2020 UC Davis
Aviation Noise & Emissions Symposium

Mitigating Aviation Noise

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ESA

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Presentation Outline

- Principles of Aircraft Noise Control
- Noise Abatement Options
  - Airfield Design
  - Operational
  - Restrict Operations
  - Management
- Noise Mitigation Options
  - Preventive
  - Remedial

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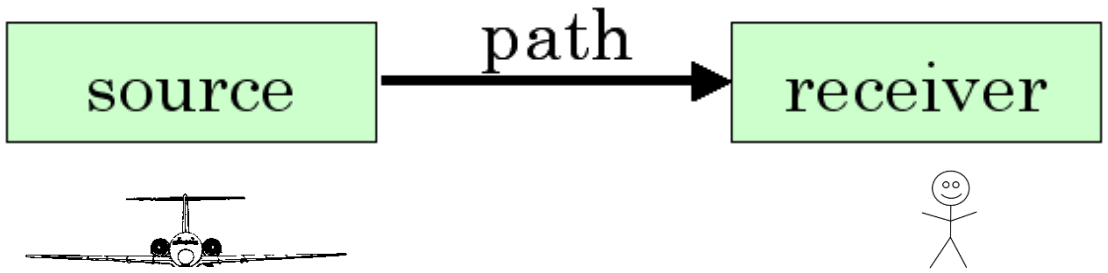
Principles of Aircraft Noise Control

- Source
- Path
- Receiver



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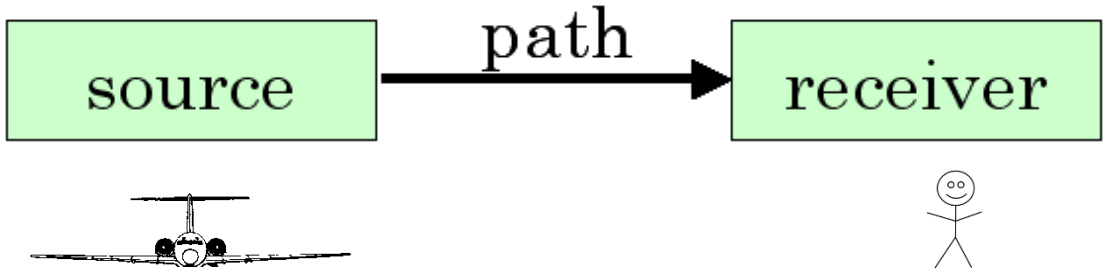
Principles of Aircraft Noise Control

- Reduce the source level
  - FAA is responsible for aircraft noise certification
  - Pilots may use reduced thrust
  - Ground crews can minimize APU use
  - Reduce or eliminate engine runups



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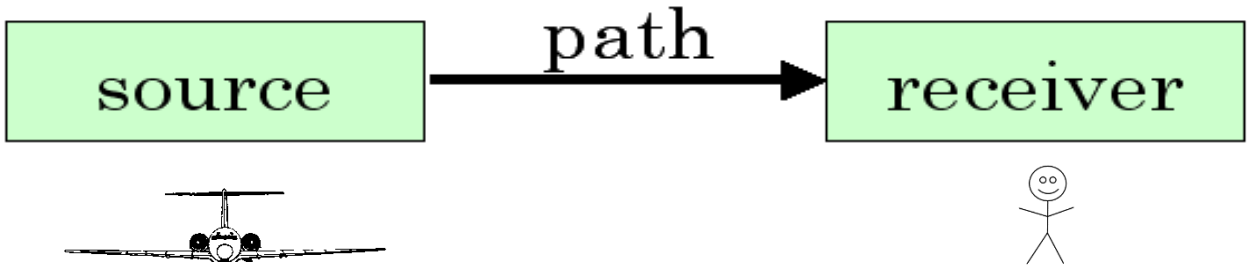
Principles of Aircraft Noise Control

