BNA MASTER PLAN
NASHVILLE INTERNATIONAL AIRPORT

Nashville International Airport

Noise Exposure Map (NEM) Update
Noise Study Advisory Committee
Noise Modeling Meeting

October 7, 2019

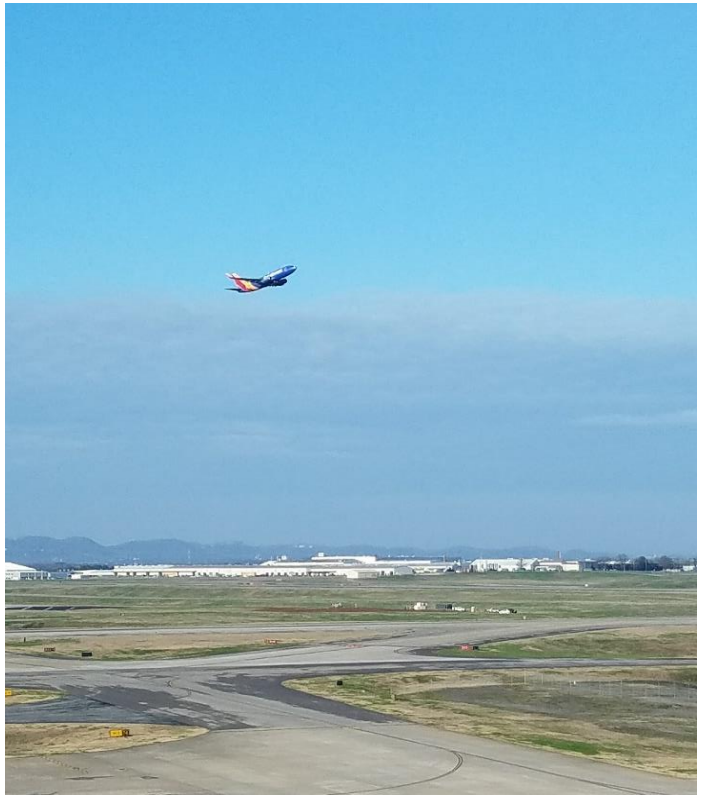
Draft

BNA Nashville International Airport

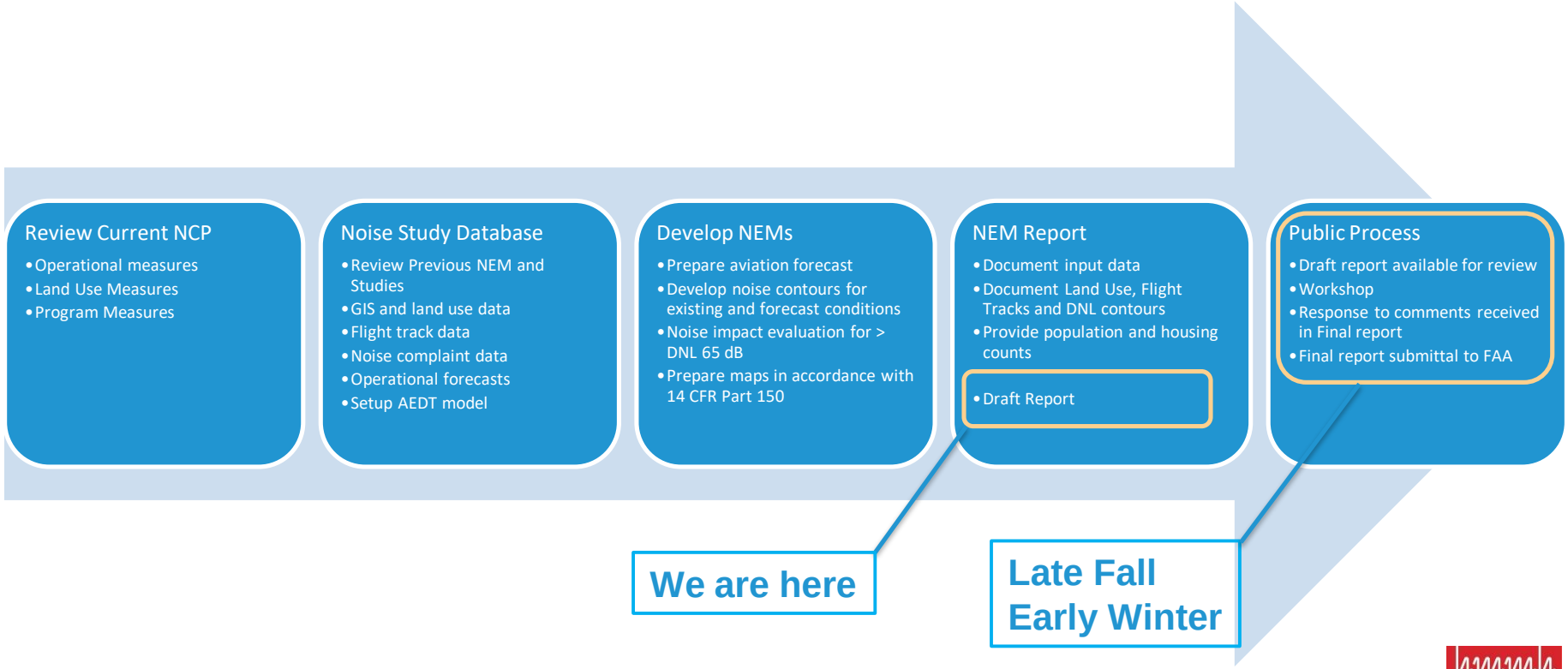
hmmh AECOM

Agenda

- Welcome and Introductions
- Noise Exposure Map Update Status
- Aircraft Noise Terminology
- Draft 2019 and 2024 DNL Noise Contour Maps
- Draft Noise Exposure Map Report
- Public Comment Period
- Next Steps



Noise Exposure Map Status



Aircraft Noise Terminology

Aircraft Noise Terminology

Primer to prepare for the NEM Update Report and Maps review

- The decibel scale (dB)
- The A-weighted decibel
- Single event noise metrics
  - Maximum sound level (L_{max})
  - Sound Exposure Level (SEL)
- Cumulative noise exposure metric
  - Day-Night Average Sound Level (DNL)



