

Ground Noise Study Progress Update

October 2021

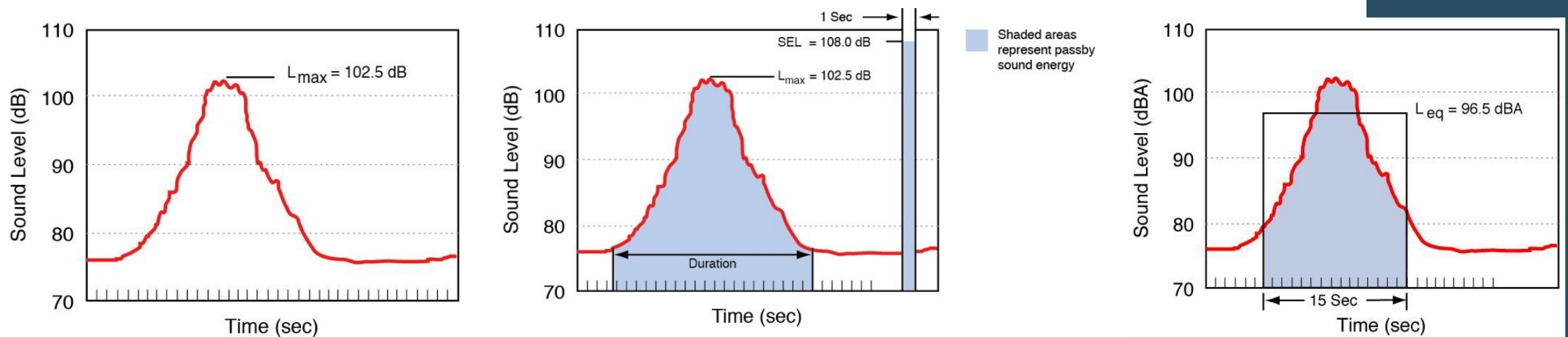
Agenda

- Acoustic Terminology
- Sound Propagation
- Scope of Work
- Noise Monitoring
- Next Steps



Acoustic Terminology

- Maximum A-weighted Sound Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})