- Move the source or the receiver
  - Relocated runways, relocated taxiway, relocated run-up areas
  - Displaced takeoff or landing thresholds
  - Relocate noise sensitive uses



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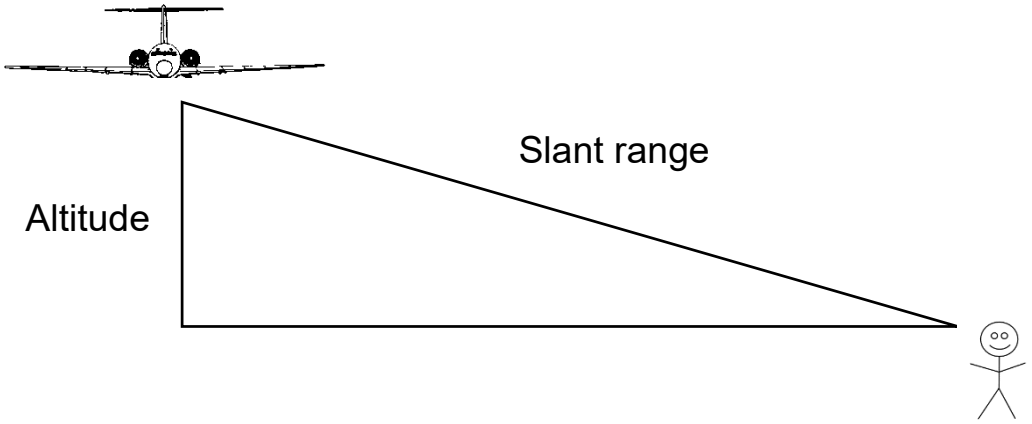
Principles of Aircraft Noise Control

- When moving aircraft away from residents, it takes a doubling of the distance to achieve a 6-dB reduction in the noise level
- Except for direct overflight, *slant range* is more important than *altitude*



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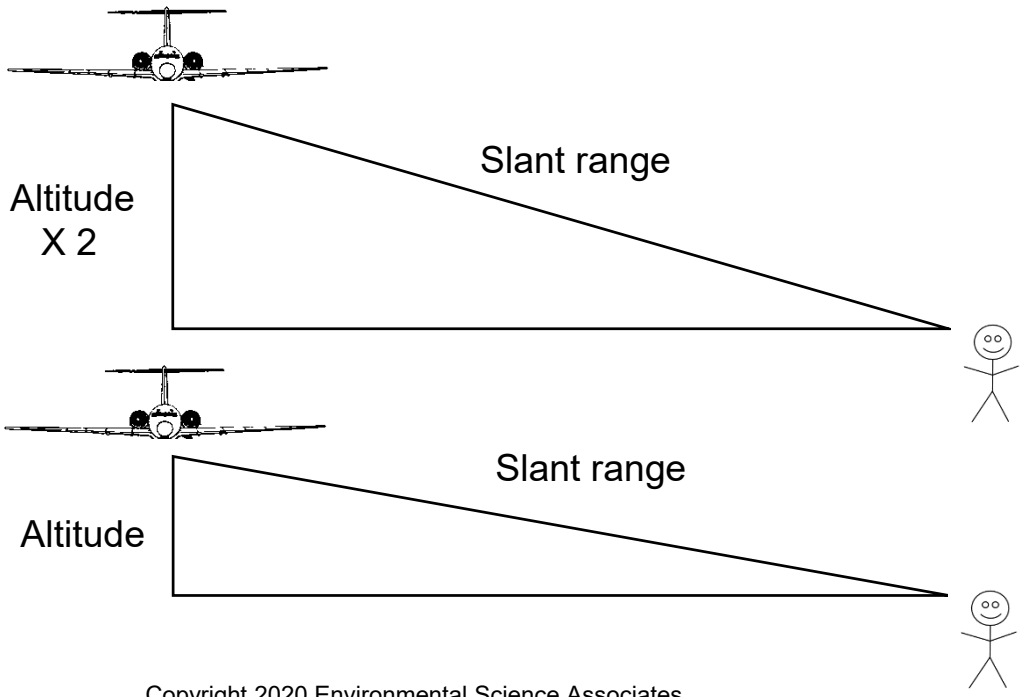
Noise Abatement – Aircraft in Flight

