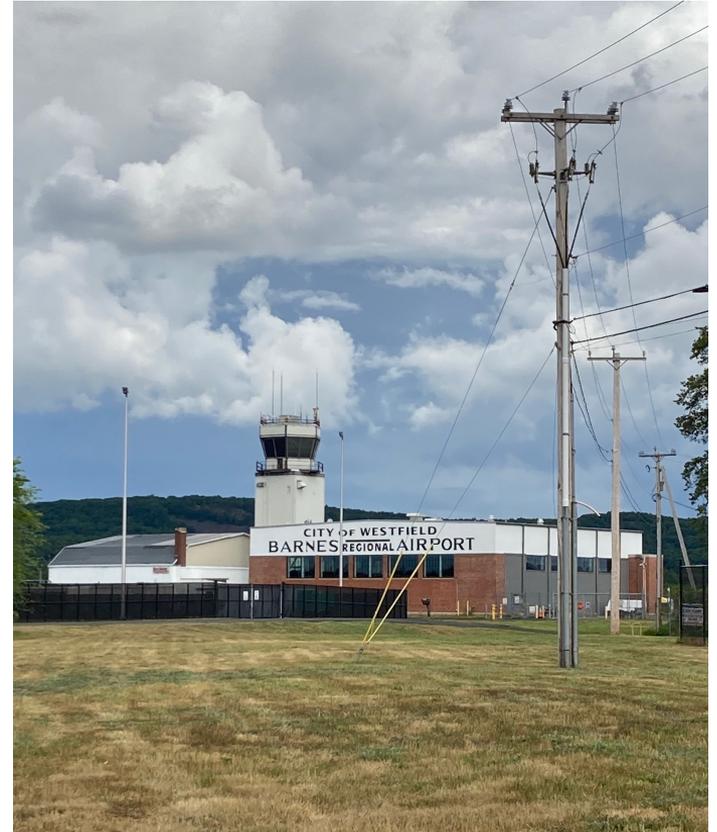
TAC MEMBER DISCUSSION



NOISE COMPATIBILITY PROGRAM UPDATE Technical Advisory Committee Meeting #5

September 13th, 2022

- Noise Compatibility Program (NCP) Overview
- NCP Recommended Measures Confirmation
- Project Schedule
- TAC Member Discussion



Noise Compatibility Program Overview

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

•Airport recommends NCP measures

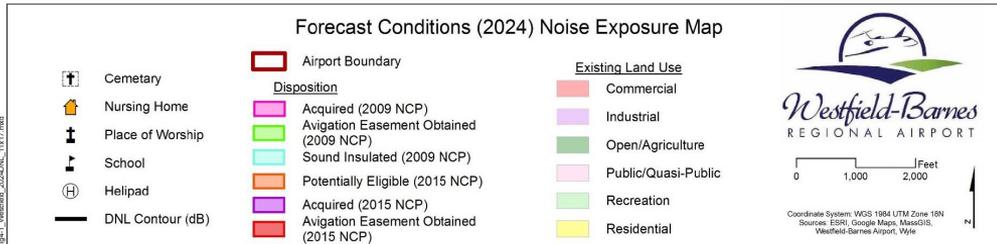
•FAA approves or disapproves each recommended measure

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective “package” of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

DNL Band (dBA)	Non-Compatible Properties	Acquired Properties	Avigation Easement	Sound Insulated Properties	Total Addressed to Date	Potential Properties to be Addressed
65-70	271	23	4	49	76	195
70-75	6	1	2	-	3	3
75+	0	0	0	0	0	0
Total	277	24*	6	49	79	198

*The 2019/2024 NEM noted the City acquired 20 properties. Since 2019 the Airport has acquired an additional 4 properties for a total of 24 properties.



Key for 2024 Noise Exposure Map (right)



Existing Noise Abatement Measures

Existing NCP Measure	Recommendation
Aircraft departing Runway 02 turn left to 360-degree heading upon crossing airport boundary	Modify existing measure slightly to begin implementation with the ANG and then possibly to all aircraft
Aircraft departing Runway 15 maintain runway heading until crossing East Mountain Ridgeline	Continue existing measure as written
Aircraft departing Runway 20 maintain runway heading until 3 miles south of the Airport boundary	Modify existing measure slightly to note limitations and reasons for low compliance
Prohibit intersection departures on Runway 33	Continue existing measure as written

Additional Noise Abatement Measures

Potential NCP Measure	Recommendation
ANG aircraft maintain 4,000 ft. MSL altitude for the high initial approach and use minimum power required on final approach	Include this new measure as recommended by the ANG staff on the TAC
Helicopters use existing noise abatement approach and departure procedures	Include these current noise abatement measures in the NCP
ANG aircraft to depart using military power (no afterburner) unless required. When afterburner is used, afterburner to be terminated prior to the end of the airfield border	Include this current practice in the NCP
Runway 02 is the preferred ANG noise abatement departure runway	Include this current practice in the NCP

Existing NCP Measure	Recommendation
Provide sound insulation to eligible residential structures	Modify existing measures to include current FAA guidelines on implementation and combine the two sound insulation measures
Provide sound insulation to eligible places of worship	
Acquire residential land	
Acquire undeveloped land	
Purchase remedial avigation easements	Modify existing measures to combine them into one measure
Purchase preventive avigation easements	
Implement an Airport Noise Overlay District (ANOD)	Remove as a recommended NCP measure

Existing NCP Measure	Recommendation
Modify local zoning	Continue existing measure as written
Modify local building codes	Remove as a recommended NCP measure
Modify local subdivision regulations	Continue existing measure as written
Continue Airport review of proposed land use development within the 65+ db DNL contour	Modify measure slightly to include addition of NEM contour layer to City GIS
Require real estate disclosures	Modify measure slightly to pursue informal disclosures
Acquire Arbor Mobile Home Park	Remove as a recommended NCP measure

Potential NCP Measure	Recommendation
Provide sales assistance	Do not include in the NCP
Provide purchase assurance	Do not include in the NCP

Existing Program Management Measures

Existing NCP Measure	Recommendation
Re-establish a Noise Mitigation Advisory Committee (NMAC)	Continue existing measure as written
Implement a Community Awareness Program	Modify measure slightly to continue the Program
Expand the Fly Quiet Program	Continue existing measure as written
Evaluate Noise Exposure Periodically	Modify measure slightly to comply with current FAA guidance

Additional Program Management Measures

Potential NCP Measure	Recommendation
Install an aircraft noise monitoring system	Do not include in the NCP
Conduct periodic noise monitoring of aircraft	Do not include in the NCP

Summary – Recommended NCP Measures

Noise Abatement Measures (8)	Land Use Measures (7)	Program Management Measures (4)
Aircraft departing Runway 02 turn left to 360-degree heading upon crossing airport boundary	Provide sound insulation to eligible residential and place of worship structures	Re-establish the Noise Mitigation Advisory Committee (NMAC)
Aircraft departing Runway 15 maintain runway heading until crossing East Mountain Ridgeline	Acquire identified residential and vacant land as they become available	Continue the Community Awareness Program
Aircraft departing Runway 20 maintain runway heading until 3 miles south of the Airport boundary	Acquire aviation easements	Expand the Fly Quiet Program
Prohibit Intersection departures on Runway 33	Modify local land use zoning	Periodically evaluate aircraft noise exposure and land use compatibility
ANG aircraft maintain 4,000 ft. MSL altitude for the high initial approach and use minimum power required on final approach	Modify local subdivision regulations	
Helicopters use noise abatement approach and departure procedures	Review proposed land use development within the 65+ DNL contour	
ANG aircraft to depart using military power (no afterburner) unless required. When afterburner is used, afterburner to be terminated prior to the end of the airfield border	Require real estate disclosures	
Runway 02 is the preferred ANG noise abatement departure runway		

	2022												2023						
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1 Public Information Meeting			◆																
2 Evaluate & Recommend Compatibility Measures																			
3 Advisory Committee Meetings			◆	◆	◆		◆	◆											
4 Prepare Draft NCP																			
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8 Public Review Period																			
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11 Submit Final NCP / Public Comments to FAA																			
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<p>Legend:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Consultant Task </div> <div style="text-align: center;">  Public Involvement </div> <div style="text-align: center;">  FAA Review </div> </div>																			

Next Steps:

- Finalize NCP Draft
- Airport, City, and FAA Draft Review
- Public Hearing and Comment Period

TAC MEMBER DISCUSSION



(March 10, 2022)

Legal Notice
City of Westfield
Westfield-Barnes Regional Airport

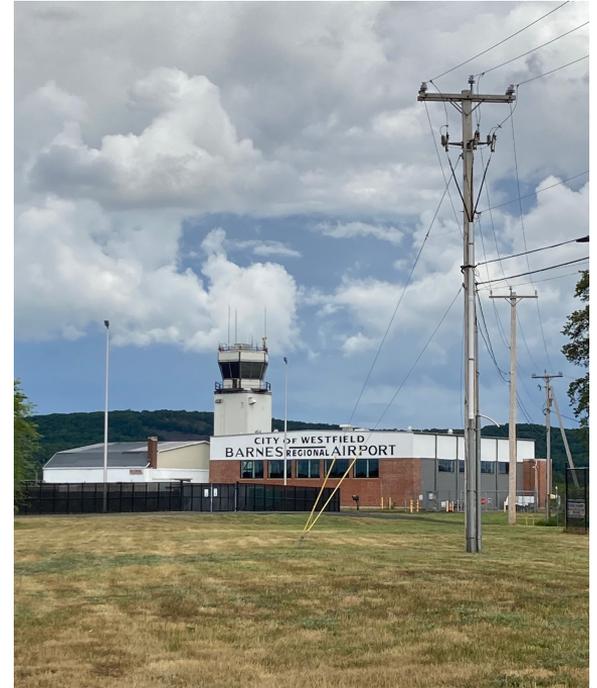
Legal Notice is hereby given that a Public Information Meeting will be held on Wednesday, March 16th, 2022 at 6:00 pm at Westfield Intermediate School, 350 Southampton Road, Westfield, MA 01085. This meeting will give an overview of the Part 150 Noise Compatibility Program update process that is being undertaken by Westfield-Barnes Regional Airport. There will be a formal presentation followed by a question and answer session regarding the Airport's noise program.

All community members are invited to attend; public comments and questions are welcome.

WELCOME
to the
NOISE COMPATIBILITY PROGRAM UPDATE
Public Information Meeting

March 16, 2022

- Introductions
- Part 150 Overview
- Existing Noise Exposure Map (NEM)
- Land Use Compatibility Guidelines
- Existing Noise Compatibility Program (NCP)

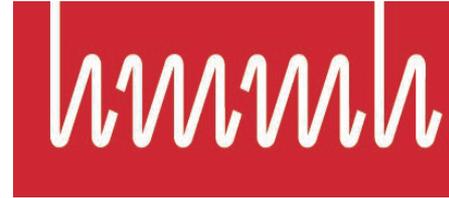




Diane Carter, Principal-in-Charge
Brianna Whiteman, Assistant Project Manager
Christina Mastrantonio, Consultant

Responsible for:

- Overall Project Management/Client/Agency Coordination
- Community Outreach
- Land Use Measures
- Noise Implementation Plan



Gene Reindel, Principal-in-Charge
Kate Larson, Project Manager
Dominic Scarano, Assistant Project Manager

Responsible for:

- Operational and Administrative Measures
- NCP Documentation
- Compliance with Federal Regulations

- Westfield-Barnes Regional Airport (BAF)
- Westfield Airport Commission
- City of Westfield
- Town of Southampton
- Army National Guard
- Air National Guard
- Ross Aviation
- MassDOT Aeronautics
- Federal Aviation Administration (FAA) - *advisory*

City of Westfield

- As airport owner and operator, the City is responsible for conducting the Noise Compatibility Program (NCP) analysis, submitting the study for approval, and implementing approved measures
- Consulting team is retained to conduct technical work and prepare documentation related to the NCP process

