Citizens' Committee on Airport Noise

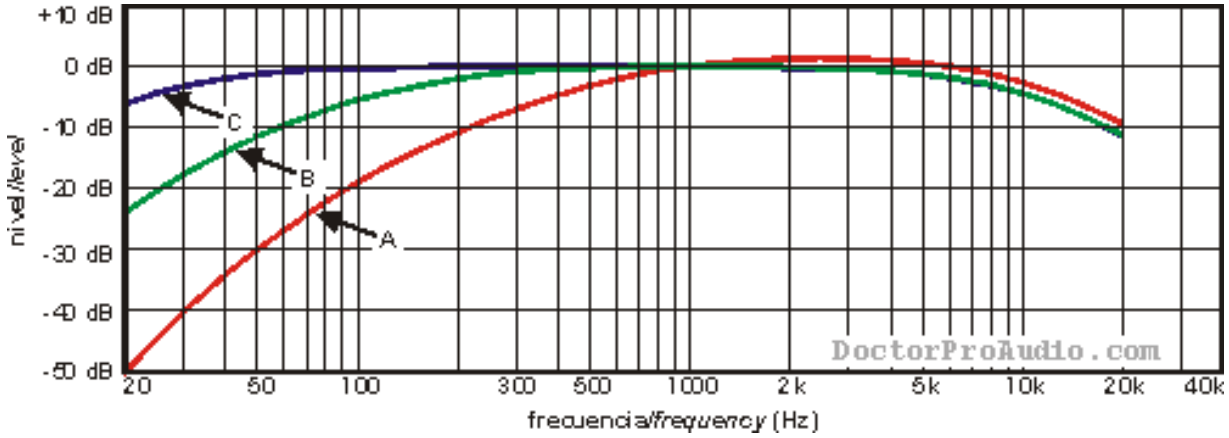
Noise Terminology, Measurements and Modeling

Presentation to Palm Beach County Citizens Committee on Airport Noise (CCAN)

Presented by Rhea Hanrahan, HMMH
Eric Pilsk, Kaplan Kirsch
April 23, 2026

Noise is Unwanted Sound

- Sound results from small and rapid changes in air pressure that our ears detect
- We characterize and judge sounds by:
  - Magnitude (loudness) in decibels (dB)
  - Frequency (pitch) in hertz (Hz)
- The EPA and FAA have adopted the A-weighted sound level for environmental analyses
- All sound levels presented in aircraft noise studies are A-weighted unless otherwise specified

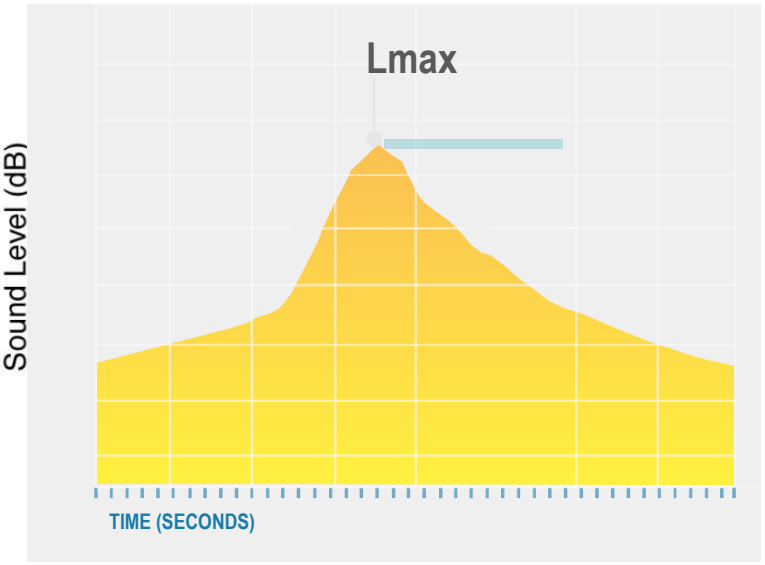


Studies have resulted in loudness curves:

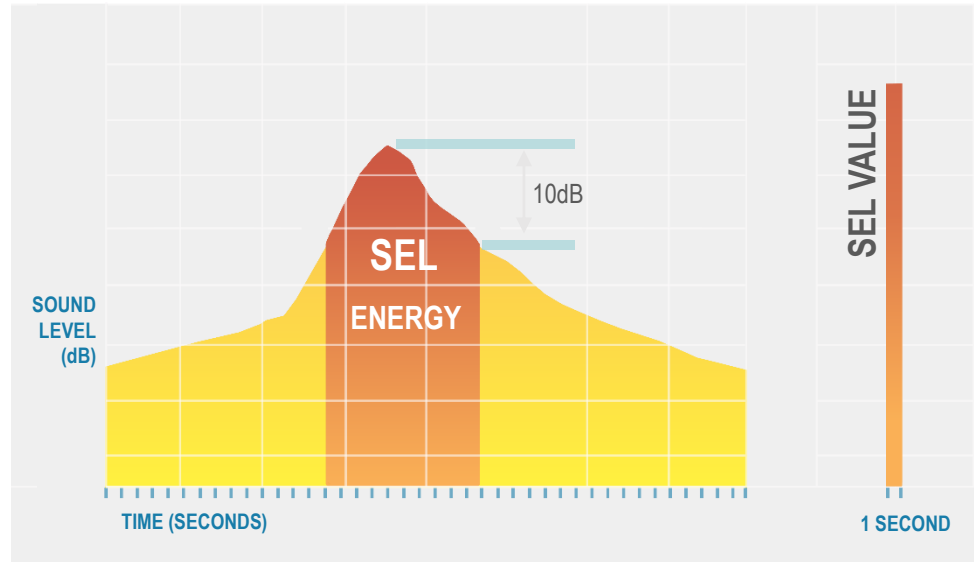
- **A-weighted** noise levels correlate to the loudness of sounds in our everyday environment (relatively low energy).
- **B-weighted** noise levels correlate to medium energy sounds.
- **C-weighted** noise levels correlate to high energy sounds.

Noise Terminology

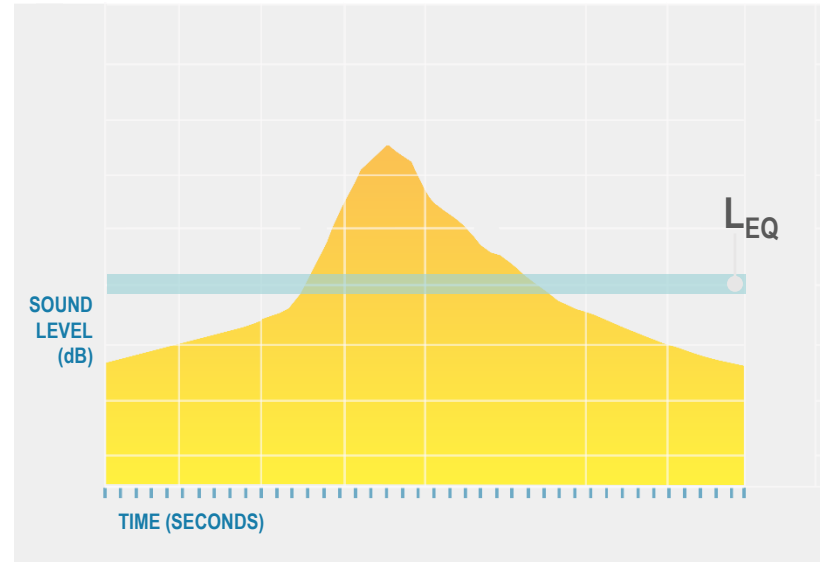
Maximum A-weighted Sound Level (Lmax)



Sound Exposure Level (SEL)



Equivalent Sound Level (Leq)