- Example: Double the altitude



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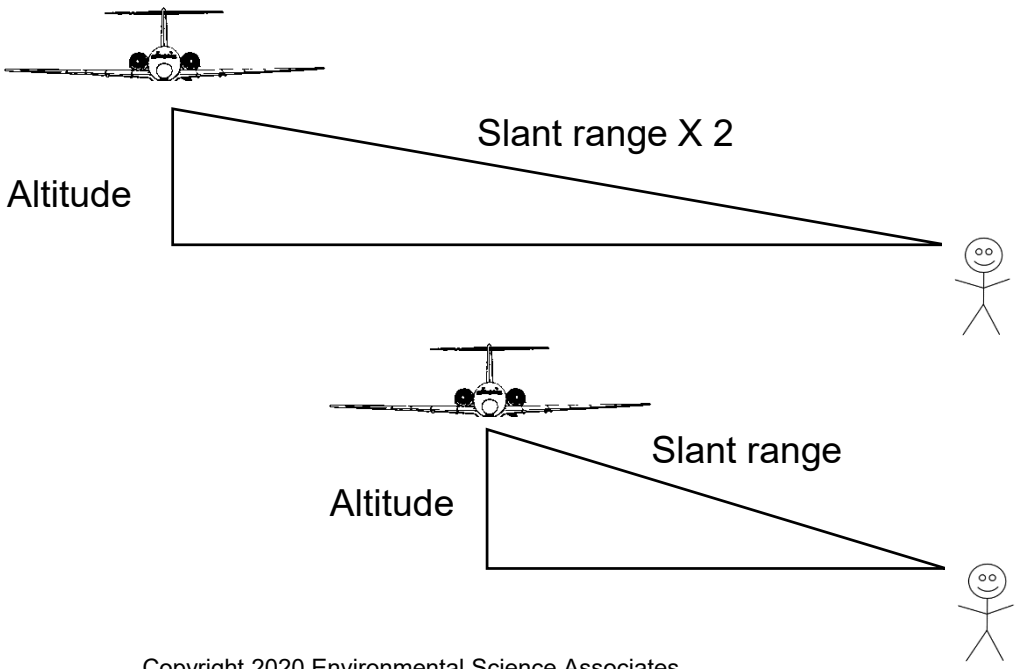
Noise Abatement – Aircraft in Flight

- Example: Double the slant range



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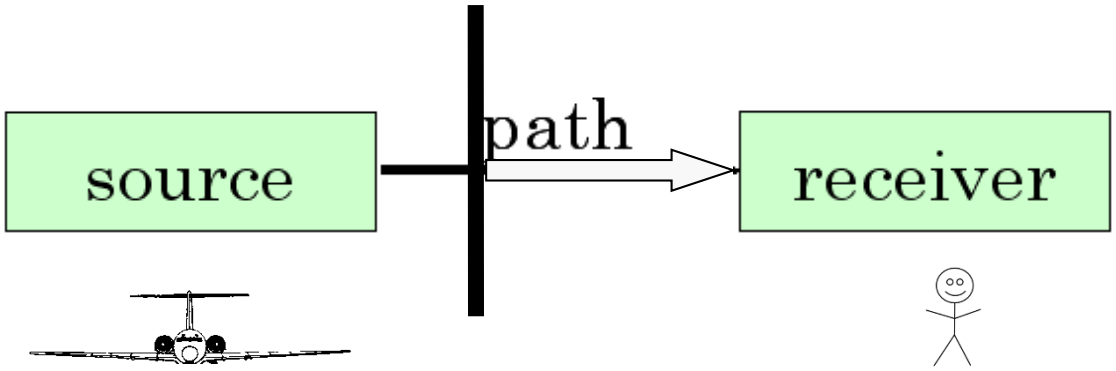
Principles of Aircraft Noise Control