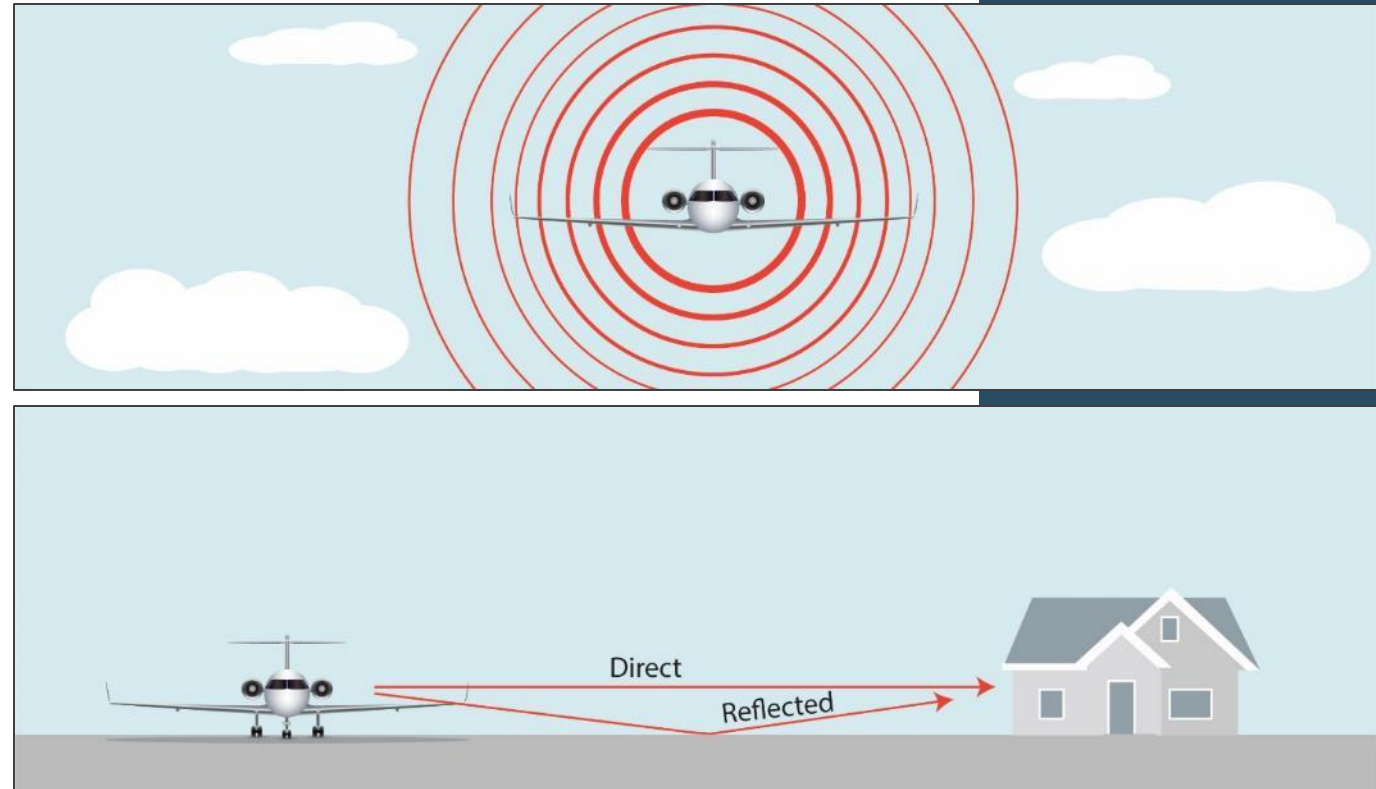
Sound Propagation

Spherical Spreading:

- Sound level decreases by 6 dB per doubling of distance
- Additional losses due to atmospheric absorption

Ground Effect:

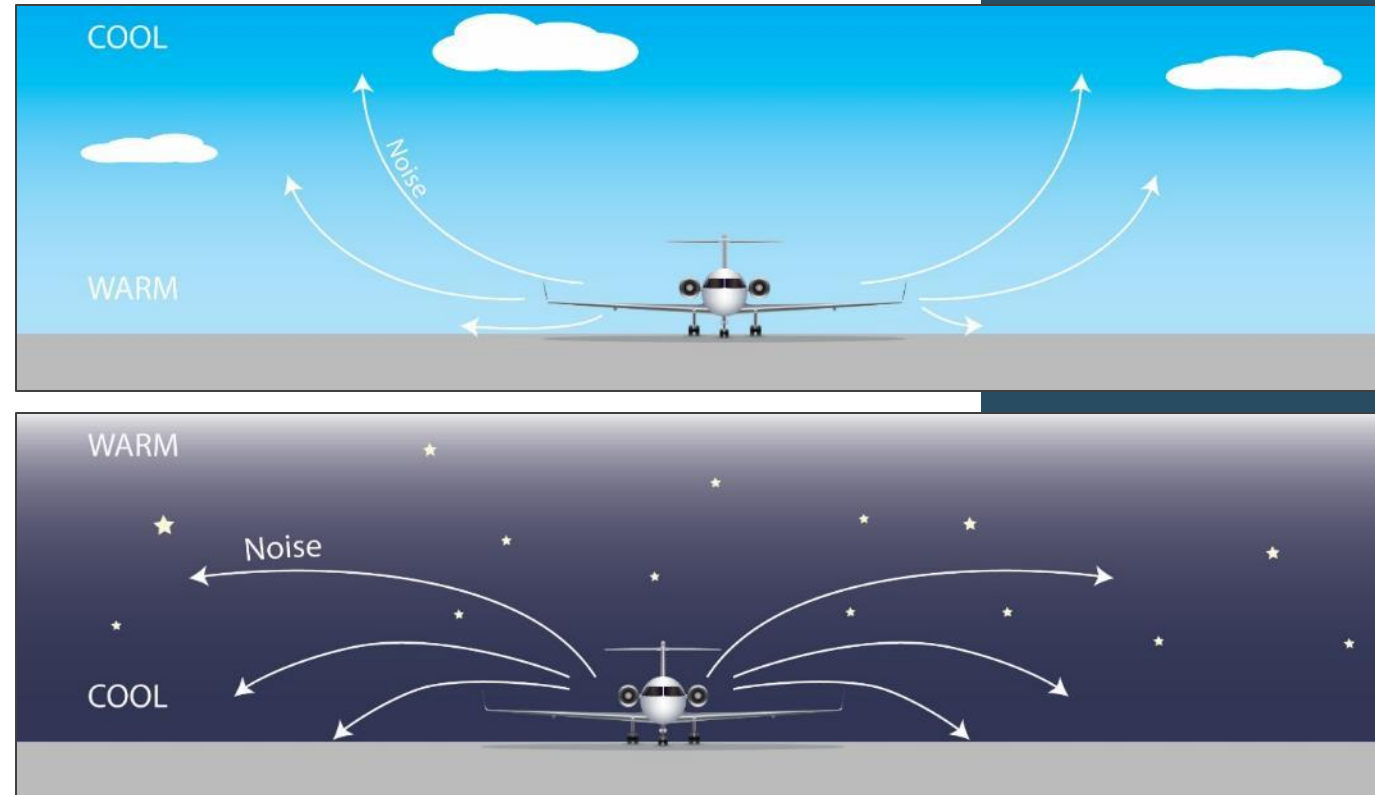
- Sound levels are lower when reflected off of soft ground vs. hard ground