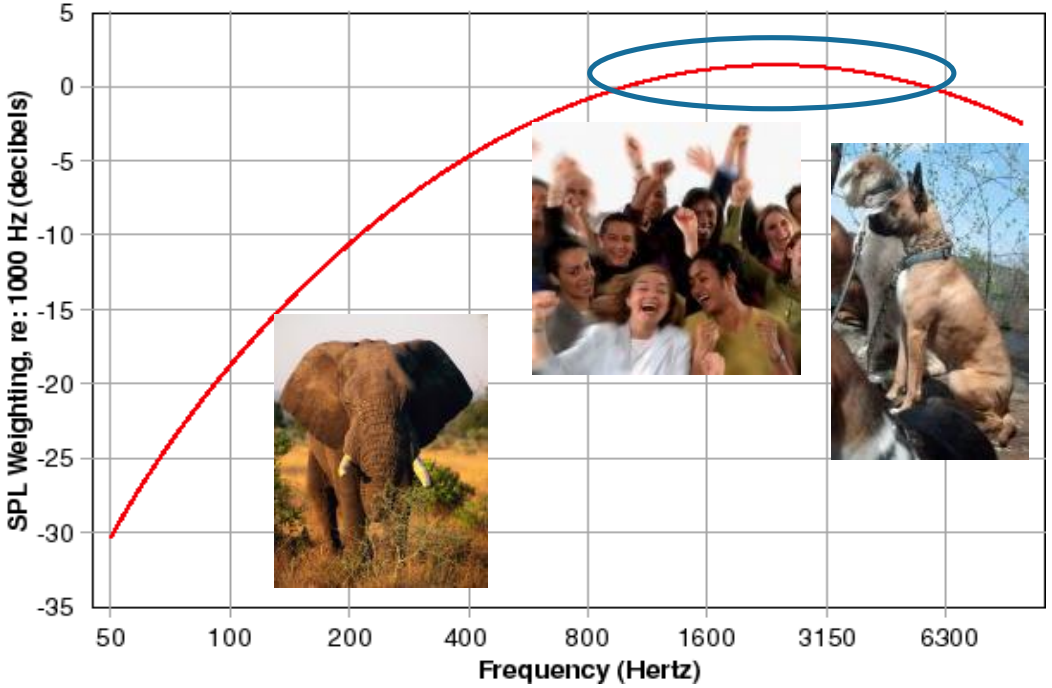
The Decibel Scale

- We use a logarithmic scale – decibels (dB) to express sound levels and noise levels
- Why?
  - We hear sound pressures over a HUGE range
  - Decibels compress this range to match the way we interpret sound pressures
  - 0 to 140 dB
  - 0.000000003 to 0.003 lbs. per sq. inch (psi)
  - We "hear" in decibels

"Energy"	dB	Common sounds
100,000,000,000,000	140	Near a jet engine at start of takeoff
10,000,000,000,000	130	Threshold of pain
1,000,000,000,000	120	On stage at a loud rock concert
100,000,000,000	110	
10,000,000,000	100	Jack hammer at 6 feet
1,000,000,000	90	
100,000,000	80	Vacuum cleaner at user's ear
10,000,000	70	Vacuum cleaner at 10 feet
1,000,000	60	Normal speech
100,000	50	
10,000	40	Quiet residential area
1,000	30	
100	20	Whisper
10	10	
1	0	Threshold of hearing
0.1	-10	

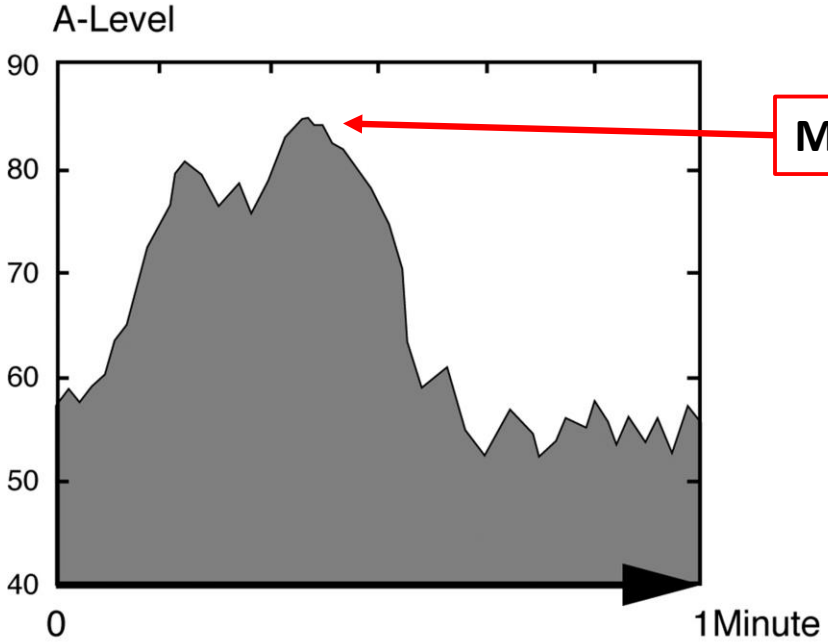
The Decibel Scale

- Our ear is not equally sensitive to all frequencies
- A-weighted decibels (dB) measure sound the way we "hear" it
- Part 150 specifies A-weighted noise metrics to describe
  - Single events
  - Cumulative exposure
- Consistent with worldwide practice