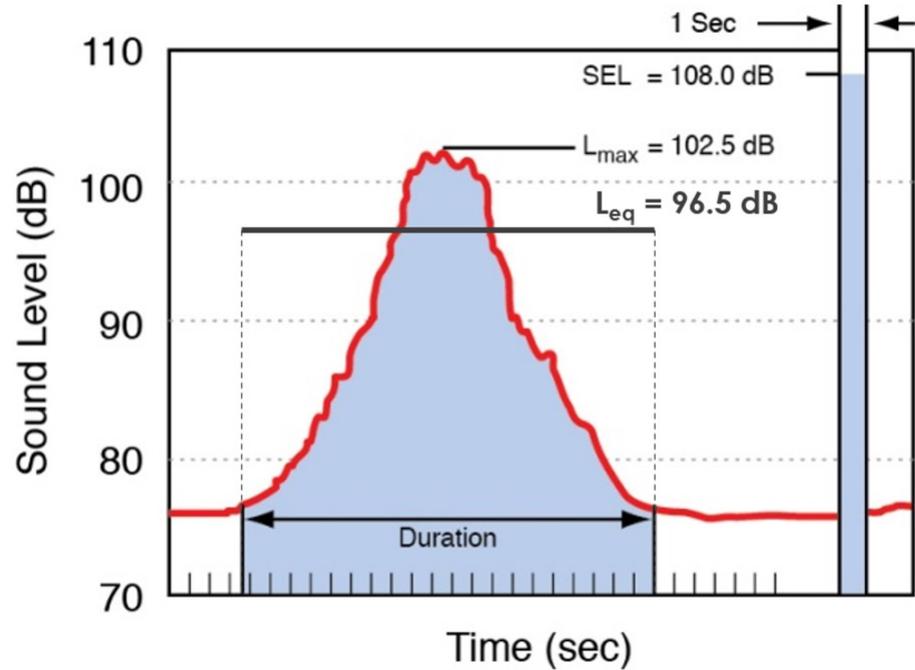
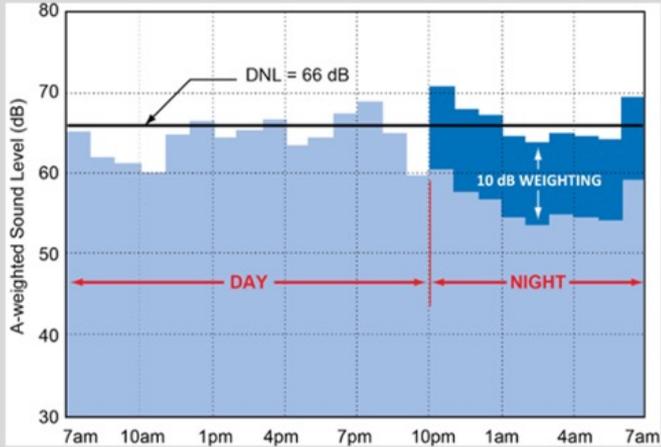
Federal Aviation Administration (FAA)

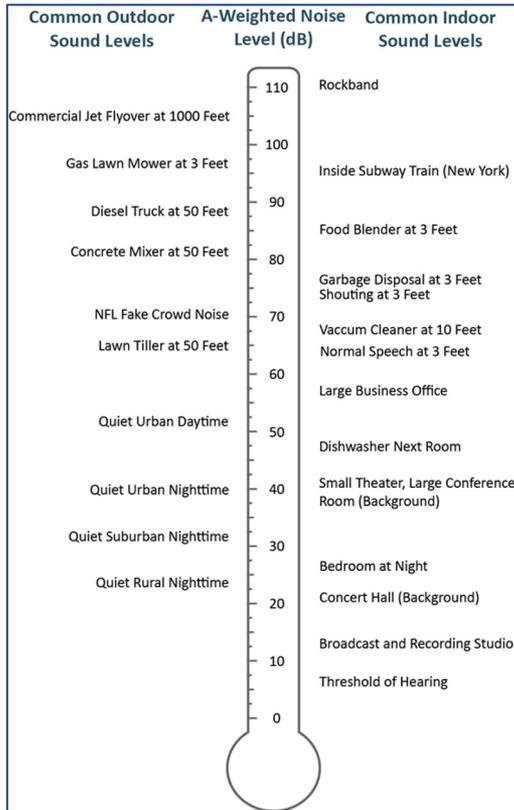
- Determines whether the NCP process has met Part 150 requirements and approves individual noise mitigation measures

Technical Advisory Committee (TAC)

- Provides representation for stakeholder organizations, including local jurisdictions, airlines, local business interests

- Maximum Noise Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Hourly Noise Level (HNL or L_{eq1h})
- Day Night Average Sound Level (DNL)



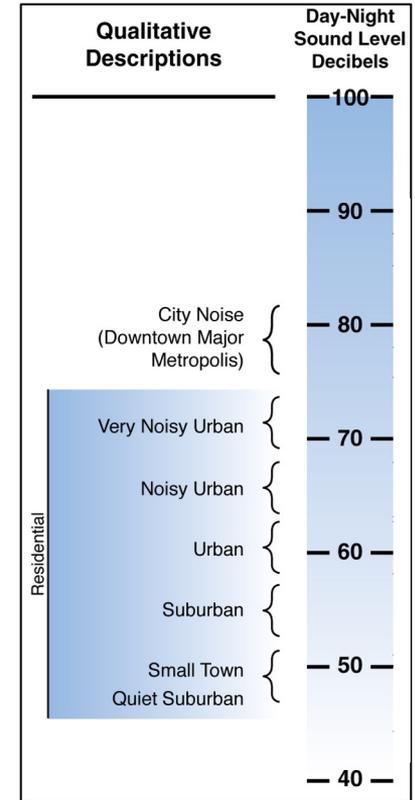


- **A-weighted decibel (dBA)**

- Reflects the manner humans hear different pitches of sound
- All federal agencies have adopted dBA for environmental studies
- dBA is the basis for different noise metrics, including maximum (Lmax) and energy averages

- **Day–Night Average Sound Level (DNL or Ldn)**

- Cumulative sound measure
- Applies a 10-fold weighting to nighttime noise (from 10pm to 7am)
- Used by all federal agencies that deal with aviation noise



The Federal Aviation Administration (FAA) developed the Part 150 Program in response to the federal Aviation Safety and Noise Abatement Act of 1979 (“ASNA”)

- Codified under Title 14 of the Code of Federal Regulations (CFR) Part 150
- Formal citation is “14 CFR Part 150,” informal is “Part 150”
- Formal title is “Airport Noise Compatibility Planning”

Voluntary FAA-defined process for airport noise studies

- 250+ airports have participated

Why do airports participate? Primary reasons include:

- Access to FAA funding of some approved measures
- Process is comprehensive, well-established, and understood

Part 150 prescribes standards and systems for:

- Measuring noise
- Estimating cumulative noise exposure using computer modeling
- Describing noise exposure
- Coordinating with local land use agencies
- Documenting the analytical process
- Submitting the documentation to FAA
- FAA and public review processes
- FAA approval or disapproval process

Consultation required with:

- All local, state, and federal entities with control over land use within DNL 65+ dB
- FAA regional officials
- Regular aeronautical users of the airport
- All parties interested in reviewing and commenting on the draft reports

Two primary elements:

- Noise Exposure Map (NEM)
- Noise Compatibility Program (NCP)

Detailed FAA guidance at:

www.faa.gov/airports/environmental/airport_noise/

BAF NEM Update completed in 2019

- 2019 (Existing Condition) and 2024 (Forecast) NEMs
- Within 65 dB DNL contour
 - Generalized land use categories
 - Historic properties, schools, places of worship, health care facilities, other “discrete” sensitive uses

DNL Band (dBA)	Program to date with 2024 NEM					2019 Newly Incompatible Properties*	GRAND TOTAL	Potential Properties to be Addressed **
	Acquired Properties	Avigation Easement	Sound Insulated Properties	Not Addressed	Total			
65-70	19	4	49	49	121	150	271	199
70-75	1	2	-	2	5	1	6	3
75+	-	-	-	-	-	-	-	-
Total ≥ 65	20	6	49	51	126	151	277	202

Notes: property was counted if any portion of the parcel is within the DNL band; Arbor Mobile Home Park located on Southampton Rd is excused.

* includes some parcels located outside of the DNL 65 dB.

** equals those not addressed in the current Program plus those newly incompatible

Land Use	DNL <65 dB	DNL 65-70 dB	DNL 70-75 dB	DNL > 75 dB
Residential	Compatible	Incompatible ⁽¹⁾	Incompatible ⁽¹⁾	Incompatible
Mobile home park	Compatible	Incompatible	Incompatible	Incompatible
Transient lodgings	Compatible	Incompatible ⁽²⁾	Incompatible ⁽²⁾	Incompatible ⁽²⁾
Schools	Compatible	Incompatible ⁽³⁾	Incompatible ⁽³⁾	Incompatible
Hospitals and nursing homes	Compatible	25 ⁽⁴⁾	30 ⁽⁴⁾	Incompatible
Churches, auditoriums and concert halls	Compatible	25 ⁽⁴⁾	30 ⁽⁴⁾	Incompatible

⁽¹⁾ Measures are required to achieve 25 to 30 dB of noise level reduction for aircraft noise from outside to inside.

⁽²⁾ "Transient lodgings" include, but are not limited to, hotels and motels.

⁽³⁾ Measures are required to achieve 25 to 30 dB of noise level reduction for aircraft noise from outside to inside.

⁽⁴⁾ The measures to achieve NLR of 25 or 30 dB must be incorporated into design and construction of structure.

• Airport recommends NCP measures

• FAA approves or disapproves each recommended measure

Objectives of proposed measures:

- **Reduce** exposure over incompatible uses
- **Mitigate** exposure where it cannot be reduced to compatible levels
- **Limit** growth in exposure over incompatible uses
- **Prevent** introduction of new incompatible uses

Land Use strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise Abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measures

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

Analysis and Selection Process

- 1) Evaluate effectiveness in addressing objectives
- 2) Evaluate feasibility (economic, operational, safety, etc.)
- 3) Select most effective “package” of measures
- 4) Identify implementation responsibilities, schedule, etc.
- 5) If not recommended, document reason(s)

1990 – NEM & NCP are Produced by the City,
Receive FAA Approval

2009 – The City Updates the NEM & NCP

2015 – NEM is Updated and Receives FAA
Approval

2016 – NCP is Updated; Receives FAA
Approval in 2017

2019 – NEM is Updated to Model Civilian
Aircraft with AEDT, Receives FAA Approval

2021 – The City Begins the NCP Update Process

Noise Abatement Measures*:

- Runway 15/33 Departure Procedures
- Runway 02/20 Departure Procedures
- Encourage Equipment-Guided Navigation

*Implemented but not FAA-approved measures in current NCP

Administrative Measures:

- Noise Mitigation Advisory Committee
- Periodic Evaluation of NEM/NCP
- Fly Quiet Program
- Community Awareness Program

Land Use Measures:

- Land Acquisition
- Residential Sound Insulation
- Place of Worship Sound Insulation
- Remedial Easement Acquisition
- Land Use Zoning
- Airport Noise Overlay District
- Building Code Modifications



	2022												2023							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
1 Public Information Meeting			◆																	
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9 Public Hearing											◆									
10 Respond to Comments & Finalize NCP											■		■							
11 Submit Final NCP / Public Comments to FAA													◆							
12 FAA Review Period													■							
Legend:																				
■ Consultant Task						■ Public Involvement						■ FAA Review								

Public Involvement

- Public Informational Meeting
- Advisory Committee (local jurisdictions, neighborhood organizations, etc.)
- Public Hearing and Comment Period

TAC Meeting 2

Wednesday April 27, 2022

- Airport Operational Measures

TAC Meeting 3

Wednesday May 25, 2022

- Land Use Measures
- Administrative Measures

TAC Meeting 4

Wednesday June 29, 2022

- Finalize Recommendations

Questions?



Should you have any additional questions, please contact:

Brianna Whiteman
(617) 790-3747 ext. 2221
bwhiteman@jonespayne.com

Thank you again for participating and we look forward to continuing the conversation.