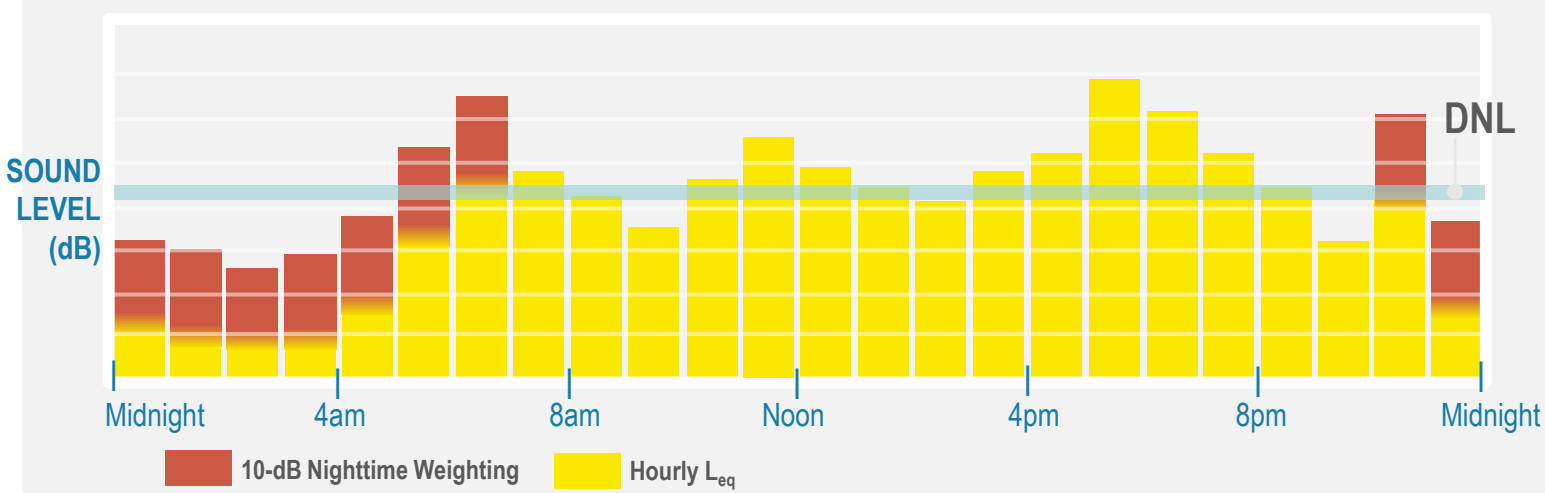


Noise Terminology

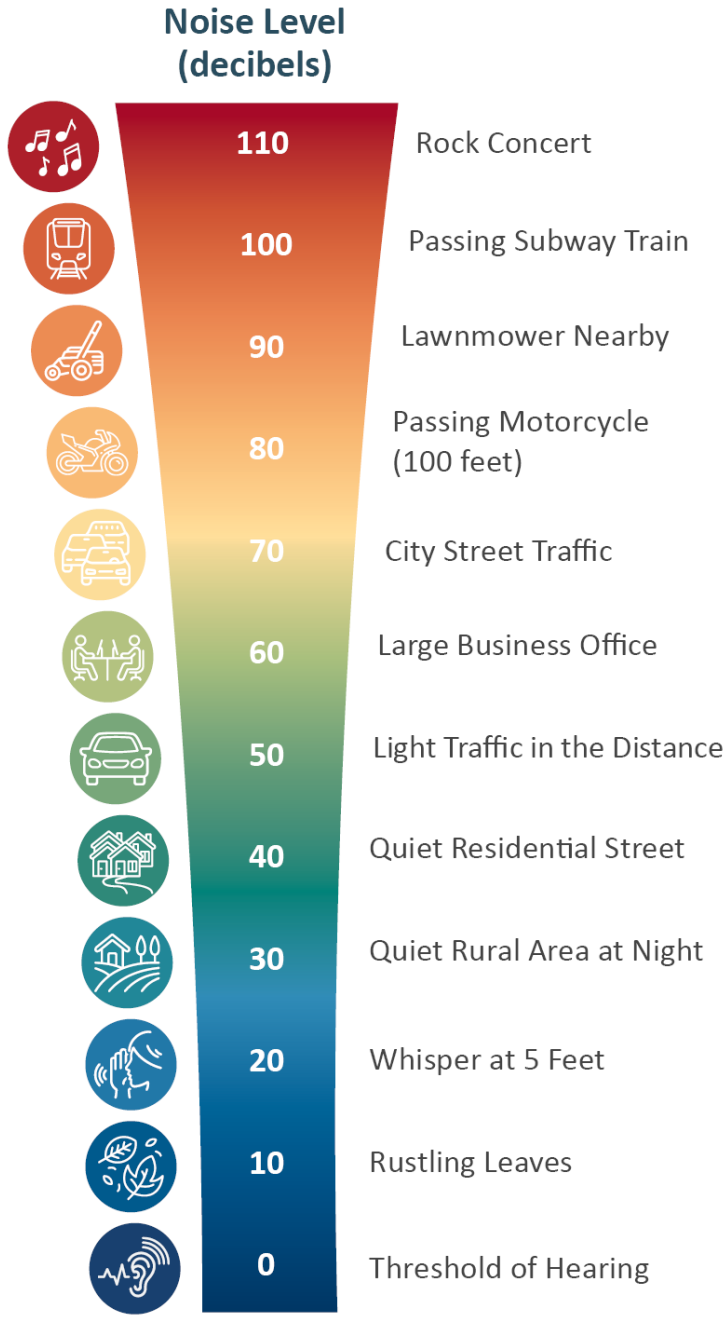
Day Night Average Sound Level (DNL)