- Block the path – insertion loss
  - Barriers, berms, buildings



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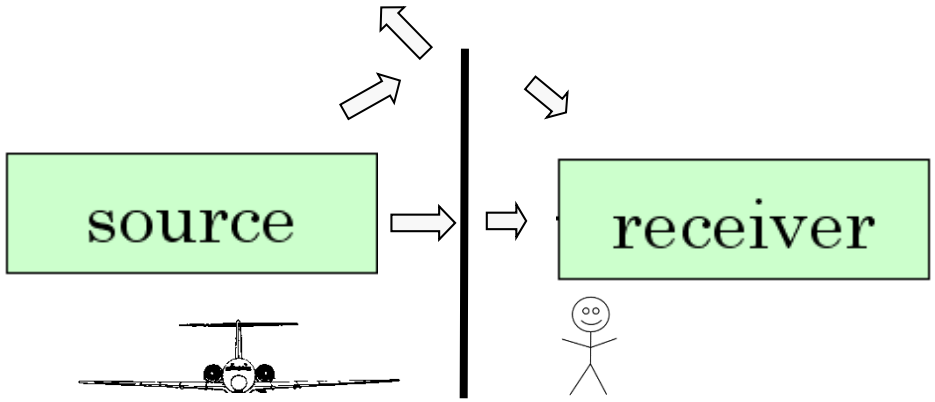
Principles of Aircraft Noise Control

- Maximum insertion loss is achieved when the source and receiver are close to the barrier
  - Highway noise barriers, ground run-up enclosures



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Principles of Aircraft Noise Control

NCP Measures That Are Required to Be Considered (14 CFR Part 150, Section B150.7)

Noise Abatement	**Noise Mitigation**
Preferential runway system	Property acquisition and avigation easements
Noise abatement flight procedures and flight tracks	Noise barriers and acoustical shielding
Aircraft operating restrictions based on noise characteristics*	
Other actions to control or abate noise recommended by stakeholders	
Other actions recommended for airport-specific analysis by the FAA	

* Subject to further notice, review, and approval requirements in 14 CFR Part 161.

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Major NCP Strategy Options

Noise Abatement

- Noise abatement flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Runup enclosures
- Use restrictions*
- Other actions proposed by stakeholders

Land Use

- Remedial Mitigation
  - Land acquisition
  - Sound insulation
  - Avigation easements
- Preventative Mitigation
  - Land use controls
  - Zoning
  - Building codes
  - Comprehensive plans
  - Real estate disclosures
- Other actions proposed by stakeholders

Programmatic

- Implementation tools
- Promotion, education, signage, etc.
- Monitoring
- Reporting
- NEM update
- NCP revision
- Other actions proposed by stakeholders

* Subject to further notice, review, and approval requirements in 14 CFR Part 161.

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Noise Abatement Options

- Noise abatement techniques can be applied to address:
  - Ground noise
  - Noise from aircraft in flight
- Techniques should be safe, cost effective, environmentally balanced, and capable of being implemented to be successful

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Noise Abatement Options

- Standard evaluation criteria
  - Level of noise reduction
  - Effects on airfield capacity and aircraft delay
  - Effects on airspace/air traffic control procedures
  - Consistency with FAA safety and other standards
  - Other environmental effects (e.g., air quality)
  - Operational effects and costs
  - Financial feasibility
  - Consistency with policies adopted by Airport Proprietor

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Noise Abatement Options

- Airfield Design
  - Runway extensions, new runway construction
  - Decommission existing runways
  - Relocate runway thresholds
- Operational
  - Dispersing departure flight tracks
  - Advanced navigational technologies
  - Change departure flight profiles
  - Modify arrival flight profiles
  - Rotational runway use
  - Ground run-up facility

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Noise Abatement Options

- Restrict operations*
  - Ground run-up restrictions
  - Curfews
  - Noise level restrictions
  - Noise budget
  - Limit number of operations

*Subject to ANCA and potentially 14 CFR Part 161.