Westfield-Barnes Regional Airport
 Noise Compatibility Program Update - Public Information Meeting
 DATE: March 16th, 2022
 LOCATION: Westfield Intermediate School
 SIGN-IN SHEET

#	NAME	ADDRESS/COMPANY NAME	PHONE NUMBER EMAIL ADDRESS
1	Lisa Berg	36 Lynnwood Dr	413 626-6826
2	Terry Barron	27 Lynnwood Dr	4136272941
3	Laurie McMahon	26 Lynnwood Dr	413-485-8860
4	Susan Feist	15 Aldrich Dr	413-5305584
5	Louie Costello	206 Holyoke Rd	413-306-7812
6	John & Leanne Mickel	26 Sandy Hill Rd	
7	Kelly Bouchard	148 Holyoke Road	413 572-2585
8	Margaret McKinstry	28 Sandy Hill Rd	413 642 0122
9	GARY CLARK	28 Sandy Hill Rd	413 642 0122
10	Jessua Brudenie	Florence St	Wallstar19@hotmail. com

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#	NAME	ADDRESS/COMPANY NAME	PHONE NUMBER EMAIL ADDRESS
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12			
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28			
29			
30			

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#	NAME	ADDRESS/COMPANY NAME	PHONE NUMBER EMAIL ADDRESS
31	Fundador Larrin	410 Sandy Hill Rd	flarrin@niestek.com
32	Leonard DeLude	308 Buck Pond Rd.	537-9675
33	Gordon Snyder + Florence Snyder	342 Holyoke Rd	562-4454
34	Mary & Paul	61 Wood Rd	413-454-3140
35	Karen Robert	433 Holyoke Rd	413-528-9826
36	Genie Muller	120 Beverly Dr.	413-568-8590
37	Mary Ann Babiowski	114 ROGERS AVE	413-568-8562
38	Bill Dugan	35 Kirtledge Dr	860-539-2115
39	Meridith Salois	15 Meadowbrook Ln	413.280.6190
40	MIKE MCCABE	8 HAWTHORNE AV	

NOISE COMPATIBILITY PROGRAM UPDATE

Public Information Meeting and Hearing

February 1, 2023

- NCP Report, Recorded Presentation and Slide Deck will be available at:

<https://cityofwestfield.org/752/Westfield-Barnes-Regional-Airport>

- This meeting is being recorded
- Zoom attendees, we have muted all microphones during the presentation

- Introductions
- Review of the Part 150 Process
- Present Recommended Noise Compatibility Program (NCP)
- Questions from the Public
- Public Hearing to receive public comment regarding the recommended NCP



City of Westfield

- As airport owner and operator, the City is responsible for conducting the Noise Compatibility Program (NCP) analysis, submitting the study for approval, and implementing approved measures
- Consulting team is retained to conduct technical work and prepare documentation related to the NCP process

Federal Aviation Administration (FAA)

- Determines whether the NCP process has met Part 150 requirements and approves individual noise mitigation measures

Technical Advisory Committee (TAC)

- Provides representation for stakeholder organizations, including local jurisdictions, airport operators, local business interests



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Consultation required with:

- All local, state, and federal entities with control over land use within DNL 65+ dB
- FAA regional officials
- Regular aeronautical users of the airport
- All parties interested in reviewing and commenting on the draft reports

Two primary elements:

- Noise Exposure Map (NEM)
- Noise Compatibility Program (NCP)
 - Current phase

Detailed FAA guidance at:

www.faa.gov/airports/environmental/airport_noise/



Noise Exposure Map Updated in 2019 Resulting in:

- 2019 (Existing) and 2024 (Forecast) Conditions Contours
- Estimated 202 noise-sensitive parcels identified as non-compatible with existing aircraft noise

Noise Compatibility Program Update to Address Non-Compatible Land Uses

DNL Band (dBA)	Program To Date with 2019 Scenario					Other 2019 Newly Incompatible Properties*	GRAND TOTAL	Properties to be Addressed **
	Acquired Properties	Avigation Easement	Sound Insulated Properties	Not Addressed*	Total			
65-70	19	4	49	49	121	150	271	199
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• Airport recommends NCP measures

• FAA approves or disapproves each recommended measure

Land Use Strategies

- Land acquisition
- Sound insulation
- Avigation easements
- Prevention
- Land use controls
- Real estate disclosures

Noise abatement strategies

- Flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Use restrictions

Programmatic measure

- Implementation
- Promotion
- Monitoring
- Reporting
- NEM updating
- NCP revision

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2016 – NCP is Updated; Receives FAA
Approval in 2017

2019 – NEM is Updated to Model Civilian
Aircraft with AEDT, Receives FAA Approval

2021 – The City Begins to update the NCP

- Westfield-Barnes Regional Airport (BAF)
- Westfield Airport Commission
- City of Westfield
- Town of Southampton
- Army Aviation Support Facility (AASF)
- Air National Guard (ANG)
- Atlantic Aviation
- MassDOT Aeronautics
- Federal Aviation Administration (FAA) - *advisory*

TAC Meeting 1

Wednesday March 16, 2022

- Introduction to Part 150

TAC Meeting 2

Wednesday April 27, 2022

- Overview of NCP elements
- Evaluation of Noise Abatement Measures

TAC Meeting 3

Wednesday May 25, 2022

- Evaluation of Land Use Measures
- Evaluation of Program Management Measures

TAC Meeting 4

Wednesday July 27, 2022

- Review of Noise Abatement Analysis

TAC Meeting 5

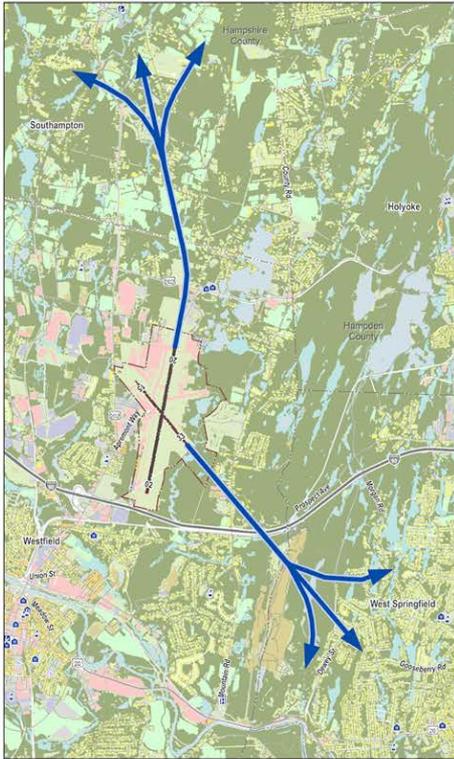
Tuesday September 13, 2022

- Finalize NCP Update Recommendations

Airport Recommended Noise Abatement Measures

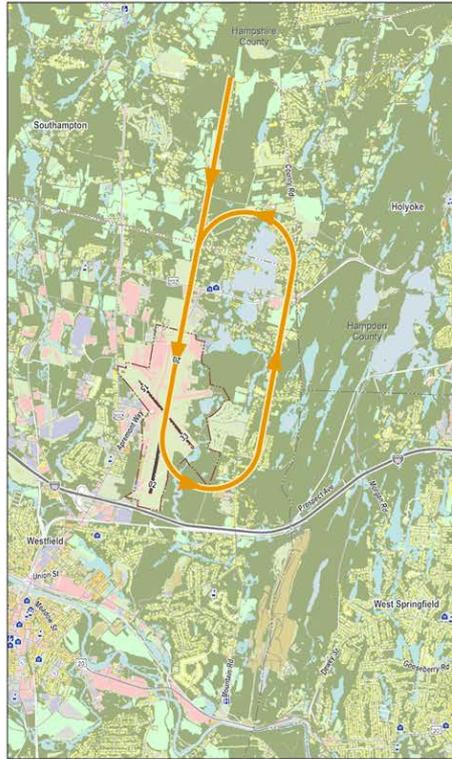
NCP Measure No.		Noise Abatement Measure	Existing / New	Implementation Status
20 23	20 16			
NA-1	NA1	Maintain Runway Heading to East Mountain Ridge after Departing Runway 15	Existing	Implemented
NA-2	NA1	Prohibit the Use of Intersection Departures on Runway 33	Existing	Implemented
NA-3	NA2	Turn to 360-degrees Heading after Departing Runway 02	Existing	Not Implemented
NA-4	N/A	Barnes ANG Preferential Runway Use Program	Existing	Implemented
NA-5	N/A	Barnes ANG Fighter Aircraft "High Initial" Approach Procedures	NEW	N/A
NA-6	N/A	Barnes ANG Noise Abatement Departure Procedures	Existing	Implemented
NA-7	N/A	Helicopter Noise Abatement Approach Procedures to Runway 02	Existing	Implemented
NA-8	N/A	Helicopter Noise Abatement Departure Procedures from Runway 02	Existing	Implemented
NA-9	N/A	Helicopter Noise Abatement Approach Procedures to Runways 15 and 33	Existing	Implemented
NA-10	N/A	Helicopter Noise Abatement Departure Procedures to Runways 15 and 33	Existing	Implemented

Measures from Previous NCP Recommended for Continuation



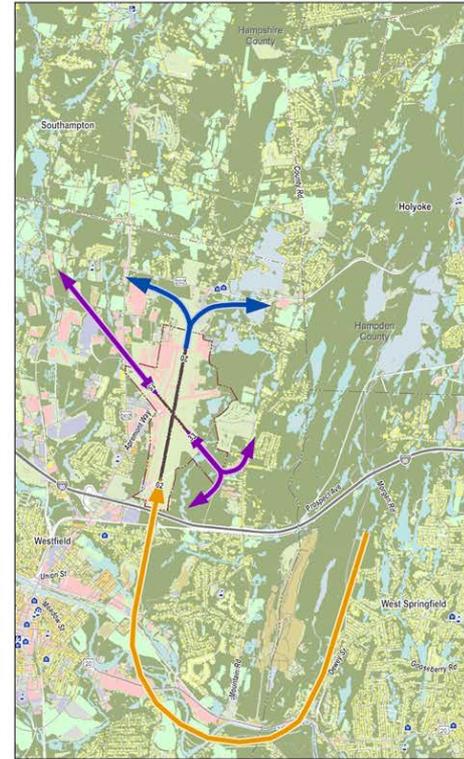
- NA-1: Maintain Runway Heading to East Mountain Ridge after Departing Runway 15
- NA-2: Prohibit the Use of Intersection Departures on Runway 33
- NA-3: Turn to 360-degree Heading after Departing Runway 02

Existing Air National Guard Noise Abatement Measures



- NA-4: Barnes ANG Preferential Runway Use Program
- NA-5: Barnes ANG Fighter Aircraft "High Initial" Approach Procedures
- NA-6: Barnes ANG Noise Abatement Departure Procedures

Existing Helicopter Noise Abatement Measures



- NA-7: Helicopter Noise Abatement Approach Procedures to Runway 02
- NA-8: Helicopter Noise Abatement Departure Procedures from Runway 02
- NA-9: Helicopter Noise Abatement Approach Procedures to Runways 15 and 33
- NA-10: Helicopter Noise Abatement Departure Procedures to Runways 15 and 33

Airport Recommended Land Use Measures

NCP Measure No.		Land Use Measure	Existing / New	Implementation Status
20 23	20 16			
LU-1	LU2,4	Sound Insulate Noise-Sensitive Structures	Existing	Partially Implemented
LU-2	LU1	Acquire Non-Compatible Residential Property	Existing	Partially Implemented
LU-3	LU3,5	Acquire Avigation Easements	Existing	Partially Implemented
LU-4	LU6	Modify Local Land Use Zoning	Existing	Not Implemented
LU-5	LU11	Modify Local Subdivision Regulations	Existing	Not Implemented
LU-6	LU9	Review Proposed Land Use Development w/in the 65 dB and higher contours	Existing	Implemented
LU-7	LU7	Voluntary Acquisition of Undeveloped Land	Existing	Not Implemented
LU-8	LU10	Voluntary Real Estate Disclosures	Existing	Not Implemented
LU-9	LU13	Acquire the Arbor Mobile Home Park	Existing	Not Implemented

Airport Recommended Program Management Measures

NCP Measure No.		Program Management Measure	Existing / New	Implementation Status
2023	2016			
PM-1	PM1	Re-establish and Maintain a Noise Mitigation Advisory Committee	Existing	Implemented and subsequently disbanded
PM-2	PM2	Continue the Community Awareness Program	Existing	Implemented
PM-3	PM3	Expand the Fly Quiet Program	Existing	Partially Implemented
PM-4	PM4	Periodically Evaluate Noise Exposure	Existing	Implemented

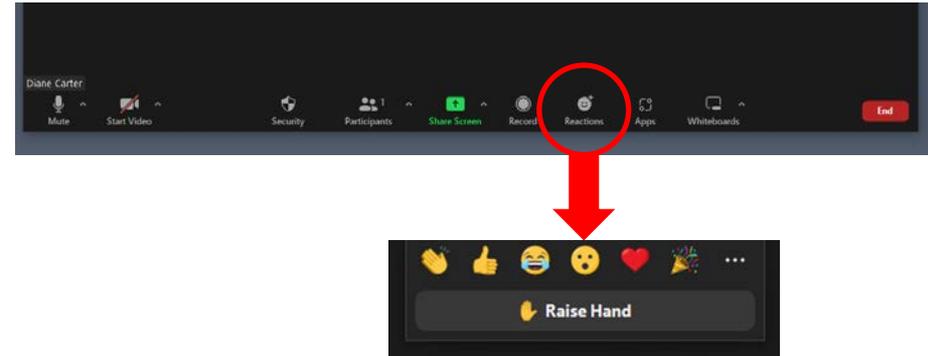
Next Steps to Finalize NCP:

- 30-day comment period ends February 17, 2023
 - Please send written comments to: bwhiteman@jonespayne.com
- Public Hearing begins following this presentation
 - We will describe the process at the end of the presentation
- Public comments and the City's response will be included in the final NCP
- Final NCP to be submitted to FAA in Spring 2023
- FAA has 180 days to review and approve individual measures

Questions Regarding Presentation & NCP Measures

- To ask a question please use the “Raise Hand” feature.
- Individuals will be recognized in the order their hand was raised.

