

Renton Municipal Airport Noise Study: Aircraft Noise 101/Study Scoping Meeting

September 25, 2007



HARRIS MILLER MILLER & HANSON INC.

Outline

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- **Renton Airport Development Alternatives**
- **Noise terminology and methodology overview**
- **Preliminary project scope**
- **Discussion**



Airport Development Alternatives

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- **Key Findings of Airport Development Study:**
 - Airport is land-poor; limited space to develop
 - City policy calls for balanced use of leased properties
 - Increasing share of light-medium business jets and VLJs
- **Master Plan identified range of alternatives**
- **Initially recommended Alternative with corporate jet facility**



Current Airport Layout



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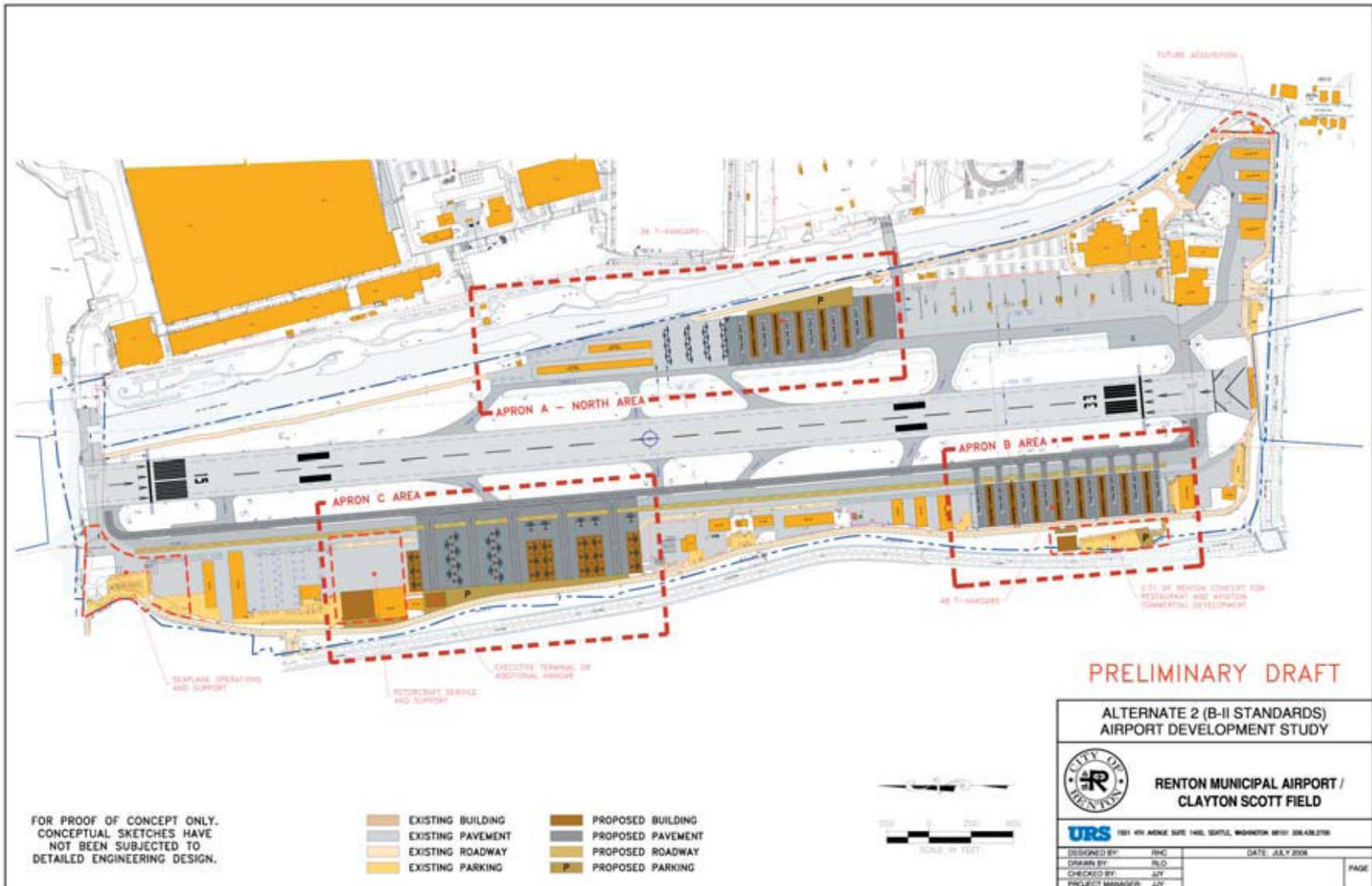
Airport Development Alternatives