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Noise Abatement Options

- Management
  - Pilot awareness program
  - Fly Quiet program
  - Noise sensitive areas noted in navigation charts

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Noise Abatement Options

- Ground noise can come from several sources:
  - Start of takeoff roll
  - Aircraft taxiing on the airfield
  - Reverse thrust on landing roll out
  - Maintenance activities on the airfield
  - Ground equipment for aircraft servicing
  - Auxiliary power units

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Noise Abatement Options

- Noise abatement techniques to consider for addressing noise from taxiing aircraft:
  - Changes in runway location, length, or strength
  - Installation of high-speed exit taxiways
  - Terminal relocation
  - Noise barriers or berms
  - Establish preferential runway use
  - Establish restrictions on ground aircraft movement
  - Establish use restrictions (e.g., single-engine taxiing)
  - Tug to runway ends or into gates

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Noise Abatement Options

- Noise abatement techniques to consider for addressing noise from ground support equipment:
  - Relocation of terminals or aircraft parking stands
  - Ground power plug-ins
  - Noise barriers
  - Establish limits on the use of ground equipment
  - Establish use restrictions

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Noise Mitigation Options

- Remedial
  - Property acquisition
  - Redevelopment programs
  - Sound insulation
  - Avigation easements
  - Transaction assistance
- Preventive
  - Comprehensive planning
  - Growth management
  - Noise overlay zones
  - Property disclosure statements

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Noise Mitigation Options

Property Acquisition

- This strategy is generally used for properties located within areas exposed to the highest noise levels (> 75 dB DNL)
- Properties are purchased and residents are relocated
- Some local communities dislike this practice because the purchase of the property removes it from the local tax roll
- However, the new compatible uses can be tax generating

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Noise Mitigation Options

Property Acquisition (cont.)

- Need to evaluate the potential for fragmentation or elimination of neighborhoods
- Only way airport operator can be assured of long-term protection for compatible land use
- This strategy can be very costly
- Public relations value of the program can be very positive or very negative

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Noise Mitigation Options

Sound Insulation

- This strategy is generally used for properties located within noise levels between 65 DNL and 75 DNL and interior noise levels greater than 45 DNL
- Homes receive new doors, windows, sealing of leaks, and other treatments to bring the interior noise level in the home to 45 DNL
- The general condition, age, and home state of repair will determine degree of soundproofing needed

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Noise Mitigation Options

Sound Insulation (cont.)

- FAA also requires at least a 5-dB reduction in the exterior-to-interior sound level

- FAA Order 5100.38D requires that the home be both within the FAA-accepted 65 DNL contour and the interior noise level be greater than 45 dB DNL

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Noise Mitigation Options

Sound Insulation (cont.)

- Avigation Easements are often secured in return for accepting the sound insulation package, the homeowner will not sue the airport over aircraft noise levels

- This strategy is generally favored by most airports due to lower cost and community acceptance when compared to acquisition, but can be costly

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Noise Mitigation Options

Avigation Easements

- Airport operator pays the property owner a monetary sum in exchange an agreement that the property owner will not sue the airport for damages associated with aircraft noise
- Not a popular option with most airports because it does not change the incompatibility with aircraft noise levels
- FAA has stopped funding this option for the reason stated above

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Noise Compatibility Programs

- All measures must:
  - Reduce incompatible land use and prevent or reduce future incompatible land use
  - Ensure safety and efficiency
  - Be consistent with the powers and duties of the FAA
  - Be subject to revision if necessary

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Noise Compatibility Programs

- Noise restrictions or rules must:
  - Not unjustly discriminate
  - Not impose an undue burden on interstate commerce (requires balancing of interests)
  - Meet both local needs and national air transportation system needs

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Noise Compatibility Programs