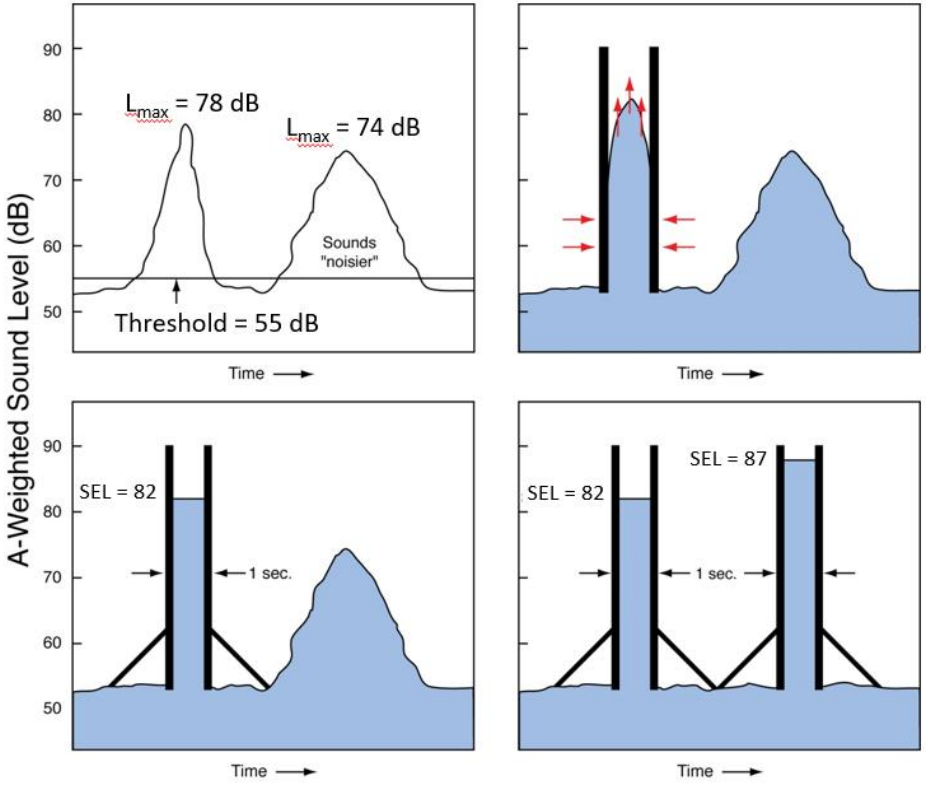
Maximum Sound Level (L_{max})

- The simplest way to describe a discrete noise "event" is its maximum sound level (Lmax)



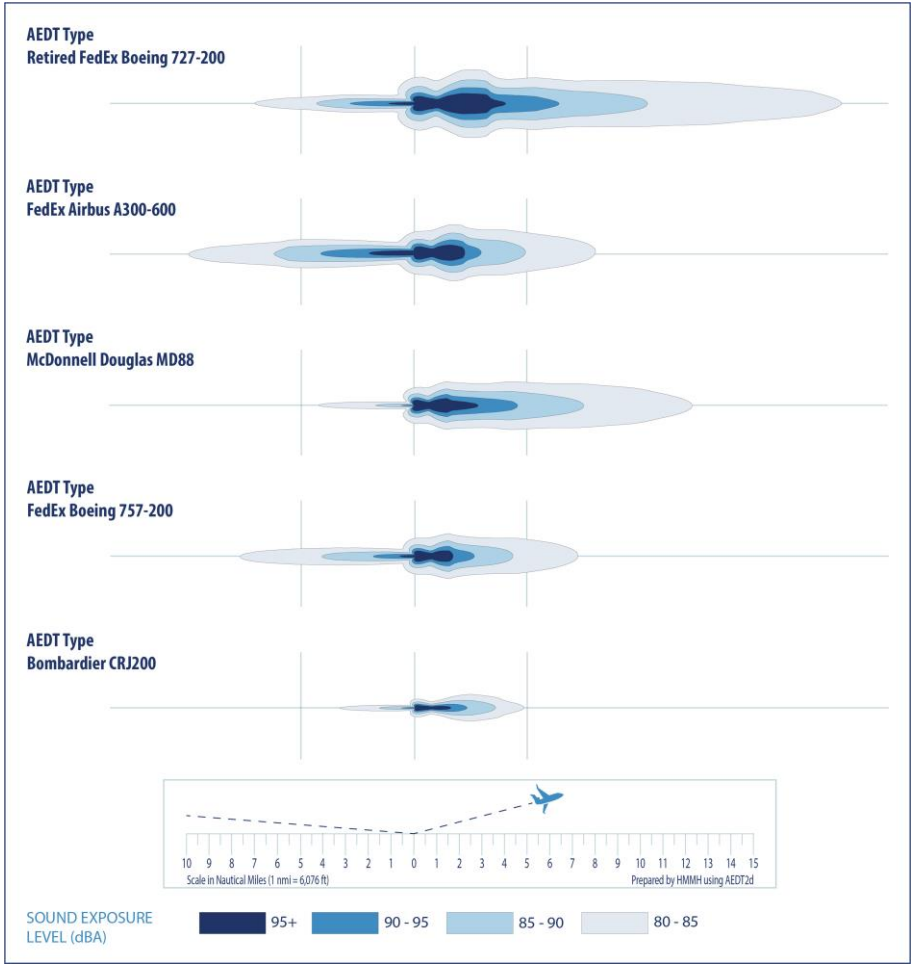
Sound Exposure Level (SEL)

- Duration matters: A longer event may seem "noisier," even if it has a lower or equal maximum level
- SEL measures the total "noisiness" of an event by taking duration into account
- The FAA's noise model (AEDT) uses SEL as the basis for calculating the required noise metric Day-Night Average Sound Level



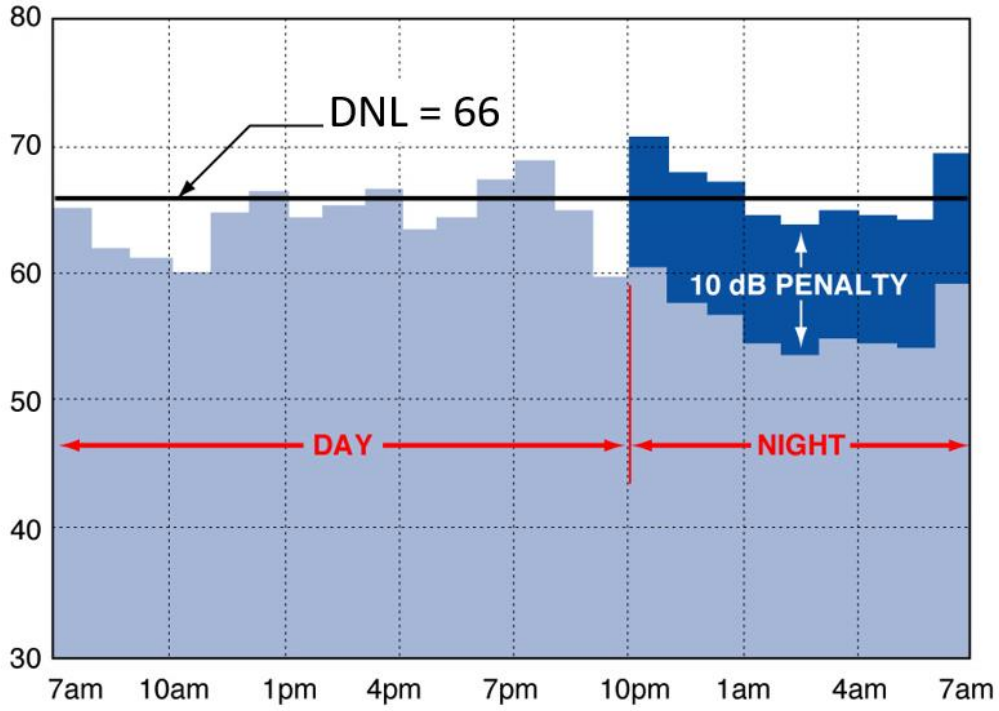
Comparative SELs

- The sound exposure levels created by an aircraft overflight depend on its
  - Engine type
  - Thrust setting profile
  - Altitude profile
  - Airspeed profile
- These graphics compare a typical landing (from left) and takeoff (to right) of different aircraft types