To be recognized by the moderator



The Public Hearing is now open.

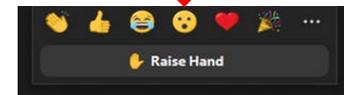
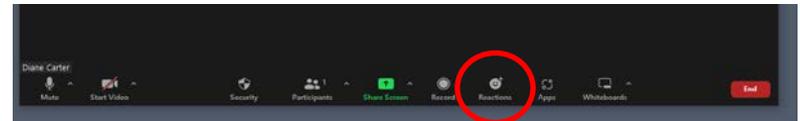
The City will now record verbal comments from the public regarding the draft noise compatibility report

In-Person Attendees:

- Please form a line in front of the court reporter
- Your comment will be recorded and will become part of the public record.
- The City will respond to the statements in the final version of the NCP report.

For Zoom Attendees:

- Please use the “raise hand” feature to be recognized.
- Comments will be received after in person attendees.



The Public Hearing is now closed.

Please send your written comments by February 17, 2023 at 5 p.m.to:

Brianna Whiteman
bwhiteman@jonespayne.com

Thank you for participating

Dear Annie

By Annie Lane



Should I encourage parents' divorce?

Dear Annie: I have never been ignorant to the fact that, in my opinion, my parents' marriage is awful. My dad is and has always been controlling and domineering. And my mom just exists and really believes it is her job to just be submissive.

But the last couple of years, particularly 2020-present, my dad has really been bad. I'm not sure if he's going through a midlife crisis or if he is just the worst man ever.

He leaves all day and does as he wills. He has come home with new cars and she has no say. I've seen her call and he doesn't answer his phone. My mom claims he hides money and spoon-feeds her finances like she's a kid. (This is nothing new, but it has gotten worse.) It's been "secret but not-so-secret" talk around the family of him supposedly cheating recently. And even more damaging, he just seems like he doesn't care for her.

I see it in his demeanor and behavior. He is cold and it's sad to see my dad be that way.

I don't live with them, and I try to stay in my own lane. But when I am around them, it's a disconnect that's horrible. It's so uncomfortable, and it makes me not want to visit.

I have informed my mom it's OK to divorce. And it's not OK to allow anyone to treat you like you're nothing; she doesn't deserve it.

I (and others in the family) am more than willing to help her leave and divorce my dad. But he's all she knows; she lives and breathes him, and she has given up on life. It's just sad that after 50 years, he is doing this.

But I have my own life, and I cannot carry people who refuse to acknowledge dysfunction. Lately, I have decided to no longer engage or be involved. I don't converse with my dad often, and I haven't confronted him because I'm concerned he'll take it out on my mom, and my mom has buried me (we don't have a great relationship in the past and has told me to stay out of how they choose to live. Yet she continues to run to me and others complaining).

I have informed her that when she's ready to divorce, I'm willing to help. But I have my own life to live. Am I wrong to move forward, build boundaries and not engage? —Concerned

Dear Concerned: This must be hard to witness. Unfortunately, one of the most difficult truths when it comes to dealing with friends and family is that

we cannot help those who do not want to help themselves.

I commend you for being proactive and communicative with your mother, but if she does not want a divorce—an enormous and frightening step to take—you cannot force it on her. Forcing yourself to suffer by getting involved in your parents' affairs will not do anyone any good.

As for your father, it is interesting that this hurtful behavior began in 2020—a time of great difficulty for many of us. It's possible he is struggling himself and taking it out on your mother. I would pull him aside and explain how hurtful his behavior is toward you and your mother, and ask if there is anything going on in his life that is causing such a change. Getting both of your parents into therapy is a worthwhile first step.

"How Can I Forgive My Cheating Partner's?" — Annie Lane's second anthology featuring favorite columns on marriage, infidelity, communication and reconciliation—is available as a paperback and e-book. Visit <http://www.creatorspublishing.com> for more information. Send questions for Annie Lane to dearannie@creators.com.

Hints from Heloise

By Ponce Kiah Marchelle Heloise Cruse Evans



Space blankets are out of this world idea

Dear Heloise: I enjoy your column in the Pasadena Star News. I'm responding to the article you recently offered the excellent idea of keeping a sleeping bag/warm blanket in the car for an emergency, especially if one lives in colder climates. Even in the more southern parts of the country, temperatures can get dangerously cold at night.

I'd like to add a suggestion to also keep at least one "space blanket" (also known as a mylar or emergency blanket) in the car.

The design of these blankets reduces the heat loss in a person's body, which would otherwise occur due to thermal radiation, water evaporation or convection.

Their low weight and compact size before unfolding make them ideal when space or weight are at a premium.

They can be easily stored in a first aid kit and in the glove compartment. And they are inexpensive, usually between \$2 to \$5. Most camping stores and big box stores have them readily available.

P.S.: A few years ago here in SoCal, we had an unusually frigid cold snap that killed plants. I have a container

garden and wrapped the plants in space blankets, and they are all still thriving. —M.T.S., Monrovia, California

SLIDESHOW PHOTO FRAMES
Dear Heloise: Adding to the hint of uploading all your photos to your computer, I took it a step further.

After I scanned all my photos, I bought a 9-by-12-inch digital photo frame that holds a huge amount of photos that you can add to or delete from at will.

The model I have has a motion detector, so it doesn't cycle through the photos when no one is around. It instead goes into slideshow mode when motion is detected, if you keep it on. They are a little pricey, but well worth it.

Now I don't have to keep a huge box of photos that sits in the closet, or even in a file on the computer that doesn't get viewed often. The smaller ones also make excellent gifts, especially if you preload photos onto it. —Dabi Robinson, Mountain Rest, South Carolina

HANDICAP PLACARDS
Dear Heloise: I was just reading your column and saw the suggestion from Jean in Connecticut about handicap placards. Remember to remove the placard

and from the mirror while driving. I see so many driving with it hanging from their mirror here in Texas.

However, if you read on the placard, it specifically says to remove it while driving. The reason for this is that it causes a blind spot, and you might not see a car when pulling into a roadway, which can cause a wreck. —Doma L., Belton, Texas

SHOPPING HINT
Dear Heloise: When shopping at Sam's, I put items in my buggy with the UPC labels facing up where they are easy to see. Then I use self-checkout and scan the items without removing them from my cart.

This saves not only time but the strain of lifting items to and from the buggy multiple times. This is especially handy when buying large or bulky items. —Ann W., Temple, Texas

Send a money-saving or interesting hint to Heloise, P.O. Box 75900, San Antonio, TX 78279-0001, fax to 1-210-HELLOISE or email it to Heloise@Heloise.com.

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LEGAL NOTICES

(January 19, 2023)

Legal Notice
City of Westfield
Westfield-Barnes Regional Airport

Legal Notice is hereby given that a Public Hearing will be held on Wednesday, February 1st, 2023, at 8:00 pm at Westfield Intermediate School, 350 Southampton Road, Westfield, MA 01085. This hearing will provide an overview of the Draft Noise Compatibility Program report that has been prepared on behalf of Westfield-Barnes Regional Airport. There will be a formal presentation followed by a question-and-answer session.

The draft NCP report can be found on the City's website: www.westfield.org/272/Westfield-Barnes-Regional-Airport

Physical copies of the draft report are also available for review at Westfield City Hall and Westfield-Barnes Regional Airport.

Public comments can be submitted at the hearing or via email to bwhamman@onespayme.com

The public comment period for the draft Noise Compatibility Program report will close Friday, February 17th, but additional comments and questions regarding the noise program can be submitted at any time.

The hearing can also be attended virtually via Zoom: <https://cityofwestfield.org/zoom/join/821920272?pwd=1J5E1DFW4nZaaF8LzV8RQcQTRhJ10z>

Meeting ID: 821 2970 7979

Passcode: ycp6F8S

Join by phone: +1 646 931 3660

Meeting ID: 821 2970 7979

Passcode: 37080698

All community members are invited to attend the hearing; comments and questions are welcome.

(January 19, 2023)

Commonwealth of Massachusetts
The Trial Court
Probate and Family Court
Hampton Probate and Family Court
50 State Street
Springfield, MA 01103
(413)748-7758

Docket No. HD23C0015CA

CITATION ON
PETITION TO CHANGE NAME

In the matter of: Brian Sergio Consiglio

A Petition to Change Name of Adult has been filed by Brian Sergio Consiglio of Westfield MA

requesting that the court enter a Decree changing their name to: Sergio Marco Consiglio

IMPORTANT NOTICE

Any person may appear for purposes of objecting to the petition by filing an appearance at: Hampton Probate and Family Court before 10:00 a.m. on the return day of 02/10/2023. This is NOT a hearing date, but a deadline by which you must file a written appearance if you object to this proceeding.

WITNESS, Hon. Barbara M Hyland, First Justice of the Court.
Date: January 13, 2023.
Rosemary A. Saccomani,
Register of Probate

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UNIVERSAL Sudoku Puzzle

8		7	9	3				
3		6						1
		5	4	8	9			
5	6				3	4		
3	7				1			9
7	9	3	2	7				
		4	3	8				7

1/19 DIFFICULTY RATING: ★★★★★ © 2023 by Andrews McMeel Syndication

Complete the grid so every row, column and 3 x 3 box contains every digit from 1 to 9 inclusively.

Previous puzzle solution

4	6	7	2	9	3	8	5	1
2	9	5	4	1	8	6	3	7
1	3	8	7	6	5	4	2	9
9	8	3	1	7	4	2	6	5
7	5	1	8	2	6	3	9	4
6	4	2	5	3	9	1	7	8
3	7	6	5	8	1	9	4	2
8	2	9	6	4	7	5	1	3
5	1	4	9	3	2	7	8	6

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Join by phone: +1 646 931 3660
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Appendix D Public Comments

Public Information Meeting Comments March 16, 2022



Westfield-Barnes Regional Airport
Part 150 Noise Compatibility Program Update
March 16, 2022
Public Information Meeting

Comments submitted will become part of a public record and will be published as a part of the NCP update.

Name: Karen Roberts Phone: 413-568-9826
Address: 433 Holyoke Rd Date: 3.16.22
Westfield Me 01085

I/we wish to comment about the following aspects of this project:

What does this do to the value of my house?

Additional comments can be made by emailing [bwhteman@jonespayne.com](mailto:jonespayne.com).

