Educational Series: Aircraft Noise Measurements

September 2024

Noise Measurement

- Purposes of aircraft noise measurements
- Choosing measurement locations
- Fixed vs. portable noise monitoring

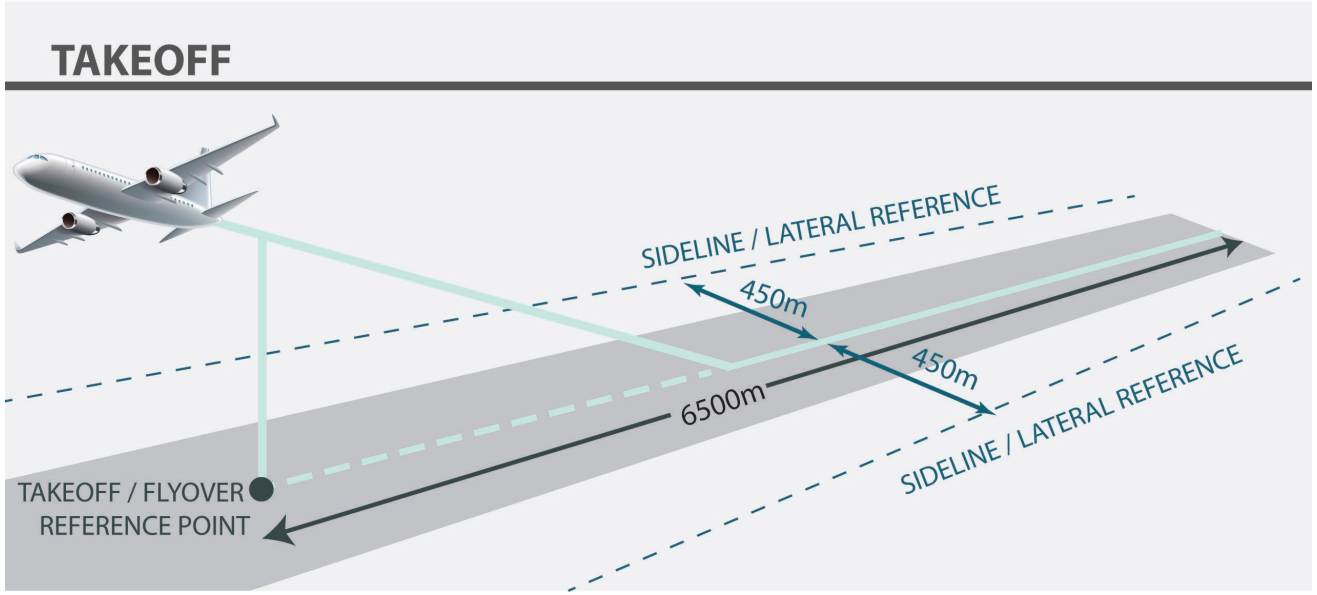
Aircraft Noise Measurement Purposes

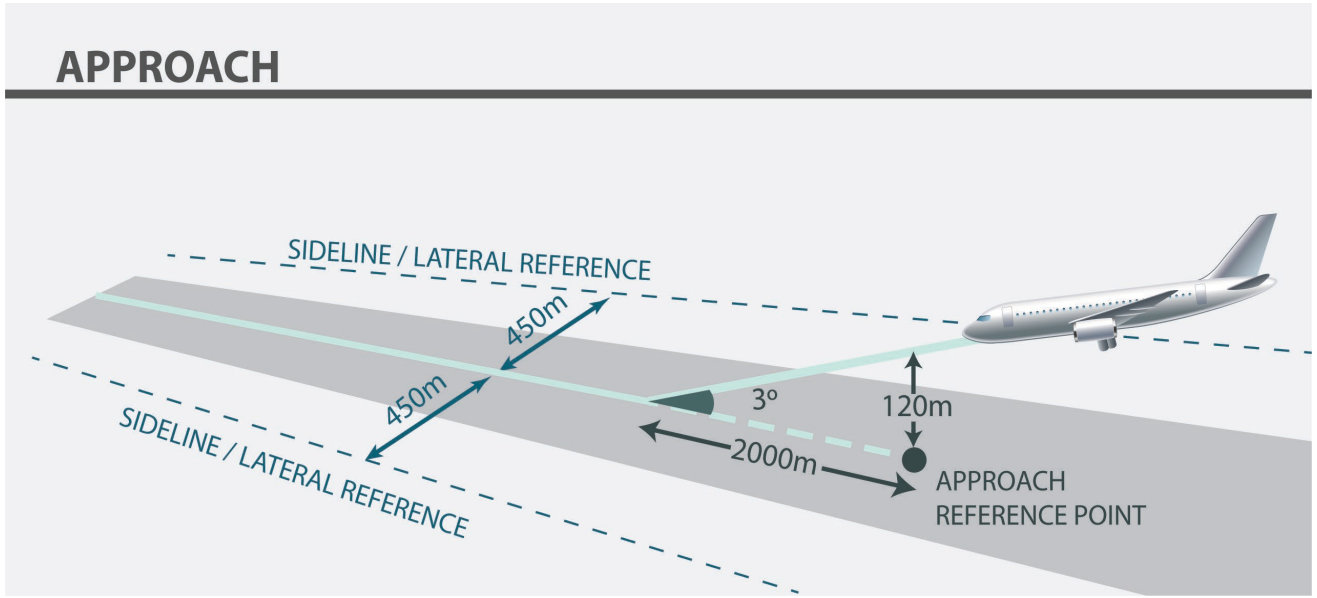
- Aircraft certification
- Data collection for modeling purposes not intrinsic to AEDT
- Title 21 requirements
- Sound insulation programs
- Specific noise and research studies