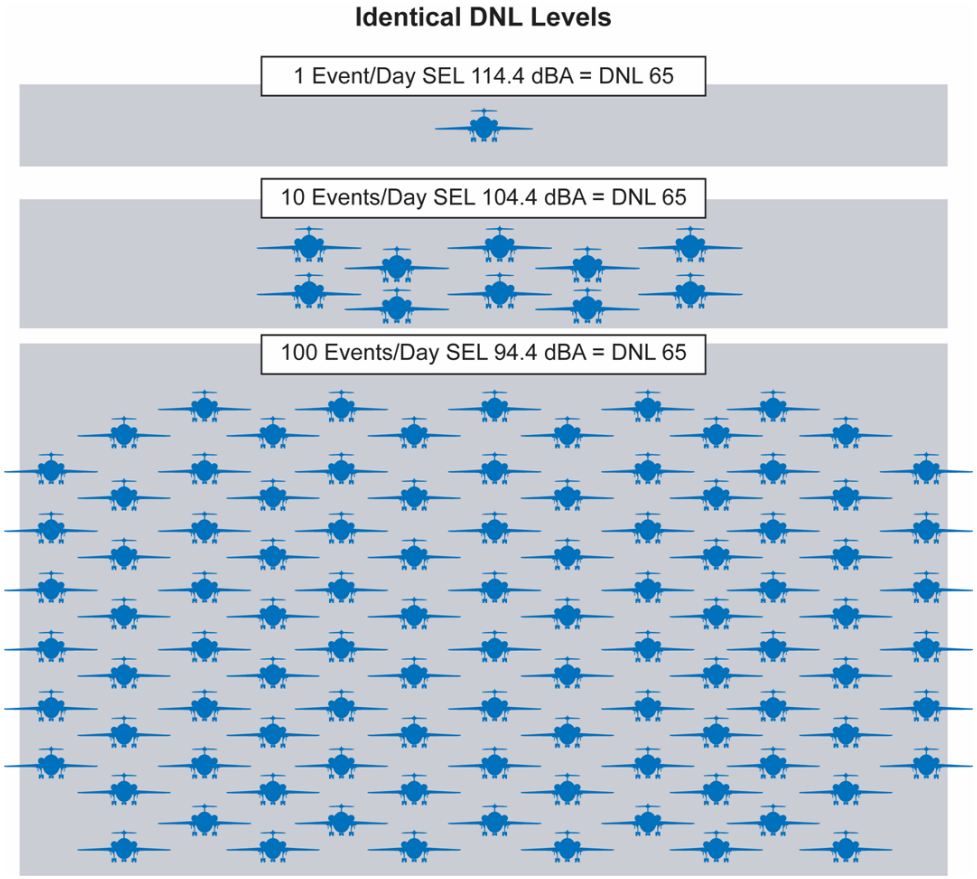
Cumulative Exposure: Day-Night Average Sound Level

- Describes 24-hour exposure
- Noise from 10 pm to 7 am is factored up by 10 dB
  - "Penalty" is equal to counting each night aircraft 10 times
- DNL is the only metric that Part 150 requires for land use compatibility



SEL versus DNL

- A given cumulative exposure level (DNL) can come from many different combinations of single noise events
- Since today's aircraft are quieter it takes many more operations to generate a similar size contour
- Hypothetical jet aircraft shown