Sound Propagation

Refraction due to Temperature:

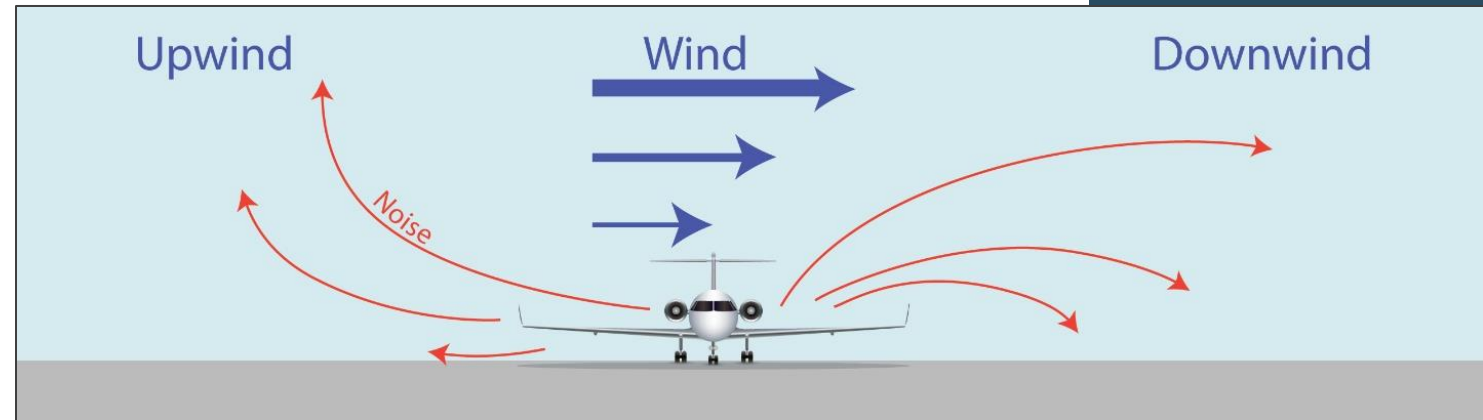
- Gradients in temperature cause the bending of sound paths
- Sound bends upward during a temperature lapse (cool air over warm)
- Sound bends downward during a temperature inversion (warm air over cool)



Sound Propagation

Refraction due to Wind:

- Gradients in wind speed cause the bending of sound paths
- Sound bends upward causing sound shadows in the upwind direction
- Sound bends downward increasing sound levels in the downwind direction
- Differences between upwind and downwind directions can be 20 dB