- Describes the noise dose for a 24-hour period
- Accounts for event "noisiness" (SEL)
- Accounts for number of noise events
- Provides an additional weighting for evening and nighttime operations

Daytime = 7:00 a.m. to 10:00 p.m.
Nighttime = 10:00 p.m. to 7:00 a.m.



Common Sound Levels



Noise Measurements

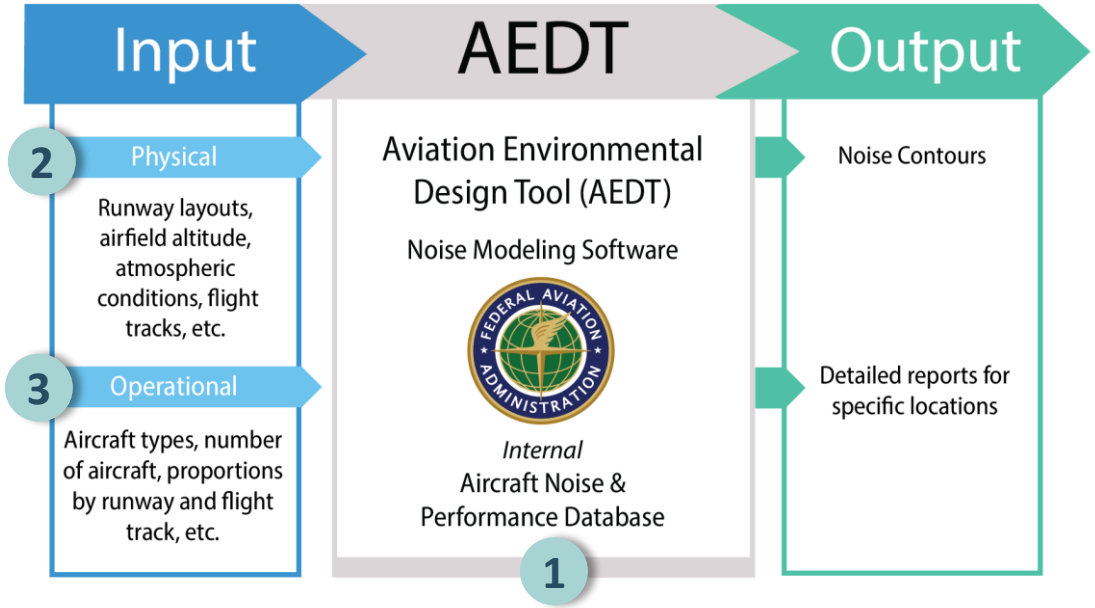
- Measurements are taken from a limited number of locations
- Permanent or portable locations
- Measurements only document what has already occurred
- Noise measurements cannot be used to determine noncompatible land use
- Measurements cannot be used to calibrate or validate the FAA noise model
- Noise monitors show dB levels in real-time, they do not indicate exceedance of FAA's DNL metric for land use compatibility

Noise Measurements

- Noise events are determined based on a set threshold and minimum duration
- Noise events are correlated to aircraft operations in the vicinity of the noise measurement site by time
- Noise energy from the noise events correlated to aircraft operations is combined to determine the daily noise exposure levels from aircraft operations

FAA Noise Modeling

- The FAA requires computer modeling with the Aviation Environmental Design Tool (AEDT) to develop average annual DNL noise contours to determine noncompatible land use.
  - Version 4a (released January 26, 2026)
- AEDT requires noise model input data in three categories:
  1. **Aircraft Noise and Performance Data**
     - Aircraft performance profiles
     - Noise level vs. distance curves
  2. **Airport Physical Data**
  3. **Aircraft Operational Data**
     - Number of aircraft operations
     - Aircraft fleet mix
     - Day-night split of operations
     - Stage length
     - Runway utilization
     - Flight track geometry and utilization