Draft 2019 and 2024 DNL Noise Contour Maps

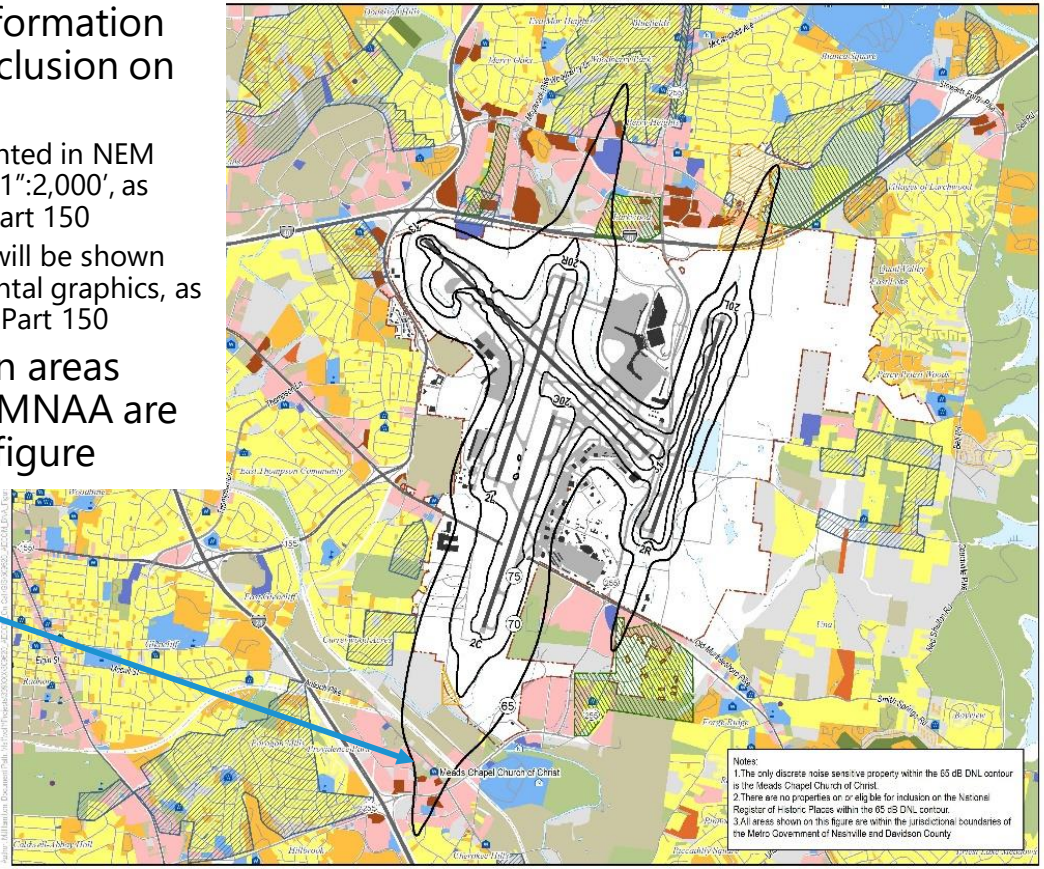
Draft 2019 and 2024 Noise Exposure Maps

- *As a refresher*, Part 150 requires depiction of:
  - DNL 65, 70, and 75 dB contours
  - Existing conditions (year of submission; 2019 in this case)
  - Forecast conditions (at least five years in the future; 2024 in this case)
  - Land use information within contours
    - Noise sensitive public buildings, such as schools, places of worship, health care facilities, and properties on or eligible for inclusion in the National Register of Historic Places
    - Identification of all noncompatible land uses
    - Jurisdiction(s) responsible for land use controls
    - Generalized land uses and street map
  - Other information
    - Runway layout and airport boundary
    - Flight tracks (may be on supplemental graphics, as in this case)

Draft 2019 Noise Exposure Map

- Contains all information required for inclusion on NEM figure
  - Will be presented in NEM document at 1":2,000', as required by Part 150
  - Flight tracks will be shown on supplemental graphics, as permitted by Part 150
- Prior mitigation areas completed by MNAA are shown on the figure

One Noise Sensitive Site



2019 Existing NEM Contour (65-75 dB DNL)
BNA Airport Boundary (Approximate)
Runway
State Boundary
Municipal Boundary
Highway
Minor Roads
Major Roads
Railroad

Land Use

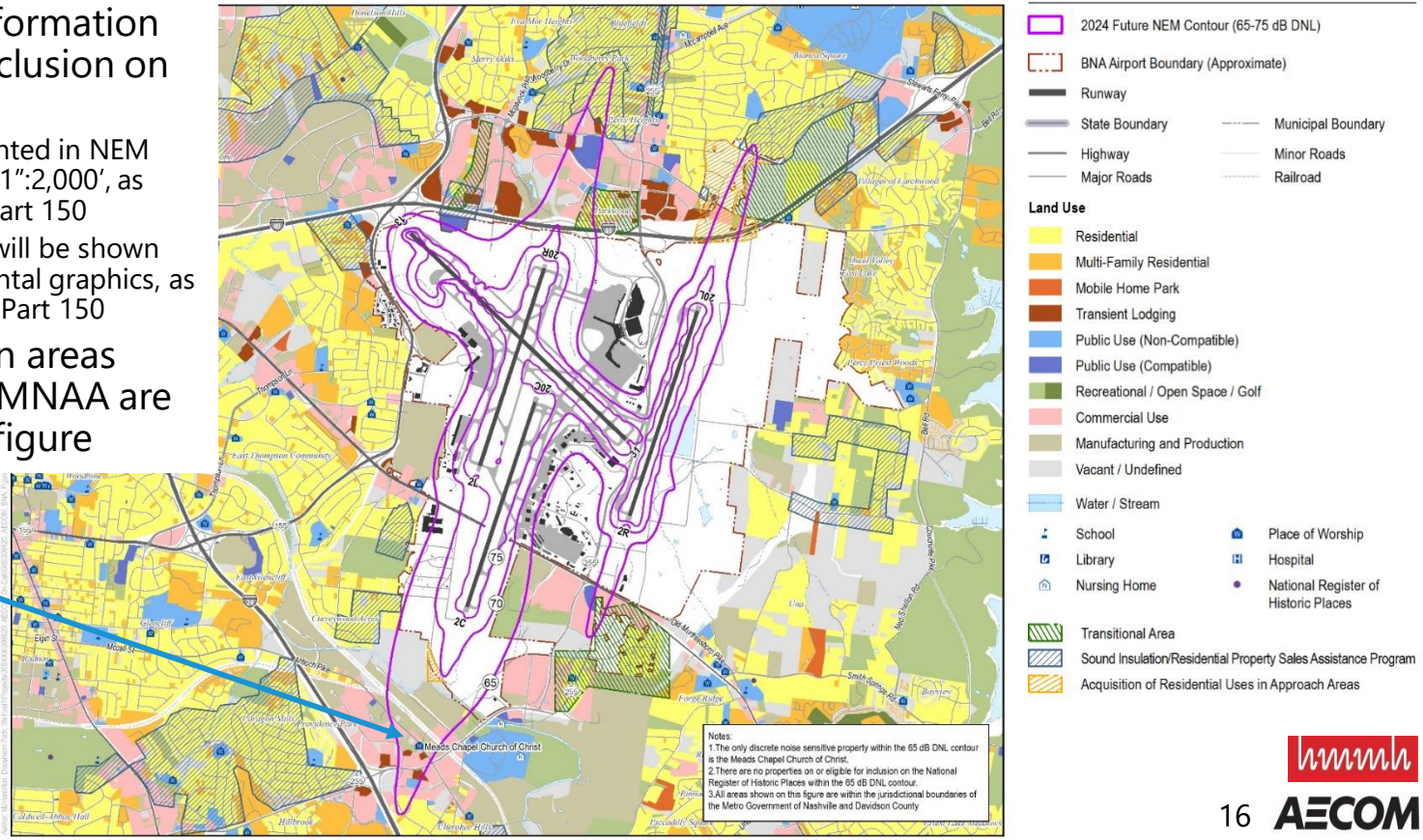
Residential
Multi-Family Residential
Mobile Home Park
Transient Lodging
Public Use (Non-Compatible)
Public Use (Compatible)
Recreational / Open Space / Golf
Commercial Use
Manufacturing and Production
Vacant / Undefined
Water / Stream
School
Place of Worship
Library
Hospital
Nursing Home
National Register of Historic Places
Transitional Area
Sound Insulation/Residential Property Sales Assistance Program
Acquisition of Residential Uses in Approach Areas