Measurements for Aircraft Noise Certification

Certification for most – *but not all* – aircraft is based on three measurements:

- Landing
- Sideline
- Takeoff





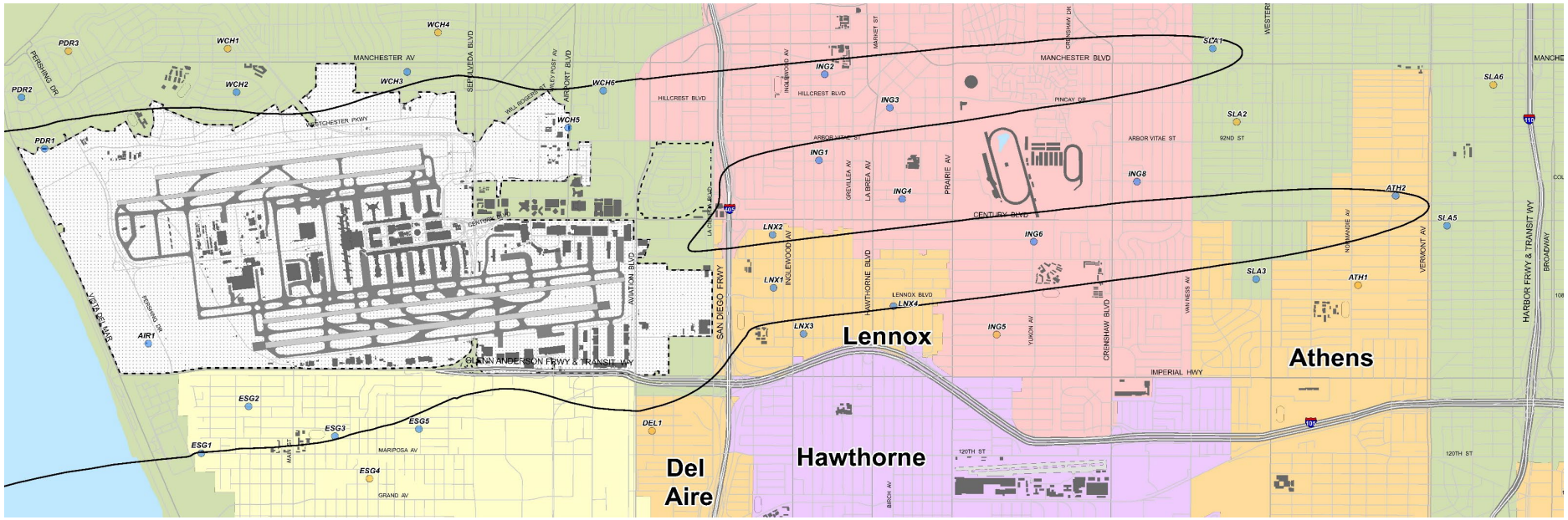
Measurement locations can vary with aircraft stage, number of engines, and lift mechanism. Some types are certificated based on level flyover.

Measurements for Noise Modeling Purposes

- Reference data for aircraft
- Ground noise 1/3-octave band data for SoundPlan™ modeling
- Sound propagation characteristics
  - Ground types (e.g., propagation over water)
  - Atmospheric conditions

Measurements for Title 21 Requirements

- Extent of quarterly noise contours are to be determined using noise measurements from noise monitors in proximity to the contour closure points



Measurements for Residential Sound Insulation Programs

- Determine eligibility (pre-construction testing)
- Specify insulation treatments required to meet Program goal (pre-construction testing)
- Validate Program goal was met (post-construction testing)

Measurements to Support Research/Studies

- Nighttime engine maintenance run-ups
- Low-frequency noise from take-off roll, thrust reverse
- Noise barrier/ground run-up enclosure testing
- Taxiway, gate, APU operations

Measurement Location Selection

Specific locations should be:

- Secure
- Away from other noise sources, such as:
  - Busy roads, railroads, industrial activity
  - HVAC equipment
  - Barking dogs/children's play areas
  - 25' from large reflecting surfaces,
    10' from trees, poles

Microphone height typically 5-6 above the ground (ear level) for portable monitoring

- Note: fixed monitor microphones are much higher, ≈20 feet

Noise Monitoring Options

Fixed monitors provide long-term data

Portable monitors provide flexible, comprehensive geographic coverage

Fixed Monitoring

- Permanent
  - Careful site selection is critical
  - Can be installed on pre-existing or new poles
- Benefits
  - Consistent, comparable, long-term results
  - Minimal operating labor
- Drawbacks
  - Limited geographic coverage
  - Siting arrangements and fees
  - Higher cost for installation and service

Measurement Equipment - Fixed

- Self-calibrating
- AC powered
- Remote data download
  - Phone lines (becoming obsolete)
  - Broadband internet
  - Cellular modem
- Similar noise data collected as portable monitors
- Some have weather data collection abilities

Portable Monitoring

- Temporary
  - Self-contained monitor, data storage, power
  - Capabilities identical to permanent units
- Benefits
  - Unlimited monitoring locations
  - Low purchase and service costs
- Drawbacks
  - Labor intensive
  - Data comparability
  - Security

Measurement Equipment - Portable

Noise Monitor Kits

- Tripod and tent stakes
- Windscreen
- Microphone and cables
- Calibrator
- Batteries for calibrator
- Batteries for SLM power
- Battery recharger
- SLM power adapter cable
- Chains and locks
- Electrical tape
- Data cards/card reader
- PC connection cable

Questions/Discussion

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