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Name	Description	Projected Annual Aircraft Operations
Existing (2006)	▪Recreational Aircraft	83,761
Alternative 1 – “Recreational Flying”	▪Recreational Aircraft	116,948
Alternative 2 – “Recreational and Business Aircraft Storage”	▪Recreational Aircraft ▪Business Aircraft Storage	90,994
Hybrid 3A/3B Alternative – “Corporate Aviation Center”	▪Recreational Aircraft ▪Business Aircraft Storage ▪Corporate Aviation	84,078

Airport Development Alternatives

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City of Renton Noise Policy

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“the City will take actions to reduce current noise and minimize noise growth...”

-- Airport Vision Statement



Overview of Noise Issues

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- Noise Terminology
- Noise Modeling Methodology



Noise Terminology

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- Maximum Sound Level
- Sound Exposure Level
- Time Above
- Number of Events Above
- Day-Night Average Sound Level



Maximum Sound Level (Lmax)

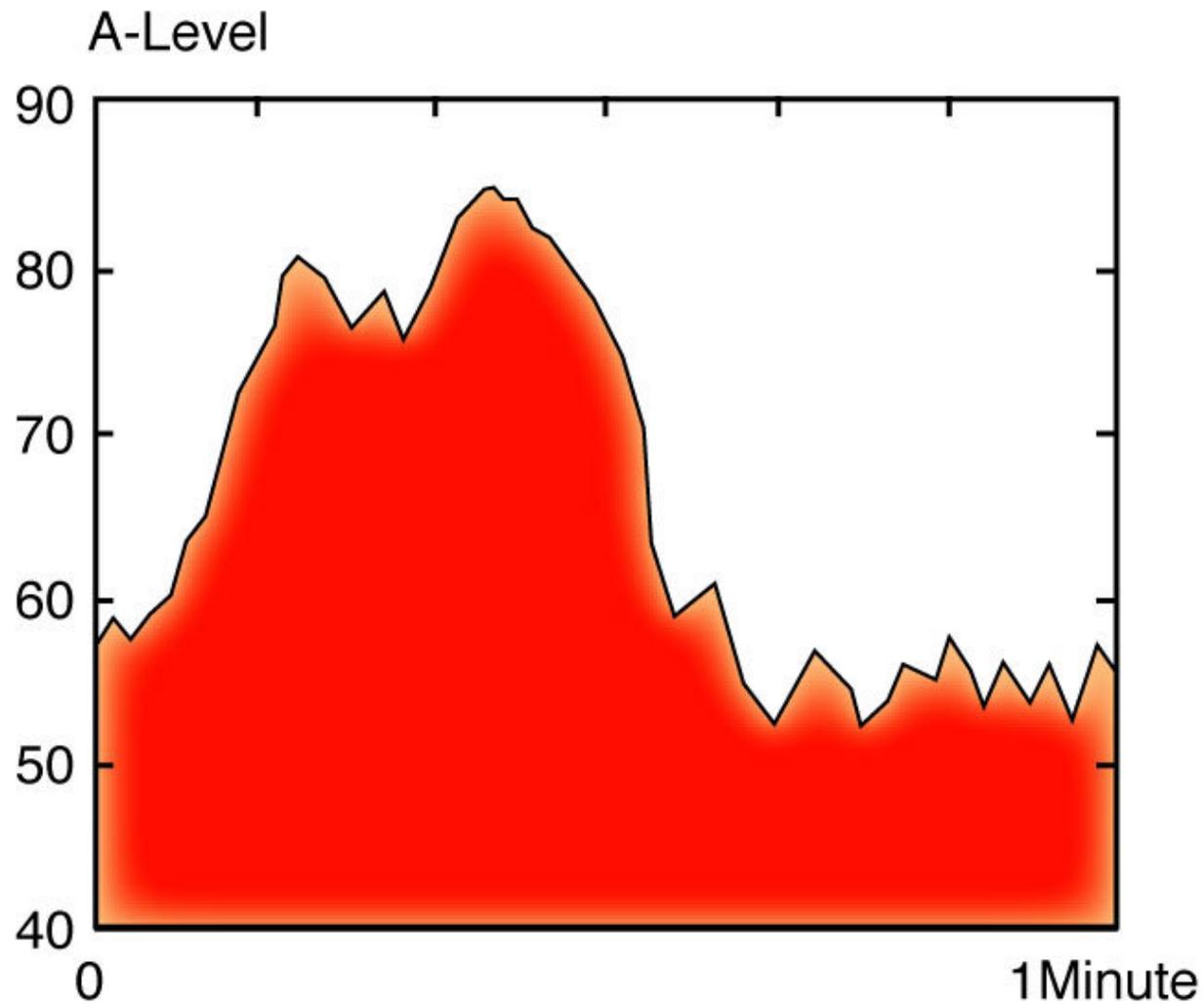
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- Because of the variation in level of a sound event, it is often convenient to describe the event with its maximum sound level, abbreviated as Lmax
- Accounts only for sound amplitude (A-weighted sound level)
- Two events may have the same maximum level, but much different exposures