BNA Nashville International Airport

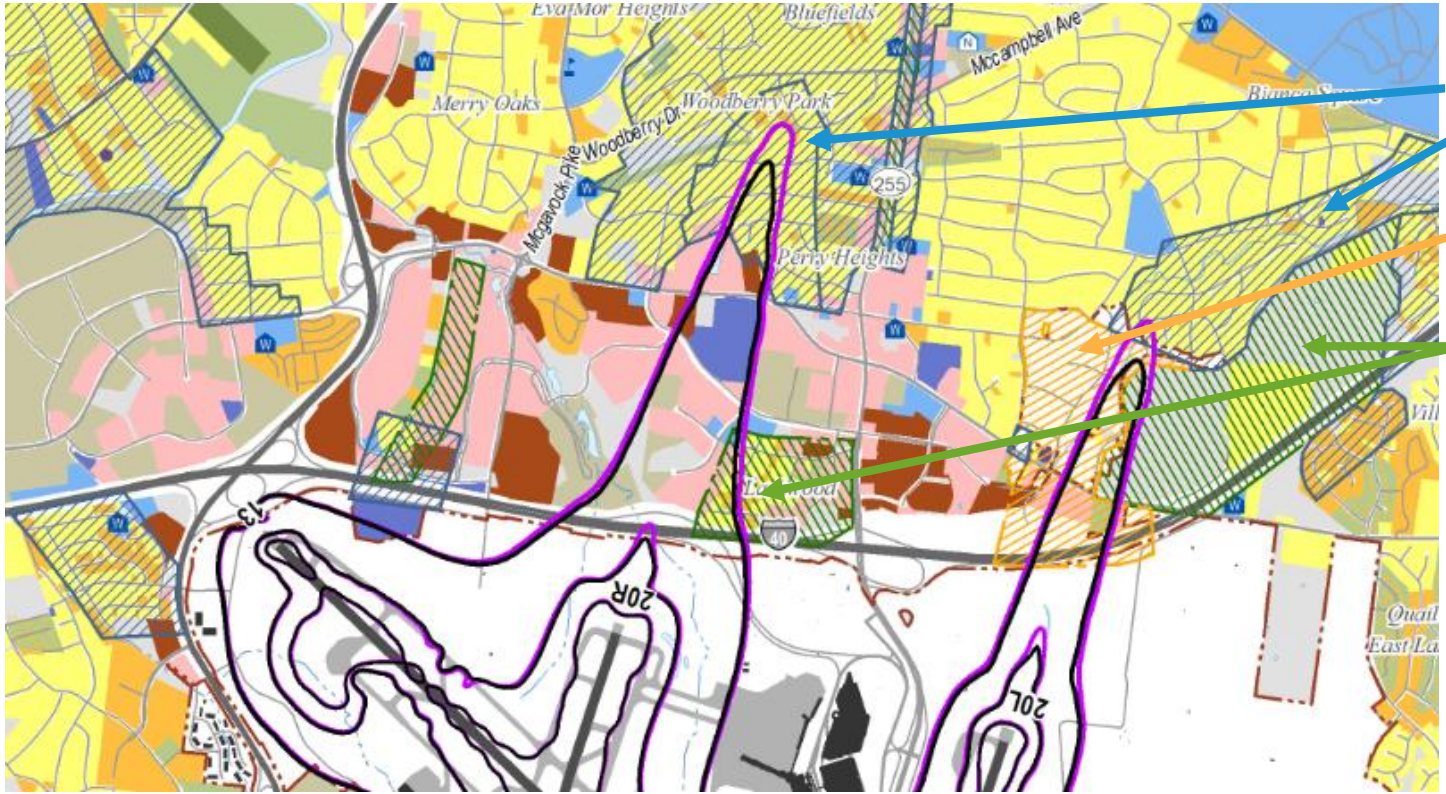
Draft 2024 Noise Exposure Map

- Contains all information required for inclusion on NEM figure
  - Will be presented in NEM document at 1":2,000', as required by Part 150
  - Flight tracks will be shown on supplemental graphics, as permitted by Part 150
- Prior mitigation areas completed by MNAA are shown on the figure