**Public Information Meeting & Hearing
Comments
February 1, 2023**

Westfield-Barnes Regional Airport
Title 14 Code of Federal Regulations (CFR) Part 150
Noise Compatibility Program Update
Responses to Public Comments Received

Comment #	Date Received	Commenter	Comment Type	Comment	Response
1	1/25/2023	Donna Laurin	Written	I am a neighbor in Southampton with a direct flight path. I absolutely love and appreciate the jets flying overhead. It is the sound of freedom. Those of us who have built or bought our houses here were well informed Barnes was our neighbor. With that comes the sound of jets. Keep flying! More shows please! ❤️	Thank you for your comment.
2	1/26/2023	William Mead	Written	I understand that the F15s make a huge amount of noise. But the Air National Guard can do much to decrease their impact if they take off at less power (as they do when they take off late at night). Stop making repeated passes along (but outside) the airport and over Westfield. They repeatedly fly parallel to East Mountain Rd. and route 10 and 202. We were told when the current aircraft were arriving that they would only practice in places like over the Gulf of Maine. I understand that the military has an agreement with the city of Northhampton, not to fly over their community. Why not take that kind of consideration into account for those us who live in and around Westfield.	The Air National Guard (ANG) utilizes noise abatement procedures whenever possible, unless training or mission requirements dictate otherwise. Upon arrival, the F-15 aircraft typically fly directly over the runway (airfield/airport) per training requirements, they then make a U-turn to make a final approach into the airport and land. Upon departure, the F-15 aircraft will use the afterburner when required based on the weight of the aircraft and weather conditions during takeoffs. If they can depart without afterburner, military power takeoffs are utilized. The Airport is not aware of an agreement between the ANG and the town of Northhampton.
3	2/1/2023	Carol Shannon	Written	How is the Noise Mitigation Advisory Committee that is referenced in the 1/31/23 Westfield News article formed? Are there community residents in the airport area that are allowed to be on the committee? If so, I would like to be considered for the committee.	As part of the implementation of the recommended measures, the study team will develop guidelines for committee membership and meeting frequency/schedule. The study team will update the public when the committee is being formed. At this time it is expected that the Airport staff will coordinate with the Airport Commission to re-establish the committee in the Spring of 2023.
4	2/1/2023	Susan Warrick	Written	We reside in Easthampton MA--"North of Barnes." The noisy jets fly directly over our neighborhood several times a day when in the area,"practising." Why are you not asking Easthampton residents about noise levels? Why is the plan to fly "North?" Is anyone tracking the noise level in Easthampton?	The primary purpose of the Noise Compatibility Program (NCP) is to provide a plan to address non-compatible land uses. While the aircraft noise does not stop at the 65 dB DNL contour, it is this area that is the focus of the NCP measures. The population density is lower to the north of the airport. Note that the noise abatement flight procedures attempt to avoid populated areas to the north and that analysis focused on single event noise levels as opposed to DNL.
5	2/1/2023	Allyn Hall	Written	Is 154 Holyoke Road located in the 65 dB DNL contour and would it be eligible for sound insulation?	No. This property is not located in the 2019 Noise Exposure Map 65 dB DNL contour. It is not currently eligible for noise mitigation. The Airport does plan to update the NEM to reflect any changes in Airport operations, which may result in changes to eligibility. As part of the implementation of the recommended measures, the study team will develop a listing/inventory of all properties potentially eligible for sound insulation. Property owners potentially eligible for sound insulation will be contacted by the Airport once the requisite funding is received and the program is restarted. The current Noise Exposure Map detailing the potentially eligible properties can be found on the Airport's website.
6	2/1/2023	Beth LaPointe	Written	I live at 134X LaPointe Road in Westfield. Is my home located in the noise contour and am I eligible for sound insulation.	No. This property is not located in the 2019 Noise Exposure Map 65 dB DNL contour. It is not currently eligible for noise mitigation. The Airport does plan to update the NEM to reflect any changes in Airport operations, which may result in changes to eligibility. As part of the implementation of the recommended measures, the study team will develop a listing/inventory of all properties potentially eligible for sound insulation. Property owners potentially eligible for sound insulation will be contacted by the Airport once the requisite funding is received and the program is restarted. The current Noise Exposure Map detailing the potentially eligible properties can be found on the Airport's website.
7	2/5/2023	Alan Pavlica	Written	The existing maps for the F - 15s flight tracks were pretty poor in depicting the actual flight paths I think it is wrong to depend on a computer model to determine the noise impacts. Noise measurements should be taken by an individual at the property to verify if the model is correct. Also can't believe that it's so expensive. Getting some college students like they do for road studies would be one way to have this paid for.	Federal regulations require the use of the Aviation Environmental Design Tool computer model to calculate the aircraft noise exposure for an airport's Noise Exposure Map. The noise contour is based on an average annual day of aircraft operations on the predominant flight paths.
8	2/6/2023	Gail Paquette	Written	I Gail Paquette live at 20 Pequot Point Rd. Westfield, Ma 01085. Noise from the military aircraft is very loud and interferes with talking on the phone or trying to work from home. I am concerned about the bigger airplanes that are coming into Barnes Westfield Regional Airport and not knowing what planes they might be getting, but they are going to be bigger and louder than the F-15C. A news article from Mass Live dated August 19, 2022, addresses and questions about the fighters being considered for Barnes that they might be getting is a F-35A Lighting II or the F-15 EX Jets. They are complaining that the noise is already bad, and they already have homes that already have insulated homes. So, with my house with only single pane windows and siding with no insulation in it you can only imagine how loud this can be. I would be so happy with just those modifications being done that would help out immensely.	This property is not located in the 2019 Noise Exposure Map 65 dB DNL contour. It is not currently eligible for noise mitigation. The Airport does plan to update the NEM to reflect any changes in Airport operations, which may result in changes to eligibility. As part of the implementation of the recommended measures, the study team will develop a listing/inventory of all properties potentially eligible for sound insulation. Property owners potentially eligible for sound insulation will be contacted by the Airport once the requisite funding is received and the program is restarted. The current Noise Exposure Map detailing the potentially eligible properties can be found on the Airport's website.
9	2/8/2023	Robert Riggs	Written	First I would like to state how much we appreciate our dedicated military of all branches. I am writing to provide some feedback on the noise from a neighboring town, Southampton. I have reviewed the noise map provided online and can say that it does not provide an accurate picture. The fighter planes regularly fly almost directly overhead during departure and arrival, most of the time very loudly. I can also say that they are very inconsistent regarding altitude requirements if they are currently to be followed. On a positive note it is also very obvious that if they don't throttle the engines too hard they are very acceptable as far as the noise level is concerned. I believe that if the pilots themselves try to be good neighbors we would all benefit in the surrounding area. I hope for the continued success of Barnes Airport in the community but am very concerned regarding the possible new aircraft. I hope that we receive the updated version of the current fighter, and not the F-35 as our area around the airport is far too residential to tolerate the sound level.	The Department of Defense is responsible for deciding which aircraft will replace the existing F-15 aircraft. The Airport is committed to continuing its relations with the Air National Guard to continue to mitigate the noise from the fighter aircraft operations to the extent that it does not interfere with their mission to protect our country.
10	2/13/2023	Jane Okscin	Written	As a resident of Westfield, we are all bothered to some degree by noise coming from aircrafts. We understand Barnes represents more than 2,100 jobs and has a total economic impact of \$236.8 million. But we would like to know how much our city has received in net profits/losses for FY22? There has been a 20% increase in aircraft operations since 2018. What do you feel created this increase and has our City's profits also increased by	Westfield-Barnes Regional Airport generates revenues between \$1.1M-\$1.2M each year directly to the City of Westfield. The operating budget of the airport is between \$900K-\$1.0M per year.

Westfield-Barnes Regional Airport
Title 14 Code of Federal Regulations (CFR) Part 150
Noise Compatibility Program Update
Responses to Public Comments Received

11	2/13/2023	Maria & Jeff Richard	Written	<p>We have the following concerns about the fighter jet operations:</p> <ol style="list-style-type: none"> 1) The noise maps are a sound overlay projection for 'approved' takeoffs. There were no actual noise measurements taken as part of the process. 2) The maps do not measure the sound level of 'scramble' takeoffs where there are considerably higher levels outside the 65dB zone. While the sound during 'approved' take-offs may match the projections, the sound during scramble takeoffs is loud enough to shake the windows and rattle the china in the cabinets of homes well outside the sound map. 3) More homes are affected by these 'scramble' takeoffs than the soundmap shows. 4) Information on the web shows the proposed new jets will be twice as loud <p>It is important to protect our quality of life. We would like the following to be implemented once the new jets arrive:</p> <ol style="list-style-type: none"> 1) Actual sound mapping measurements should be made when jets are taking off under 'scramble' mode, as well as during normal takeoffs. 2) Homes that are outside the noise area from normal takeoffs, but are affected by high noise from 'scramble' takeoffs should also be eligible for sound proofing assistance. 	<p>The noise exposure maps were developed using the FAA's required model, AEDT. Noise measurements cannot be used to generate the contours per federal regulation, 14 CFR Part 150. The noise exposure maps are to be updated every five years or when there has been a significant change. It is expected that the noise exposure maps will be updated after the Department of Defense determines the aircraft that will be stationed at the Airport to replace the F-15 aircraft.</p>
12	2/15/2023	Kristen Mello	Written	<p>The noise contour is out of date and needs to be updated. It would improve relations if you would conduct actual noise measurements. This would give everyone a neutral, data-driven place to begin discussing noise and allow for residents and their representatives to discuss their experiences when Bradley International Airport's Air Traffic Control (giving directions after take off) has a plane fly over their homes here in Westfield, and would allow for residents to bring noise complaints to the Air National Guard in a data based fashion.</p> <p>On the topic of Land Use Compatibility, if airport operations make surrounding land incompatible for residential use, please consider helping to mitigate the damage done by airport activities by creating a program to help re-wild these properties with the native and endangered species, priority habitat, and pollinator supporting native plantings that would exist here were it not for human activities.</p>	<p>The noise exposure maps were developed using the FAA's required model, AEDT. Noise measurements cannot be used to generate the contours per federal regulation, 14 CFR Part 150. The noise exposure maps are to be updated every five years or when there has been a significant change. It is expected that the noise exposure maps will be updated after the Department of Defense determines the aircraft that will be stationed at the Airport to replace the F-15 aircraft. Thank you for the suggestion on how to redevelop land deemed incompatible with aircraft operations. The program focus is currently on sound insulating the noise-sensitive structures on incompatible parcels rather than repurposing the land through acquisition, though acquisition remains a recommended measure to implement when such land becomes available to the Airport.</p>
13	2/15/2023	Lori Newsome	Written	<p>We are very affected by the noise generated by the fighter aircraft. We are unable to work or enjoy our home due to the noise. We also experience our house shaking from the vibration caused by the fighter jets.</p>	<p>Thank you for sharing your concern as part of this noise compatibility program update. Please review the measures the Airport is recommending to address non-compatible land use resulting from existing aircraft operations including the F-15 fighter wing.</p>
14	2/17/2023	Damell Giroux & Ro	Written	<p>We moved here in 2016 and immediately applied for sound insulation. Since that time, we have noticed a considerable noise increase with the jets overhead. Our home is under the direct launch/landing path. We have concerns that the north side of the airport has barely had any of the homes' noise protected and we don't know if any of the noise or air pollution is causing damage to our homes, land and ourselves.</p>	<p>Thank you for sharing your concern as part of this noise compatibility program update. Please review the measures the Airport is recommending to address non-compatible land use resulting from existing aircraft operations including the F-15 fighter wing.</p>
	2/1/2023	Mary Ann Babinski	Verbal	<p>I am concerned residents from Arbor Mobile Home Park might have to give up their property and they are no longer going to be able to live there.</p>	<p>The recommendation for the mobile home park acquisition is voluntary. If the park owners prefer to remain, the Airport will not pursue acquisition.</p>
	2/1/2023	Kathy Hillman	Verbal	<p>I really want to see the citizen outreach. Please make sure that happens.</p>	<p>This NCP document recommends a number of ways to keep the community engaged regarding the noise program including re-establishment of the Noise Mitigation Advisory Committee (NMAC), and continuing the Community Awareness Program (CAP).</p>
	2/1/2023	Kristen Mello	Verbal	<p>I want to empathize that we need a commitment to take actual data, and redesign the noise map once we know what the new fighter aircraft will be based here. I also want to say that I haven't heard much about the Heritage Mobile Home Park at the end of that short runway. I believe it will be noisier and louder and hotter and sunnier with the removal of the trees.</p>	<p>The noise exposure maps were developed using the FAA's required model, AEDT. Noise measurements cannot be used to generate the contours per federal regulation, 14 CFR Part 150. The noise exposure maps are to be updated every five years or when there has been a significant change. It is expected that the noise exposure maps will be updated after the Department of Defense determines the aircraft that will be stationed at the Airport to replace the F-15 aircraft.</p>
	2/1/2023	Laurie Mozella	Verbal	<p>I support the sound insulation program. I understand that there is nothing that can be done for the out doors. It is difficult to sleep at night with the aircraft operations. Sound insulation would be helpful so that I can sleep at night.</p>	<p>As part of implementation of the recommended measures, the study team will develop a listing/inventory of all properties potentially eligible for sound insulation. Property owners potentially eligible for sound insulation will be contacted by the Airport once the requisite funding is received and the program is restarted. The current Noise Exposure Map detailing the potentially eligible properties can be found on the Airport's website.</p>



Brianna Whiteman <bwhiteman@jonespayne.com>

Barnes sound “pollution”

Donna Laurin <dml626@hotmail.com>

Wed, Jan 25, 2023 at 12:54 PM

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

I am a neighbor in Southampton with a direct flight path. I absolutely love and appreciate the jets flying overhead. It is the sound of freedom. Those of us who have built or bought our houses here were well informed Barnes was our neighbor. With that comes the sound of jets.