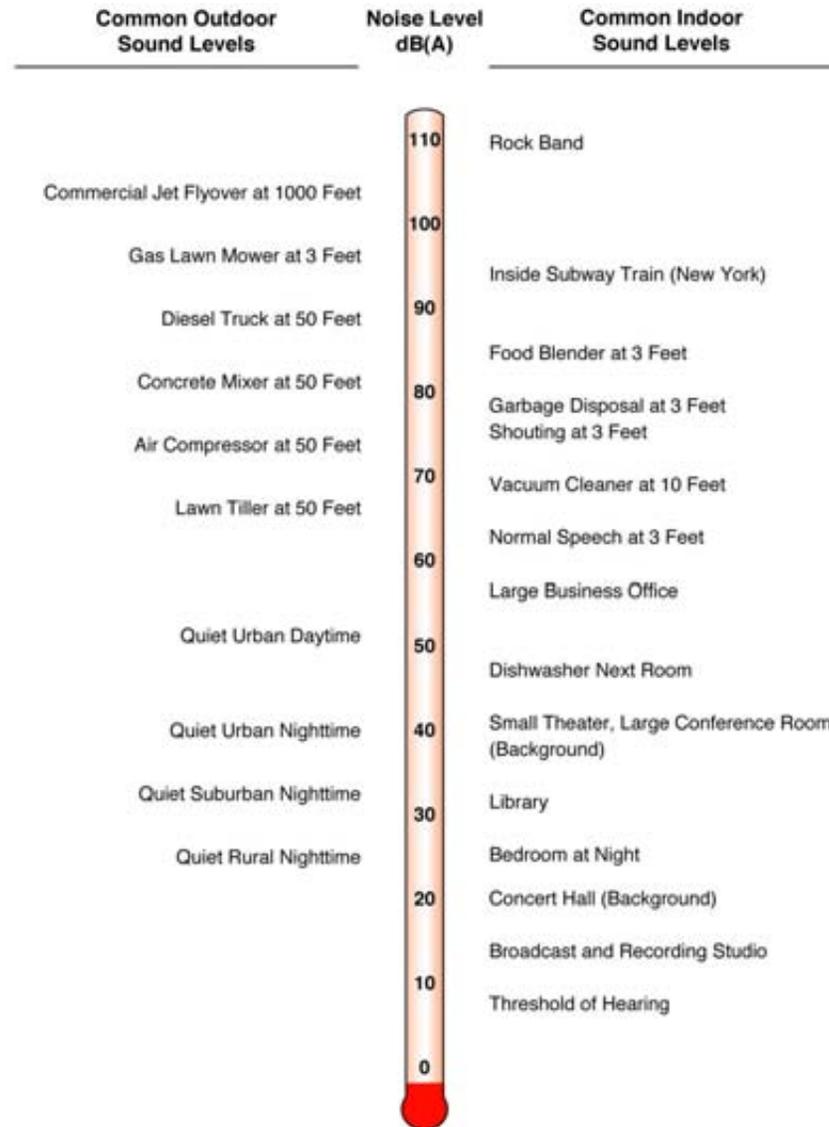
A-weighted Sound Pressure Level Time History