One Noise Sensitive Site



Draft 2019 & 2024 Noise Exposure Maps



Completed Sound Insulation/Residential Property Sales Assistance Program Area

Completed Residential Property Acquisition Area

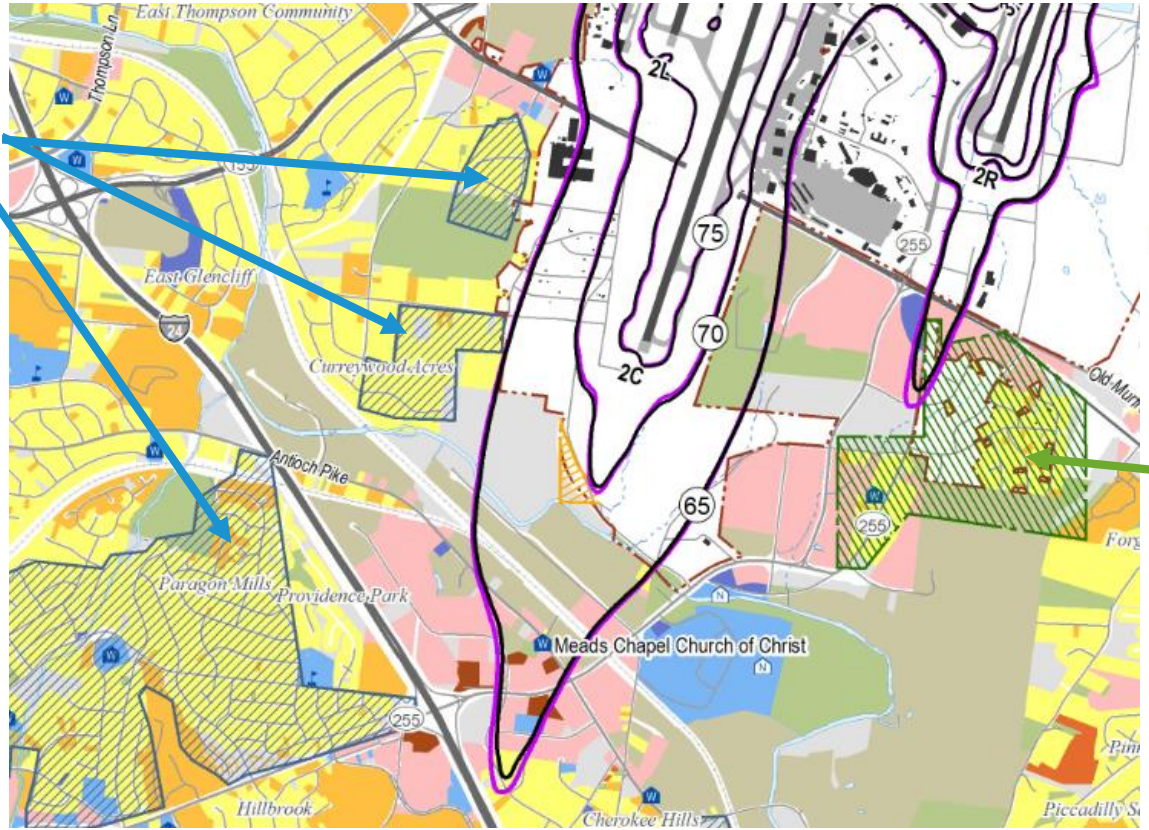
Transitional Land Use Area

2019 Existing NEM Contour (65-75 dB DNL)

2024 Future NEM Contour (65-75 dB DNL)

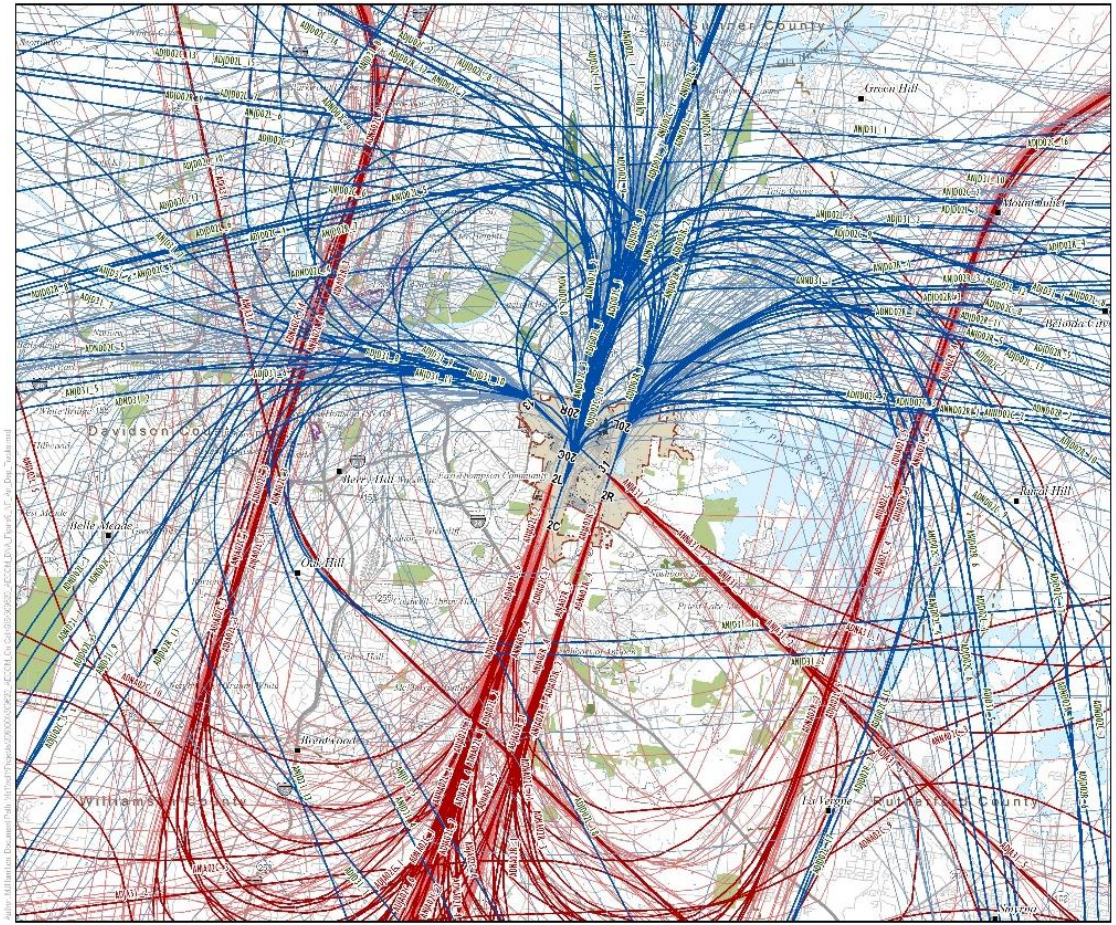
Draft 2019 & 2024 Noise Exposure Maps

Completed Sound Insulation/Residential Property Sales Assistance Program Area

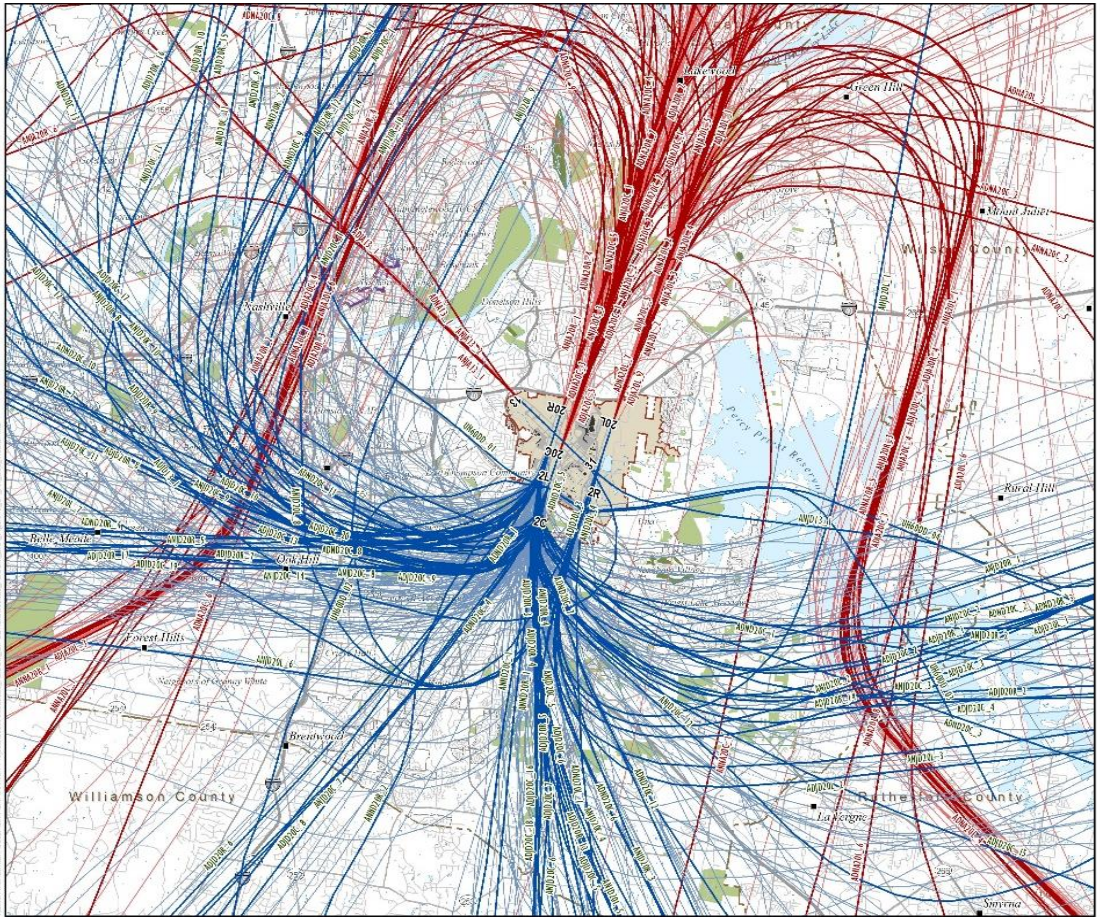


Transitional Land Use Area

North Flow Arrival and Departure Flight Tracks



South Flow Arrival and Departure Flight Tracks



Draft Population/Housing Summary

- Overall decrease of 164 persons and 59 housing units in 2019 as compared to 2012 exposed to 65 DNL or higher
  - However, 2012 had 2 noncompatible housing units (the remaining 116 were mitigated)
  - 2019 has 6 noncompatible housing units (the remaining 53 have been mitigated)
- Overall decrease of 60 persons and 15 housing units in 2024 as compared to 2012 exposed to 65 DNL or higher
  - 2024 has 13 noncompatible housing units (the remaining 90 have been mitigated)
- Even with the shift in the area of the 65 DNL contour to the north and south of the airport, the area of noncompatible land use is still very small at BNA

2012 Contour Population & Housing		
Contour Intervals	Population Census 2010	Housing Units
65-70 DNL	294	118
70-75 DNL	0	0
>75 DNL	0	0
Total >= 65	**294**	**118**

Draft 2019 Contour Population & Housing		
Contour Intervals	Population Census 2010	Housing Units
65-70 DNL	130	59
70-75 DNL	0	0
>75 DNL	0	0
Total >= 65	**130**	**59**

Draft 2024 Contour Population & Housing		
Contour Intervals	Population Census 2010	Housing Units
65-70 DNL	234	103
70-75 DNL	0	0
>75 DNL	0	0
Total >= 65	**234**	**103**

Draft Noise Exposure Map Report

Organization of Draft Noise Exposure Map Report

Main Body

Sponsor's Certification (Executed in final submission)

Glossary

1. Introduction
   FAA Checklist
2. Land Use Compatibility Guidelines and Standards
3. Existing Noise Compatibility Program
4. Existing and Forecast Noise Exposure Maps
5. Development of Noise Contours
6. Public Consultation

Appendix Volume

A. Noise Terminology
B. FAA Acceptance of Previous Noise Exposure Maps
C. Record of Approval for 1989 NCP Submission
D. 2019 and 2024 Noise Exposure Map Forecast Documentation and FAA Approval
E. Noise Study Advisory Committee
F. Documentation Related Draft Noise Exposure Map Notice, Review, And Comment Opportunities
G. Public Workshop
H. Written Comments

Draft NEM Report Availability and Comment Period