Keep flying! More shows please! ❤️

Donna Laurin



Brianna Whiteman <bwhiteman@jonespayne.com>

F15 noise

m <eastmtadv@aol.com>

Thu, Jan 26, 2023 at 8:55 AM

To: bwhiteman@jonespayne.com, letters@repub.com, ReportIt@wwlp.com, tips@westernmassnews.com

I have lived near Barnes airport for over a quarter of a century. I have felt the very negative impact of the military aircraft here. I understand that the F15s make a huge amount of noise. But they can do much to decrease their impact if they take off at less power (as they do when they take off late at night). Stop making repeated passes along (but outside) the airport and over Westfield. They repeatedly fly parallel to East Mountain Rd. and route 10 and 202. We were told when the current aircraft were arriving that they would only practice in places like over the Gulf of Maine.

I understand that the military has an agreement with the city of Northhampton, not to fly over their community. Why not take that kind of consideration into account for those of us who live in and around Westfield.

This incredible amount of noise could be reduced almost immediately if the command at Barnes would try to be a better neighbor.

Simply by taking into consideration that they are the largest noise polluter's in the city of Westfield. They should be forced to respect the citizens that they say they respect.

I am as patriotic as any American. But the military command needs to realize they are not at war with us. And that they need to stop assaulting those they swore to protect. The current manager at the airport is great at communicating concerns to the Air Force commanders. But it is up to those commanders to enforce policy's that protect those of us who live in Westfield.



Brianna Whiteman <bwhiteman@jonespayne.com>

Re: Noise Mitigation Advisory Committee

1 message

Christopher Willenborg <cwillenborg@barnesairport.com>

Wed, Feb 1, 2023 at 2:34 PM

To: Carol Shannon <c.shannon@cityofwestfield.org>

Cc: Brianna Whiteman <bwhiteman@jonespayne.com>

Hi Carol,

Thank you for the email outreach and questions below.

We are recommending to FAA to reestablish this Committee. We don't have to wait for the 180 approval of FAA so I would anticipate we would reestablish this Committee in the Spring. I will work with the Westfield Airport Commission and our on-call noise mitigation consultants on how we would set up the Committee.

I greatly appreciate your willingness to be part of this Committee and this committee does need representative from the Community so I will pass along this information.

If you have any questions, please let us know.

Thank you,

Chris

Christopher J. Willenborg, C.M.
Airport Manager
Westfield-Barnes Regional Airport
[110 Airport Road](#)
Westfield, MA 01085
413-572-6275 - Office
413-386-6139 - Mobile
cwillenborg@barnesairport.com
www.barnesairport.com

From: Carol Shannon <c.shannon@cityofwestfield.org>

Sent: Wednesday, February 1, 2023 9:06 AM

To: Christopher Willenborg <cwillenborg@barnesairport.com>

Subject: Noise Mitigation Advisory Committee

Mr. Willenborg,

I will be unable to attend the meeting at the Westfield Intermediate School but did have a question: How is the Noise Mitigation Advisory Committee that is referenced in the 1/31/23 Westfield News article formed? The article indicated the committee had existed in the past but that you said it had become inactive.

Are there community residents in the airport area that are allowed to be on the committee? If so, I would like to be considered for the committee.

Thank you,
Carol Shannon



Brianna Whiteman <bwhiteman@jonespayne.com>

Noise Levels Surrounding Area/ Barnes

1 message

Susan Warrick <smaw22@gmail.com>

Wed, Feb 1, 2023 at 2:58 PM

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

There is a public meeting tonight which we cannot attend.

We reside in Easthampton MA--"North of Barnes." The noisy jets fly directly over our neighborhood several times a day when in the area,"practising." Why are you not asking Easthampton residents about noise levels? Why is the plan to fly "North?" Do you think that will make us happy? Do you think we are more at risk of aggravation as well as crashes?

Last week the jets (usually four) came out of "nowhere" several times with a horrific, heart stopping noise. Is this to appease Westfield? Is anyone tracking the noise level in Easthampton, over Main Street,over the BigY shopping lot in Southamton and, most importantly, over quiet residential neighborhoods? Please note that it is not just Westfield that is a concern.The flight patterns must be addressed. Had we not purchased the Springfield paper on Thursday,1/26/2023, we would not be aware of this meeting. Perhaps a notice in The Daily Hampshire Gazette or on local TVnews would be most appropriate.

Thank you.



Brianna Whiteman <bwhiteman@jonespayne.com>

Fw: [EXTERNAL]154 Holyoke Road

1 message

Christopher Willenborg <cwillenborg@barnesairport.com>
To: Brianna Whiteman <bwhiteman@jonespayne.com>

Thu, Feb 2, 2023 at 5:11 PM

FYI

Christopher J. Willenborg, C.M.
Airport Manager
Westfield-Barnes Regional Airport
[110 Airport Road](#)
Westfield, MA 01085
413-572-6275 - Office
413-386-6139 - Mobile
cwillenborg@barnesairport.com
www.barnesairport.com

From: Christopher Willenborg <cwillenborg@barnesairport.com>
Sent: Thursday, February 2, 2023 5:11 PM
To: Allyn Hall <603weatv@gmail.com>
Subject: Re: [EXTERNAL]154 Holyoke Road

Good evening Mr. Hall,

Thank you for patience in response and our phone call earlier. Also, thank you for your feedback from last night's meeting.

I looked up your address on Google Maps and compared to the current Noise Exposure Map that the FAA approved in 2019. You are currently outside the 65DL noise contour line.

If you want to further discuss, we could set up a time tomorrow or early next week based on your schedule.

Let me know and thanks again for patience.

Chris

Christopher J. Willenborg, C.M.
Airport Manager
Westfield-Barnes Regional Airport
[110 Airport Road](#)
Westfield, MA 01085
413-572-6275 - Office
413-386-6139 - Mobile
cwillenborg@barnesairport.com
www.barnesairport.com

From: Allyn Hall <603weatv@gmail.com>
Sent: Wednesday, February 1, 2023 8:44 PM
To: Christopher Willenborg <cwillenborg@barnesairport.com>
Subject: [EXTERNAL]154 Holyoke Road

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize and verify the sender and know the content is safe.

Hello Chris,

The information you and the other members of your team were clear and easy to understand during the 02/01/23 meeting, I found most of the question asked by many puzzling, as if they weren't listening. Please keep up the good work.....

My question: I can not zoom in on the map enough – Can you tell me if 154 Holyoke Road is one of the property's which qualify for the sound abatement and what was the property sound level rated at?

Thank you, Allyn Hall

154 Holyoke Road
Westfield, Ma. 01085-1611
Cell (413) 847-9886

Sent from [Mail](#) for Windows



Brianna Whiteman <bwhiteman@jonespayne.com>

Re: [EXTERNAL]F-35/ Barnes

Christopher Willenborg <cwillenborg@barnesairport.com>

Mon, Feb 6, 2023 at 1:33 PM

To: Alan Pavlica <alanpavlica@gmail.com>

Cc: William Onyski <william.onyski@cityofwestfield.org>, "Susie1055@aol.com" <Susie1055@aol.com>, Brianna Whiteman <bwhiteman@jonespayne.com>

Good afternoon Alan,

Thank you for email and outreach.

I've included Brianna Witeman from Jones Payne Group as she is collecting comments for the Noise Compatibility Program document. Can you forward your email to her directly so it will be incorporated into the document.

Thank you,

Chris

Christopher J. Willenborg, C.M.
Airport Manager
Westfield-Barnes Regional Airport
[110 Airport Road](#)
Westfield, MA 01085
413-572-6275 - Office
413-386-6139 - Mobile
cwillenborg@barnesairport.com
www.barnesairport.com

From: Alan Pavlica <alanpavlica@gmail.com>

Sent: Sunday, February 5, 2023 2:43 PM

To: Christopher Willenborg <cwillenborg@barnesairport.com>

Cc: William Onyski <william.onyski@cityofwestfield.org>; Susie1055@aol.com <Susie1055@aol.com>

Subject: [EXTERNAL]F-35/ Barnes

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize and verify the sender and know the content is safe.

First, I want to thank you for the invitation to the past meeting. As one could see the existing maps for the F - 15s were pretty poor in the actual paths that the existing jets used. I could not believe how much they really impacted some people like myself. These people couldn't even conduct their businesses.

I do believe you are going to do your best next time and you can be trusted. The one item I think everyone is wrong is depending on the computer model without at least hearing the people out and verifying if what they are saying is true or not by actually having some on the ground data. Having a person or persons go out and verifying the data would be hugely helpful. Also can't believe that it's so expensive. Getting some college students like they do for road studies would be one way.

Again thank you for meeting us at our house too, we are neighbors of the sort.



Brianna Whiteman <bwhiteman@jonespayne.com>

Barns Airport Noise Compatibility Program Comments

1 message

Gail P <gpaquette9107@gmail.com>
To: bwhiteman@jonespayne.com

Mon, Feb 6, 2023 at 6:14 PM

Attn. Brianna,
From <<https://www.cityofwestfield.org/752/Westfield-Barnes-Regional-Airport>>

2/4/2023

Good afternoon, Brianna,

I Gail Paquette live @ 20 Pequot Point Rd. Westfield, Ma 01085
And I have lived here for 29 years. I am witting this letter for the comments to be recorded from the meeting that was held on 2/1/2023 I originally wrote a letter on 7/4/2018 an Application for Noise Mitigation Program to the one that was in charge with the program back in 2018 was Jane Verbeck. She said that it would be kept in the files for the future Noise Compatibility Program. Almost 5 years later and with the new program I hope all in the surrounding areas including my house would get the help that they need from the grant.

I have talked to Christopher Willenborg which he is very understanding in our concerns and listening to all the others what they have to say. I was also letting him know that how my house shakes and vibrates as well when the airplanes go by and over my house and others nearby. I did tell him I do have an app on my phone that reads the decibels noise, and these readings are inside my house the max readings that I have gotten is 89 Decibels and the rest are all above 65 and 70 Decibels. I also have videos of the planes just from my Ring cameras how loud they are. The map they have shown the black line and it cuts off right before my street when you can see they clearly go right over our houses.

You can't hear anyone trying to talk on the phone especially if it's a doctor's office calling, you are calling for Appointments or even Telehealth Appointment phone calls, even if you work from home and they can't hear, and you have to tell these people to hold on while the planes go by so I can hear you. I guess that doesn't matter as they measure and use the readings inside the airplanes. That doesn't help when you are up in the air, and it affects all the neighborhoods in all the surrounding areas which including the echo of being

near the Hampton Ponds water. I understand there are different levels of noise variations in different areas for concern.

With the concern for the bigger airplanes that are coming into Barns Westfield Regional Airport and not knowing what planes they might be getting, but they are going to be bigger and louder than the F-15C. A news article from Mass Live dated August 19, 2022, addresses and questions about the fighters being considered for Barns that they might be getting is a F-35A Lighting II or the F-15 EX Jets. They are complaining that the noise is already bad, and they already have homes that already have insulated homes. So, with my house with only single pane windows and siding with no insulation in it you can only imagine how loud this can be. I would be so happy with just those modifications being done that would help out immensely.

I hope that all the comments and letters that are written from others as well as mine from the meeting will help and hopefully will be enough where we all can get the help and get answers. I would like to thank you for your time and everyone else that is a part of the Noise Compatibility Program. If you need any further information, please contact me.