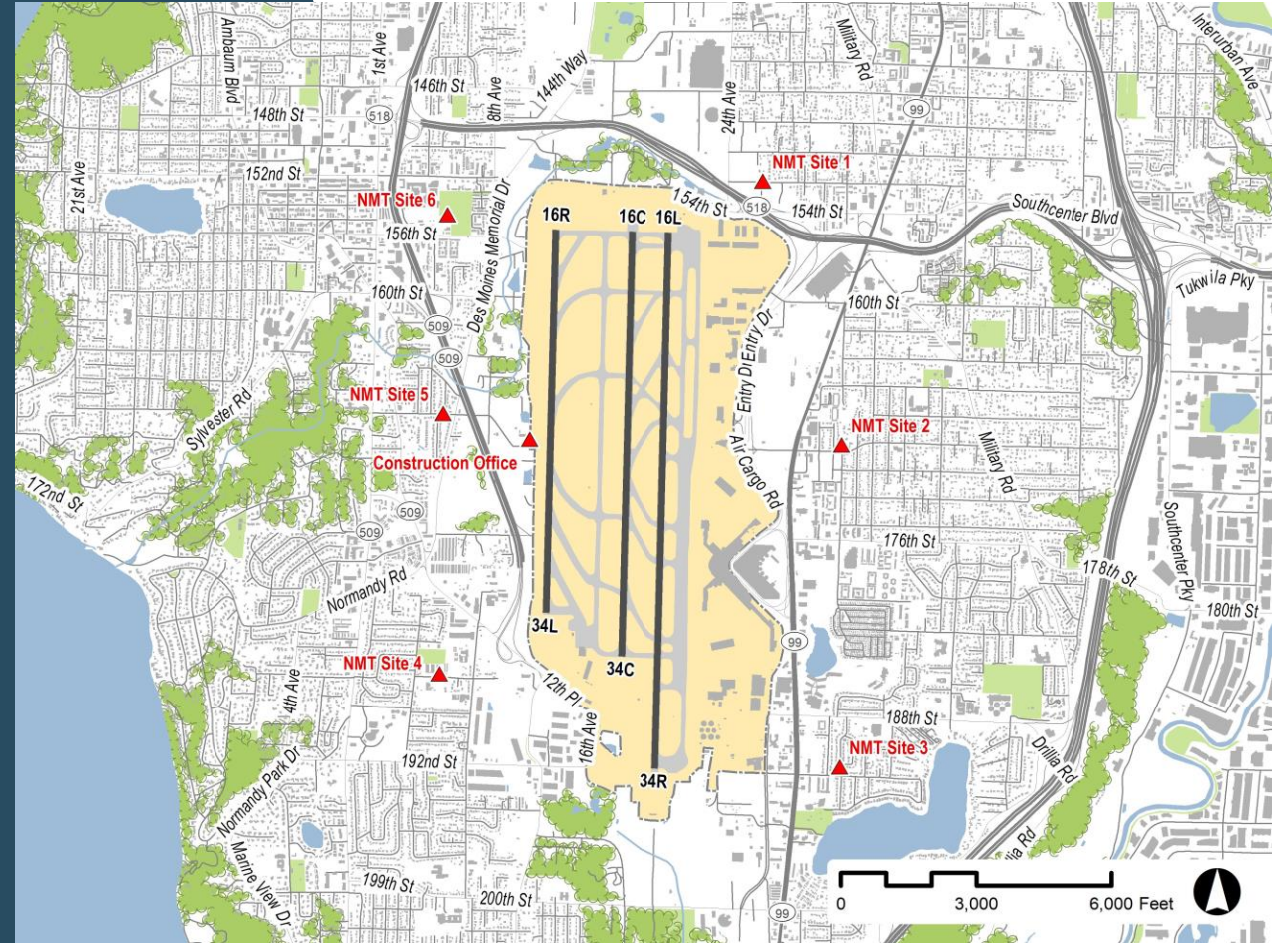


Scope of Services

- ✓ Ground Noise Data Research
 - Meet with StART
 - Identify ground noise sources and locations
 - Identify atmospheric conditions that may increase ground noise
- Noise Monitoring (*in progress – data acquisition complete*)
 - Obtain and analyze data from permanent monitors
 - Collect and analyze additional temporary noise monitoring data
- Identify Mitigation Options
 - Present findings on ground noise sources and levels and solicit input on mitigation measures
 - May include changes in aircraft operating procedures or utilization of new or existing structures to reduce community noise exposure
- Report Project Results