- The Draft NEM report will be available for public review for a period of 30 days this Fall
- The Draft NEM report will be available
  - On the MNAA website, at: https://www.flynashville.com/about/Pages/noise-information.aspx
  - At seven physical locations:
    - MNAA Offices
    - Six Local Libraries

MNAA Administrative Offices (during business hours)
Nashville International Airport
One Terminal Drive, Suite 501
Fourth Floor Reception Area
Nashville, TN 3706
(615) 275-1600

Nashville Public Library Branches

Main Library
615 Church Street
Nashville, TN 37219
(615) 862-5800

Hermitage Branch
2315 Lebanon Road
Nashville, TN 37214
(615) 862-5859

Edmonson Pike Branch
5501 Edmondson Pike
Nashville, TN 37211
(615) 880-3957

Donelson Branch
2315 Lebanon Road
Nashville, TN 37214
(615) 862-5859

Southeast Branch
2325 Hickory Highlands Drive
Antioch, TN 37013
(615) 862.5871

Thompson Lane Branch
380 Thompson Lane
Nashville, TN 37211
(615) 862-5873

Draft NEM Report Availability and Comment Period

- The Draft NEM report availability and comment period will be advertised through:
  - Legal advertisements in The Tennessean newspaper
  - Emailed notices to Metropolitan Council representatives
  - Emailed notices to airport tenants and regular aeronautical users
  - NSAC meeting
- While not a Part 150 requirement, the MNAA will include the NEM update in a public workshop held in coordination with the concurrent Airport Master Plan Update
- Written comments may be submitted by:
  - A form on the MNAA website
  - Mailed to MNAA
  - Emailed to MNAA (email address will be provided with public comment notice)

Draft NEM Report Availability and Comment Period

- MNAA will collect and review all comments provided:
  - MNAA will provide these comments to the FAA
- Part 150 does not require MNAA to provide a response to each comment for a Noise Exposure Map Update



Next Steps

- Preliminary Draft NEM Report is under review by FAA
- MNAA will address FAA comments and develop the Draft NEM Report for public review
- MNAA will schedule 30 day public review period and send out notices
- Draft NEM Report will be available during the 30 day comment period
- MNAA will update the NEM Report after the public comment period and then submit the Final NEM Report to FAA for review and acceptance
- FAA will review and provide a Record of Acceptance
- 2019 or 2024 NEM contours will then be the approved contours for any ongoing or upcoming projects

Thank You for Your Participation!

Follow the NEM Update on
https://www.flynashville.com/about/Pages/noise-information.aspx

Comments or Questions
https://www.flynashville.com/contact/Pages/commentsandquestions.aspx