Airport Noise Compatibility Planning (14 CFR Part 150)

The Aviation Safety and Noise Abatement Act of 1979 (ASNA) required the FAA to:

- Establish a single, uniform, repeatable system for considering aviation noise around airport communities.
- Establish a single system for determining noise exposure from aircraft, which takes into account noise intensity, duration of exposure, frequency of operations, and time of occurrence.
- Identify land uses that are normally compatible with various exposures of individuals to noise

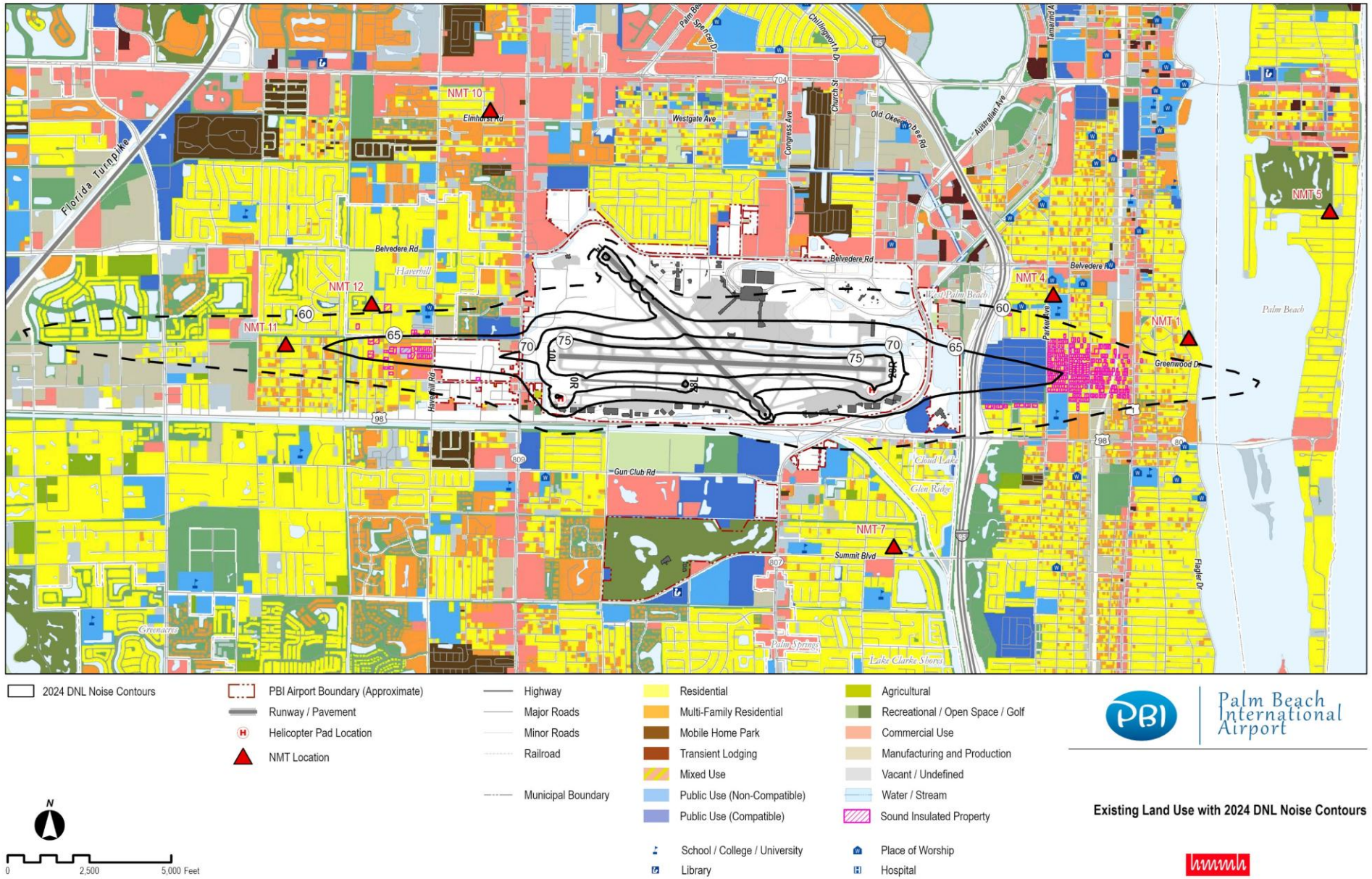
14 CFR Part 150 prescribes standards and systems for:

- 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 the FAA
- FAA and public review processes
- FAA approval or disapproval process

Noise Exposure Map (NEM)

- FAA “accepts” NEM as compliant with Part 150 standards.
- NEM must include a 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 the year of submission)
- FAA must approve the aviation forecast used for the Part 150.