- May be subject to ANCA and 14 CFR Part 161
  - Curfews, noise limits, etc.
  - FAA does not approve noise rules and restrictions through the 14 CFR Part 150 process
- Even if not subject to 14 CFR Part 161, must withstand rigorous scrutiny
  - Reduce existing land use incompatibility above DNL 65
  - Be reasonable and not unjustly discriminatory
  - No undue burden on interstate commerce

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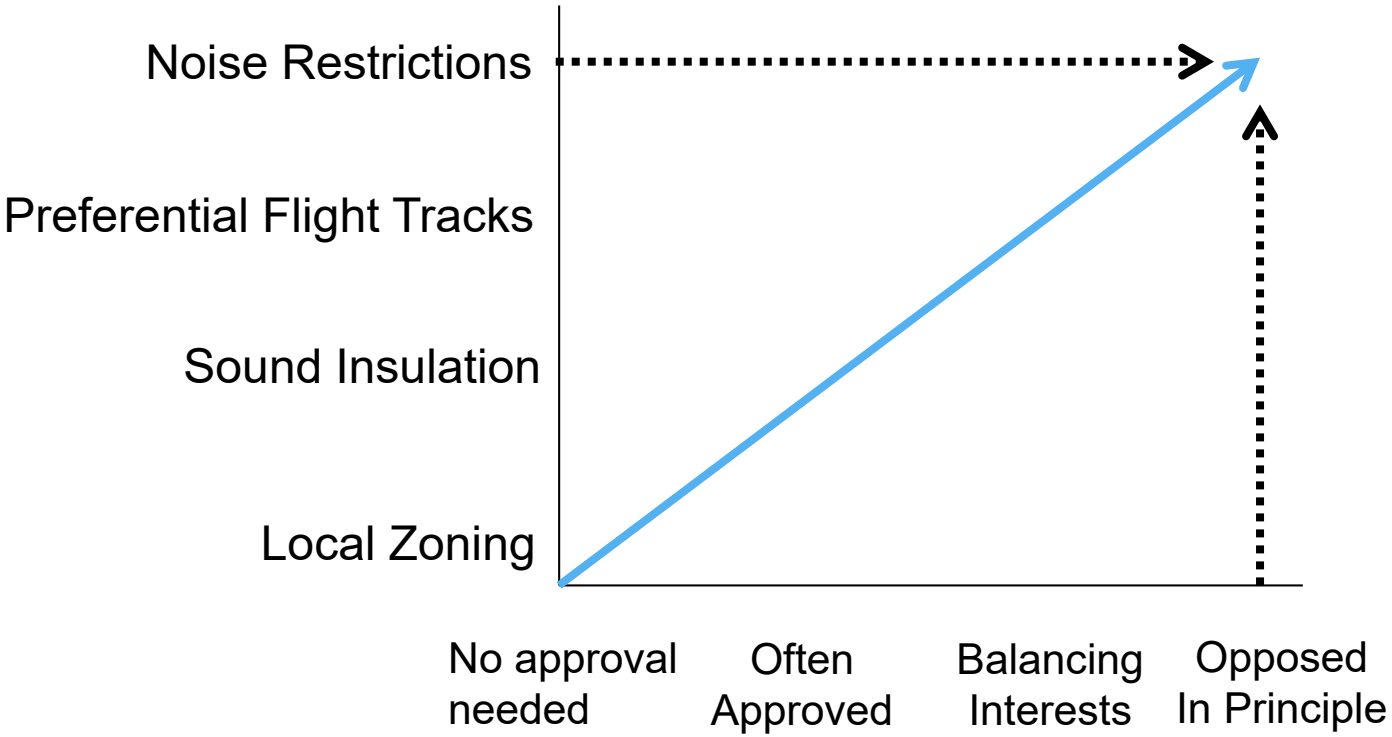
Noise Compatibility Programs
Difficulty of Obtaining FAA Approval



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Principles of Aircraft Noise Control

Questions?

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