Gail Paquette
@ gpaquette9107@gmail.com
Tel# 413-530-3070



Brianna Whiteman <bwhiteman@jonespayne.com>

Barnes Noise Program

1 message

hamptonwholesale@aol.com <hamptonwholesale@aol.com>

Wed, Feb 8, 2023 at 4:59 PM

Reply-To: hamptonwholesale@aol.com

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

To the Draft Noise Compatibility Program Committee,

First I would like to state how much we appreciate our dedicated military of all branches. I am writing to you today to provide some feedback on the noise from a neighboring town, Southampton. I have reviewed the noise map provided online and can say that it does not provide an accurate picture. My residence is located at [88 Pleasant Street](#) in Southampton and the fighter planes regularly fly almost directly overhead during departure and arrival, most of the time very loudly. I can also say that they are very inconsistent regarding altitude requirements if they are currently to be followed. On a positive note it is also very obvious that if they don't throttle the engines too hard they are very acceptable as far as the noise level is concerned. I believe that if the pilots themselves try to be good neighbors we would all benefit in the surrounding area. I hope for the continued success of Barnes Airport in the community but am very concerned regarding the possible new aircraft. I hope that we receive the updated version of the current fighter, and not the F-35 as our area around the airport is far too residential to tolerate the sound level that they produce based on reports I have read. I can't imagine the sound level living right next door to the airport. I feel sometimes that our local, state, and federal politicians are too quick to push for things for future votes without regard to those who live with the consequences.

Thank you for your time in reading this,

Robert Riggs
[88 Pleasant St.](#)
[Southampton, MA](#)



Brianna Whiteman <bwhiteman@jonespayne.com>

Noise Compatibility Program at Barnes

1 message

Jane Okscin <jokscin@comcast.net>

Mon, Feb 13, 2023 at 11:47 AM

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

As a resident of Westfield, we are all bothered to some degree by noise coming from aircrafts. We understand Barnes represents more than 2,100 jobs and has a total economic impact of \$236.8 million. But we would like to know how much our city has received in net profits/losses for FY22?

There has been a 20% increase in aircraft operations since 2018. What do you feel created this increase and has our City's profits also increased by 20%?

How much is a civilian aircraft actually charged to land the plane, park for a few hours and then take off again (without refueling here)? Are all civilian planes charged or is the training school Lugu exempt from these charges?

Jane Okscin
[341 Steiger Dr](#)
[Westfield, MA](#)

Date:Feb.13, 2023



Brianna Whiteman <bwhiteman@jonespayne.com>

Barnes Airport Jet Noise

1 message

Maria Richardson <xmisiac@gmail.com>
To: bwhiteman@jonespayne.com

Mon, Feb 13, 2023 at 4:34 PM

From: Maria and Jeff Richardson
[139 Rider Road](#)
[Westfield, MA 01085](#)

Based on information presented in the meeting on February 1st 2023 at Westfield Intermediate School about the noise from the military jet operations at Barnes Airport, we have the following concerns:

- 1) The noise maps are a sound overlay projection for 'approved' takeoffs. No on the ground measurements were used to develop the map.
- 2) The maps do not measure the sound level of 'scramble' takeoffs where there are considerably higher levels outside the 65dB zone. While the sound during 'approved' take-offs may match the projections, the sound during scramble takeoffs is loud enough to shake the windows and rattle the china in the cabinets of homes well outside the sound map.
- 3) More homes are affected by these 'scramble' takeoffs than the soundmap shows.
- 4) Information on the web shows the proposed new jets will be twice as loud, thereby increasing the area affected. See web link: <https://www.defencetalk>

As important as it is to properly train pilots to fly these planes, it is also important that Westfield residents living in the shadow of these flights get assistance to minimize the impact of this noise on their quality of life. We would like the following to be implemented once the new jets arrive:

- 1) Actual sound mapping measurements should be made when jets are taking off under 'scramble' mode, as well as during normal takeoffs.
- 2) Homes that are outside the noise area from normal takeoffs, but are affected by high noise from 'scramble' takeoffs should also be eligible for sound proofing assistance.

Thank you,
Maria Richardson
Jeff Richardson



Brianna Whiteman <bwhiteman@jonespayne.com>

Public Comment on Westfield-Barnes Regional Airport Noise Compatibility Program Draft Report

1 message

Kristen Mello <kristen.mello@cityofwestfield.org>

Wed, Feb 15, 2023 at 3:55 PM

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

Cc: Christopher Willenborg <cwillenborg@barnesairport.com>, William Onyski <william.onyski@cityofwestfield.org>

Thank you for the opportunity to provide this written comment on the draft Noise Compatibility Program report that has been prepared on behalf of Westfield-Barnes Regional Airport.

This draft program report suffers from a lack of current and longitudinally monitored data. I ask that you make a new, updated, real-world-data noise exposure map.

While I made this comment (virtually) at the Public Hearing, I would like to re-iterate that the Noise Exposure Map in this draft report, generated by a computer model in 2019, is four years old and outdated.

This map does not accurately represent current conditions.

There are fewer trees in this area than there were in 2019. The airport has more activity, more businesses, more planes and helicopters flying now than 2019, and the surrounding area has seen more development.

This map also does not accommodate known future changes including further tree removal in an Environmental Justice neighborhood, increased impervious surface, and a change in aircraft by the Air National Guard.

Westfield-Barnes Regional Airport Runway 15 Obstruction Removal, Taxiway B, and Southwest Quadrant, EEA #16579 (<https://www.cityofwestfield.org/DocumentCenter/View/11895>)

Air National Guard Operational Beddowns

<https://www.104fw.af.mil/News/Article-Display/Article/3119558/environmental-impact-study-for-aircraft-beddown/> <https://www.angf15ex-f35a-eis.com>

This outdated map was made from estimates and computer modeling, and residents do not believe it reflects our lived experience of aircraft noise.

Residents living on the side of East Mountain, at Hampton Ponds, and in other areas of the City of Westfield have been complaining about the noise from aircraft. It would improve relations for us to work together to measure and monitor the sounds that residents are subjected to. Such a residential noise monitoring program would give everyone a neutral, data-driven place to begin discussing noise. Additionally, an actual data monitoring program would allow for residents and their representatives to discuss their experiences when Bradley International Airport's Air Traffic Control (giving directions after take off) has a plane fly over their homes here in Westfield, and would allow for residents to bring noise complaints to the Air National Guard in a data based fashion.

Article 97 of the Massachusetts Constitution states that the people shall have the right to freedom from excessive and unnecessary noise.

I also ask that you create a pilot residential neighborhood noise monitoring program to help honor the rights of our City's residents, provide data and feedback to Bradley control and the Guard, and

respect our residents' experience and requests for noise mitigation.

On the topic of Land Use Compatibility

If airport operations make surrounding land incompatible for residential use, please consider helping to mitigate the damage done by airport activities by creating a program to help re-wild these properties with the native and endangered species, priority habitat, and pollinator supporting native plantings that would exist here were it not for human activities.

Thank you again for the opportunity to provide comment on this draft Noise Compatibility Program report, prepared for Westfield-Barnes Regional Airport. I hope you will take these comments into consideration moving forward.

Sincerely,

Kristen Mello

Kristen L. Mello (she/her)
Chair | Natural Resources Committee
Councilor At-Large | Westfield City Council
413.564.4772 (cell)



Brianna Whiteman <bwhiteman@jonespayne.com>

Barnes Airport Noise Complaint

1 message

Lori <pequot11@yahoo.com>

Wed, Feb 15, 2023 at 4:38 PM

To: "bwhiteman@jonespayne.com" <bwhiteman@jonespayne.com>

Per the last meeting we were told to submit our noise issues/complaints to you. I live at [11 Pequot Pt Road, Westfield](#). We have a raised ranch. The planes have gotten louder over the past 30 years that I have lived here. When they take off or come in for a landing, the noise is so loud that we can not hear the tv at all. We can not talk on the phone as we cant hear the other person speaking. I work from home and speak with clients through out the day and sometimes I have to put them on hold because I can not hear them. Its very unprofessional to do so. If louder planes come in I dont know what I will do. Our house vibrates and so do the windows. The hearing issues happen when the windows and doors are closed. But if its summer and they are open its even worse. The noise even hurts my ears. We have notices from the vibration the screws that are holding up the gutters, shutters etc outside the house are coming loose and or haven fallen out. We have to check them every year and replace or tighten them. I see them when they take off and land. Sometimes they take a u-turn and will come in very low, over our house and I can see the pilot very well. *I cant imagine having louder planes flying over us. Our windows already shake. If we ever want to sell our house it will be very difficult due to the noises the jets make. I am hoping you dont get bigger planes. That will cause much anxiety and frustration with the noise levels. I wont be able to do my job properly.*

Thank you for listening.

*Lori Newsome
413 378 7814*



Brianna Whiteman <bwhiteman@jonespayne.com>

Barnes Airport noise program resident response to public meeting

1 message

Darnell G <darnellg9@gmail.com>
To: bwhiteman@jonespayne.com

Fri, Feb 17, 2023 at 4:42 PM

To whom it concerns:

We attended the zoom public meeting about the airport noise program. We wanted to have our concerns put into the records. We also just found out that some of our neighbors had no idea of the public meeting and I am sure there were many more neighbors of the airport that had no idea of the meeting.

To introduce ourselves, we are Miss Darnell Giroux & Mr. Robert Greenleaf Jr. We live at [98 Old Stage Rd, Westfield](#) & the house is listed under Robert Greenleaf Jr.

We bought this home in May of 2016 and we sent out our application within a few months of moving in to be considered for the noise abatement program with no response at all.

Since we moved here we have noticed a considerable noise increase with the jets overhead. Our home is under the direct launch/landing path. The jets are literally over our treeline & sometimes lower behind our trees in our back acreage. We have been able to see the pilots helmets & even wave to them. One day when we were having some pine trees being taken down in our backyard the guy that was above the crane, which was fully extended, to take the tree down was able to clearly see the pilot in the jet as they were on the landing path flying by & the tree guy was above the jet at the time. The tree guy said our highest tree was 110ft. Hopefully this can give you an idea of how low the jets travel and how close we are.

We have concerns that the north side of the airport has barely had any of the homes' noise protected and we don't know if any of the noise or air pollution is causing damage to our homes, land and ourselves. We are not sure if previously the noise has been measured in any of the homes on the north side in the past but we would gladly let someone measure it in our home.

Over the past almost 7 years that we have lived here we have heard a considerable noise increase in the jets. At times the noise can sound like the equivalent of a muscle car with a large motor accelerating except this is a jet that sounds like they are revving the engine which is much louder and it's not when they are higher up but it's done shortly after take off.

Robert Greenleaf Jr previously grew up on [243 Holyoke Road, Westfield](#) (south side of the airport) and he knows that the noise of the jets, even before that house was sound protected in 2010, was not as loud as it is now on the northside of the airport in our home at [98 Old Stage Rd, Westfield](#). He states that there is a large difference in the noise and his parents home was never as loud as our home is now with the sounds of the jets. We can see from the maps included in the airport report that the south side has had many homes noise protected or taken down completely while the north side has only had a handful of homes protected or taken down.

While we completely support the air force and everything they do to protect our country we also would like to live in a home that won't have damage due to the prolonged noise and air pollution that comes from the jets.

If you would like to contact us with any questions please feel free to by mail to [98 Old Stage Rd, Westfield, Ma 01085](#) or by phone at 413-562-5931.

Thank you for your times and consideration,
Sincerely,
Miss Darnell Giroux & Mr. Robert Greenleaf Jr.

**Hearing
February 01, 2023**

COMMONWEALTH OF MASSACHUSETTS

***** *

IN RE: WESTFIELD PUBLIC HEARING *

Overview of the Draft Public Noise *

Compatibility Program *

***** *

WESTFIELD INTERMEDIATE SCHOOL

350 Southampton Road

Westfield, Massachusetts 01085

February 1, 2023 6:00 P.M.