PBI 2024 DNL Noise Contours



Land Use Compatibility Guidelines

- Determined using noise modeling
- All land use is compatible with aircraft noise less than DNL 65 dB
- Land Use compatibility assessments use 5-dB contour bands
    - 65 to 70 dB
    - 70 to 75 dB
    - Greater than 75 dB
- FAA Order 1050.1F Desk Reference provides detailed guidance

FAA mitigation applies to noncompatible land use (within the DNL 65 dB contour) or noise-sensitive land use exposed to a significant impact due to a Proposed Action (within the Proposed Action DNL 65 dB contour).

FEDERAL CONTROL OF AIRSPACE

- "The United States Government has exclusive sovereignty of airspace of the United States." 49 U.S.C. § 40103(a)(1).
- FAA has the exclusive authority over:
  - Aircraft in flight
  - Air traffic control
  - Flight paths
  - Flight procedures (STARs, SIDs, NextGen, etc.)

FEDERAL CONTROL OF AIRCRAFT NOISE

- Noise Abatement and Control Act (1968) and Noise Control Act of 1972
  - Directed FAA (with EPA) to establish noise standards for aircraft
  - Noise regulation at its source is federal responsibility
  - Research into effects of noise on public health
  - 14 C.F.R. Part 36, *Noise Standards*
    - *New aircraft are required to meet noise certification standards*
    - *Introduction of "stage" ratings for aircraft*

FEDERAL CONTROL OF AIRCRAFT NOISE

- *What are powers of state and local governments?*
- *Lockheed Air Terminal v. Burbank* (1972)
  - Non-Proprietor Curfew Preempted
  - Proprietors' Exception: Proprietors may adopt reasonable, non-discriminatory, non-arbitrary access restrictions
  - Codified at 49 U.S.C. § 41713(b)

FEDERAL LIMITS ON PROPRIETARY POWERS

- Airport Noise and Capacity Act (ANCA) & 14 C.F.R. Part 161
  - Phased Out Older, Louder Stage 2 Aircraft
  - New restrictions on Stage 3+ require FAA approval
  - FAA has not approved ANY restrictions on Stage 3 or higher aircraft under ANCA
- Grant Assurance 22 (incorporates Part 150 standards)
- Constitutional Limits (Equal Protection, Due Process, etc.)

WHO CAN CONTROL AIRCRAFT NOISE?

- FAA Has Exclusive Control Over
  - Aircraft in Flight
  - Noise at Source
- Proprietary Power to Adopt Restrictions Sharply Limited
  - FAA approval under ANCA required
  - Subject to FAA review under Grant Assurance 22
  - Constitutional limits
- Non-Proprietary Powers
  - Zoning and Land Use Outside Airport Fence, including expansion

NEPA ENVIRONMENTAL REVIEW

- Analyze environmental impacts
  - Projects using federal funds or needing federal approval
  - Analogous state laws (CEQA; SEQR)
- Three levels of review
  - Environmental Impact Statement (EIS)
  - Environmental Assessment (EA) - Finding of No Significant Impact (FONSI)
  - Categorical exclusion (CatEx) - FAA Order 1050.1F, Section 5-6

NEPA ENVIRONMENTAL REVIEW

- DNL 65 dB legal threshold of significance
  - DNL 1.5 dB Increase Within or Into the DNL 65 dB Contour
  - Disclose:
    - 3 dB increase between the 60 – 65 DNL
    - 5 dB increase between 45-60 DNL
- Airspace changes above 3,000 feet AGL are subject to categorical exclusion

Questions?

Rhea Hanrahan

HMMH

rhanrahan@hmmh.com

Eric Pilsk

Kaplan Kirsch

epilsk@kaplankirsch.com

Thank you!

Citizens' Committee on Airport Noise