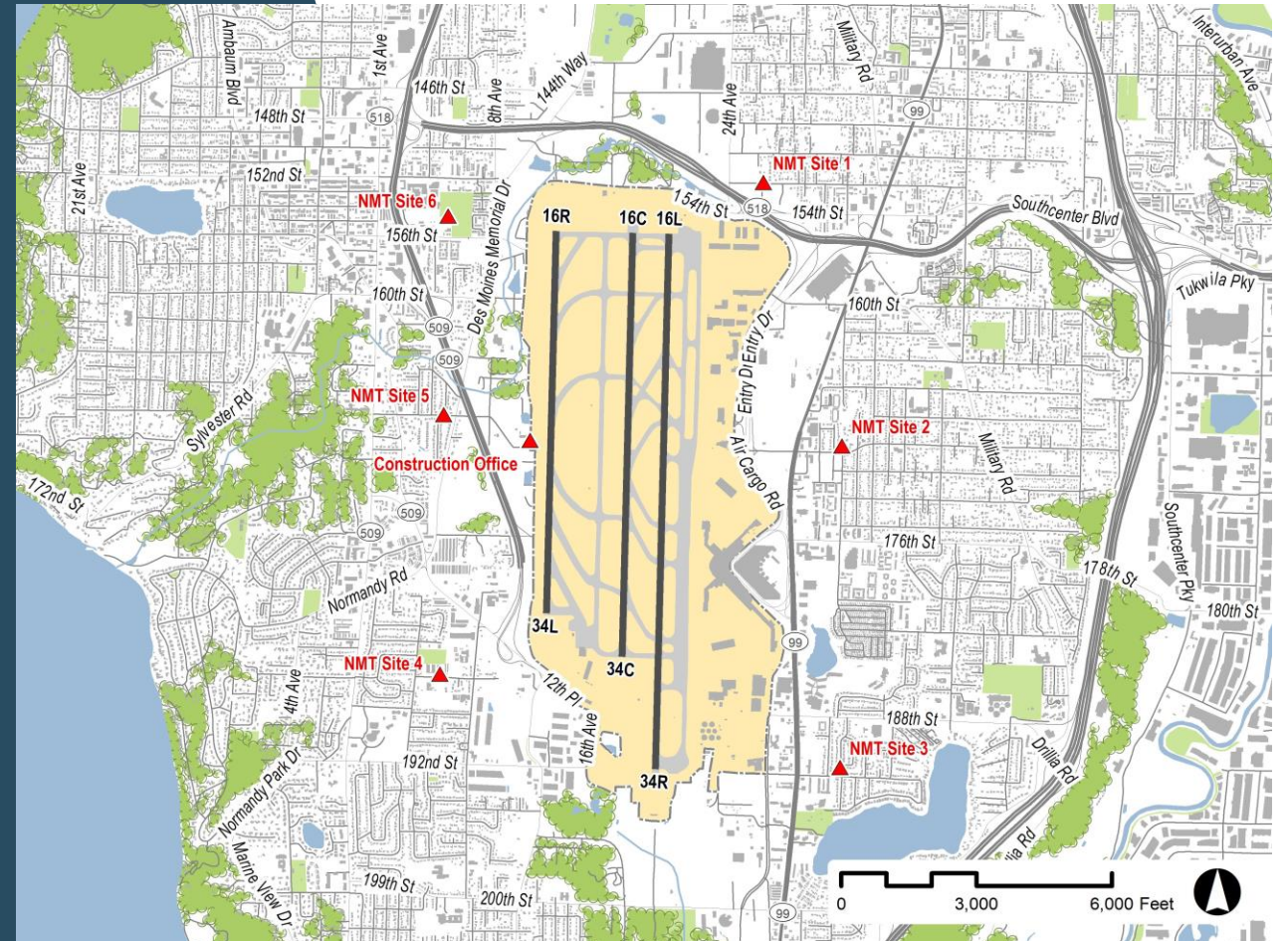
Noise Measurement Locations

- Site 1: Northeast
 - Taxiing/queueing
 - Start-of-takeoff roll
 - Engine run-ups
- Site 2: East
 - Terminal din
 - Auxiliary Power Units (APU) and taxi
 - Engine run-ups
- Site 3: Southeast
 - Taxiing/queueing
 - Start-of-takeoff roll
 - Engine run-ups



Noise Measurement Locations

- Site 4: Southwest
 - Thrust reverse
 - Taxiing
 - Start-of-takeoff roll
- Site 5: West
 - Thrust reverse
- Site 6: Northwest
 - Thrust reverse
 - Start-of-takeoff roll
- Construction Office
 - Thrust reverse (source)



Next Steps (Estimated Schedule)

- Analyze the noise measurement data
(October 2021)
- Model the noise measurement data
(November 2021)
- Identify and assess potential noise mitigation measures, if any
(December 2021)
- Report the results
(First Quarter 2022)

Discussion

Presented by: Gene Reindel, HMMH Vice President

October 2021 StART Meeting