Sharon Waskiewicz

Court Reporter

<p style="text-align: right;">Page 2</p> <p>1 APPEARANCES: 2 3 4 THE JONES PAYNE GROUP, INC. 5 123 North Washington Street 6 Boston, MA 02114 7 BY: DIANE BRYANT CARTER 8 CHIEF OPERATING OFFICER 9 dcarter@jonespayne.com 10 617-790-3747 11 12 13 HARRIS MILLER MILLER & HANSON INC. 14 700 District Avenue 15 Burlington, MA 0180 16 BY: KATE LARSON 17 SENIOR CONSULTANT 18 klarson@hmmh.com 19 781-852-3158 20 21 22 Also present: 23 Gene Reindel, VP 24 Chris Willenborg, Airport manager</p>	<p style="text-align: right;">Page 4</p> <p>1 advisory committee meetings, as well as a 2 formal presentation, which has been provided 3 this evening. 4 Comments will be accepted on the 5 Draft Noise Compatibility Report until 6 February 17th, 2023 at 5 p.m. Comments may 7 be submitted in writing, utilizing the 8 comment forms provided at tonight's meeting, 9 or through the airport's website at The City 10 of Westfield. 11 The comment period is now open. We 12 will be accepting comments and responses 13 will be provided in the final report. 14 Please keep your comments to three minutes 15 in duration. 16 With that we will take any first 17 comments. Please do state your name, your 18 first and last name before you start your 19 comment so that the reporter can get that 20 FOR the record. 21 MR. WILLENBORG: And Diana, if 22 someone does not want to come up, they can 23 fill this out -- 24 MS. CARTER: That is correct.</p>
<p style="text-align: right;">Page 3</p> <p>1 MS. CARTER: So I'm going to read a 2 statement to the court reporter to 3 officially open the public hearing. 4 Again, if you want to make a 5 comment, a verbal comment, if you're in the 6 room, please step forward and you'll need to 7 state your name and then the reporter will 8 record your statement. 9 If you're online, do the raised-hand 10 feature. You do not have to give a verbal 11 statement; you can either fill out the form 12 or you can send us an e-mail. It's up to 13 you. 14 So I am going to start the public 15 hearing. It is 7:19 on February 1st, 2023. 16 My name is Diane Carter, and I am opening 17 the public hearing for the 14 CFR, Part 150 18 Noise Compatibility program update for the 19 Westfield Barnes Regional Airport. 20 The purpose of this event is for the 21 public to comment on The Draft Noise 22 Compatibility Program Report, which has been 23 published by the City of Westfield and has 24 been discussed at several of our technical</p>	<p style="text-align: right;">Page 5</p> <p>1 MR. WILLENBORG: -- leave it with 2 us, and then that will become part of the 3 public comment. 4 MS. CARTER: That is correct. You 5 can fill out the form. 6 MR. WILLENBORG: So you have some 7 options. 8 MS. CARTER: You can send an e-mail 9 or you can come up front to the court 10 reporter. 11 AUDIENCE MEMBER: Can you do both? 12 MS. CARTER: Yes. You can do all 13 three, if you want to make a verbal comment. 14 And then you can send in as many e-mails as 15 you would like. You are not limited to one 16 e-mail. If you think of something the next 17 day, that's fine. 18 Do we have any volunteers? 19 MS. LAPOINTE: My name is Beth 20 LaPointe. And, again, I would like to know 21 where my house sits in the map. Because I 22 really feel that I'm 70, 80, 90, whatever 23 you want to call it. The model does not 24 really show exactly how we were all impacted</p>

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1 because it is a computer. And the computer
2 does not know how to deal it with it. I
3 want to know where I'm on that list of
4 properties that that gentleman says he has.
5 Like I'd said, I am at the end of that
6 runway and am 80 percent impacted with
7 extreme noise.
8 Again, I work from home. It impacts
9 my job because I can't talk when the jets
10 are going over and my house shakes. Like
11 Marie was saying, the windows are a problem.
12 And I just want to know when this is all
13 going to be figured out.
14 MS. CARTER: Thank you. And do you
15 want to give us your address so that we can
16 respond to where you are located?
17 THE WITNESS: Yes. It is 134X, the
18 letter X, LaPointe Road in Westfield.
19 MS. CARTER: Thank you.
20 Is there anyone else from the
21 audience?
22 (Raised hand from the audience)
23 MS. CARTER: Okay. Please come on
24 up. Please make sure you give her your

Page 7

1 first and last name.
2 MS. BABINSKI: I am Mary Anne
3 Babinski. And I live right over here on
4 Rogers Avenue, 114.
5 I just have to first say that I'm
6 kind of disappointed that this place wasn't
7 packed and that it wasn't held in the
8 auditorium where there are more comfortable
9 seats to sit at.
10 So because, you know, people come to
11 these kinds of things, and I'm concerned
12 that the people that aren't here are not
13 here because, as the gentleman before said,
14 they are resigned to the fact that this is
15 going to happen and we are going to have to
16 put up with it or we are going to have to
17 live with it.
18 I am also concerned, as probably
19 that was already stated, is that we are
20 being pushed out one way or the other. This
21 is on the north side. There is something
22 that is going to be an assault on our air,
23 our water, our land, and the quality of
24 life.

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1 I mean, one complaint I can have is
2 I know that you can't control -- I mean, we
3 have had so many meetings like this.
4 There's been -- I think there has been two
5 other changes that I know of or remember.
6 And I'm getting older so I might not have it
7 all straight. But that noise compatibility
8 outline there changed.
9 There were homes that were taken
10 down. Some of them were mitigated by
11 putting in insulation and windows and all of
12 that. Others were told, nope, we ran out of
13 money. That was when Wily Coyote was in
14 charge of the whole thing.
15 So this is the noise compatibility
16 study, didn't have any more money, so now
17 they had to take their homes. We have
18 vacant land out there taken off the property
19 tax coffers of the city, so we lost out on
20 money there. And then it was redone another
21 time.
22 And other homes -- I think some of
23 the homes that were taken originally were
24 now outside of the contour lines. And now

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1 we had other homes that were taken down or
2 told that they weren't eligible anymore for
3 mitigation.
4 So lots of things have happened that
5 have discouraged people over time. So it
6 would have been nice if more than one of
7 these meetings were held, or more than two
8 even.
9 I am concerned that people from
10 Arbors are now being exposed to the fact
11 that they might have to give up their
12 property and they are no longer going to be
13 able to live there. Yes, they are closer to
14 the airport. These people have a hard time
15 moving around. Where they live is important
16 to them.
17 They didn't move the last time.
18 They couldn't receive mitigation, for their
19 insulation for the noise, because they're
20 mobile homes. They are an environmental
21 justice community population. That has
22 changed in this city. A whole side of the
23 north side here has been removed from that.
24 We are working on that and trying to

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1 straighten this mess out.
2 But Arbors is still a part of that.
3 So I am hoping that thing is going to be
4 taken into consideration when this continues
5 and when it's followed through with.
6 Helicopters, they fly where they
7 want. The FAA has said -- I have had a
8 helicopter fly over and around and back over
9 my house, and I don't even live within those
10 lines there. So I think they go where they
11 want to go and we are might have to put up
12 with the noise.
13 I hope there's a little bit more --
14 I am disappointed at the time already. It
15 is the 17th. This is a tough time of the
16 year to reach out to people, to do outreach
17 and get them involved. First it was around
18 the holidays and now it's the wintertime the
19 next terrible time we when do things that
20 involve and impact on residents of the city,
21 is the summertime, when nobody is thinking
22 about what's going on politically, that it's
23 going to impact them.
24 I don't know what motivated this

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1 particular change this time. You'd said the
2 FAA has a requirement that we look at it
3 again. It has gotten noisier. I guess
4 that's why. And I am afraid that we're
5 anticipating the F35s coming in. That's
6 going to be the next change of those contour
7 lines, so get ready. Get your earmuffs and
8 your earplugs. Thank you.
9 MS. CARTER: Thank you.
10 Yes. Come on up.
11 MS. HILLMAN: Kathy Hillman, with a
12 K. H-I-L-L-M-A-N. 179 Susan Drive.
13 I just would like to say that I
14 really want to see the citizens outreach and
15 we make sure that that happens.
16 MS. CARTER: Thank you.
17 Gene, do you have anyone on --
18 MR. REINDEL: Yes. We'll go to
19 Kristen Mello.
20 MS. CARTER: And please make sure
21 you say your first and last name.
22 MS. MELLO: Kristin Mellow. 27
23 Welsley Avenue. And I will send comments in
24 writing as well.

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1 So for tonight, just off the top of
2 my head, I want to empathize that we need a
3 commitment to take actual data, and redesign
4 the noise map once we know what the Air
5 National Guard has chosen in terms of the
6 airplanes that they'll be flying.
7 It's not the regular planes that
8 make the noise, so it may be a small number
9 of percentage of flights, but it is a large
10 amount of noise. Honestly, they do come to
11 the south end, because I can see them right
12 up over my yard when I'm out with the dog.
13 I literally can't be outside when they fly
14 over, Chris. So we need to look at what
15 this, you know, approaching from the south
16 thing is, because it happens.
17 And they take off this week too.
18 Especially when it's like taking off in a
19 panic, and there's a whole bunch of them
20 like one after the next, after the next.
21 And everybody, you know, has to stop what
22 they're doing because, oops, they're taking
23 off. So we need to look at that.
24 And, in addition -- I understand

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1 that computer models are the way things are
2 done. I am totally with you. I am an
3 analytic chemist; I understand that. There
4 is no replacement for actual data and I
5 can't empathize enough that we need a
6 monitoring program at the residences so that
7 people can see how loud it actually is.
8 Maybe it feels really loud to me because of
9 the geographic area and it's only so many
10 decibels. And I don't know that because I
11 am not an engineer; I am a chemist, right?
12 I think a resident monitor program
13 would really benefit everyone and it would
14 gather real data to let you know if we do,
15 in fact, need more mitigation.
16 I also want to say that I haven't
17 heard much about the Heritage Mobile Home
18 Park at the end of that short runway. If
19 all those trees come down, it's going to be
20 noisier and louder and hotter and sunnier
21 there. And I don't know that the maps that
22 you have took the fact that those trees are
23 coming down, and it too place, right?
24 Because you are using data from 2019. In

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1 2019, I mean, I still went to work, without
2 a mask, and ate at restaurants, right? So
3 these are different days and we need an
4 updated map, and we need an actual
5 commitment, from everybody involved, about
6 that map.
7 Is that everything? I think that's
8 everything. I want to make sure -- oh.
9 Chris, I will reach out to you
10 because I believe your land compatibility
11 use problem might fit nicely into a
12 conservation plan.
13 Thank you very much.
14 MS. CARTER: Thank you very much.
15 Gene, any ...
16 MR. REINDEL: Give me a second.
17 Okay. We have on the line here -- please
18 state your name, first and last and address.
19 MS. MOZELLA: My name is Laurie
20 Mozella and I am on 92 Longfront.
21 A couple of things: The residential
22 noise monitoring, that Chris just said, is a
23 really good idea, because there is different
24 aspects of municipal area. There is always

Page 15

1 construction and always trees coming down.
2 All of that good stuff.
3 I mean, I don't mind them when I'm
4 outside but, when I'm sleeping at night,
5 yeah, not conducive to good sleep. But I
6 would really like to see if they had some
7 sort of a program that they even test where
8 people sleep in their homes.
9 Because I have a second floor that's
10 obviously not well-insulated. Or, if it is,
11 it's not the job. Just for the fact of
12 living inside the home. Outside, I get it;
13 it's going to be loud for a few minutes. I
14 knew that buying the house but, I didn't
15 realize it would be that loud on the inside
16 for just having my own residence and being
17 able to sleep. I would hope they put
18 something into consideration for that.
19 Other than that, I appreciate you
20 guys doing this tonight. I hope this comes
21 out in a good way for everybody. Thank you.
22 MS. CARTER: Thank you.
23 Anyone else?
24 No one? All right.

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1 We are going to close the public
2 hearing, for this evening, for the Westfield
3 Barnes Regional Airport.
4 On the slide in front of you is the
5 contact information for Brianna Whiteman.
6 If you'd like to send an e-mail comment to
7 her, those will be the ones that will be
8 incorporated into the NCP report. You have
9 until February 17th at 5 p.m. Thank you for
10 coming out this evening and we appreciate
11 your attendance.
12 For everyone online, thank you very
13 much for participating. The meeting is over
14 and we will be leaving the Zoom meeting.
15
16 (Hearing concluded at 7:35 p.m.)
17
18
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21
22
23
24

Page 17

1 COMMONWEALTH OF MASSACHUSETTS
2
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6
7 I, SHARON WASKIEWICZ, COURT REPORTER, do hereby
8 certify that the foregoing is a true and accurate
9 transcription of my stenographic notes, to the best
10 of my knowledge and ability.
11 WITNESS MY HAND, this 10th day of February, 2023.
12
13
14
15
16
17 
18
19 Sharon Waskiewicz
20 Court Reporter
21
22
23
24

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01085 1:14	781-852-3158 2:19	aspects 14:24	Chris 2:24 12:14 14:9,22	control 8:2
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