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Common Environmental A-weighted Sound Levels, in dB

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Time Above a Threshold Level (TA)

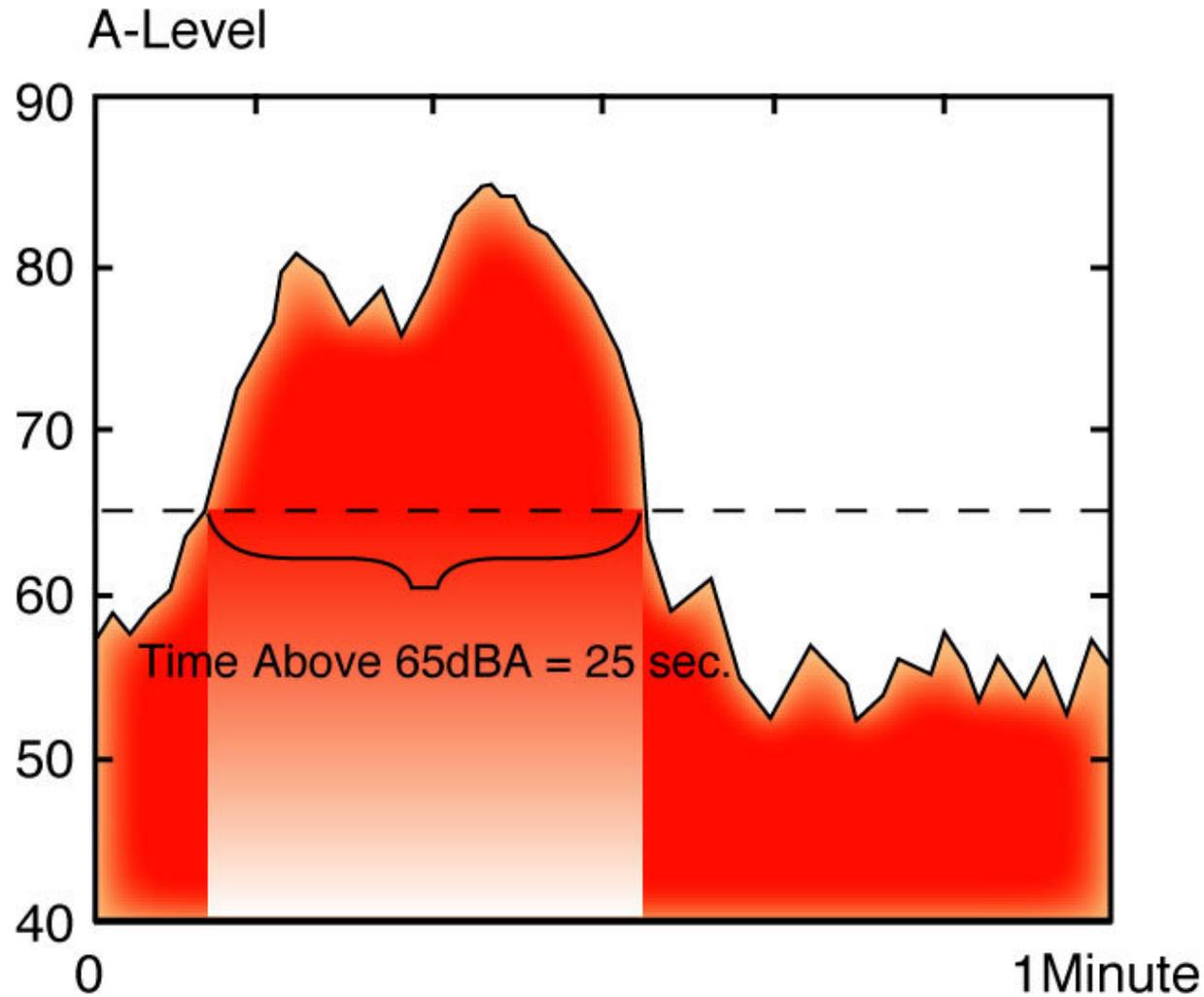
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- Another means of describing sound events is the amount of time the level is above a threshold sound level
- Accounts only for duration, or time
- Unreliable metric for assessing human reaction
 - Louder events can have a lower TA



Time Above a Threshold Level (TA)

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Number of Events Above a Threshold Level (NA)

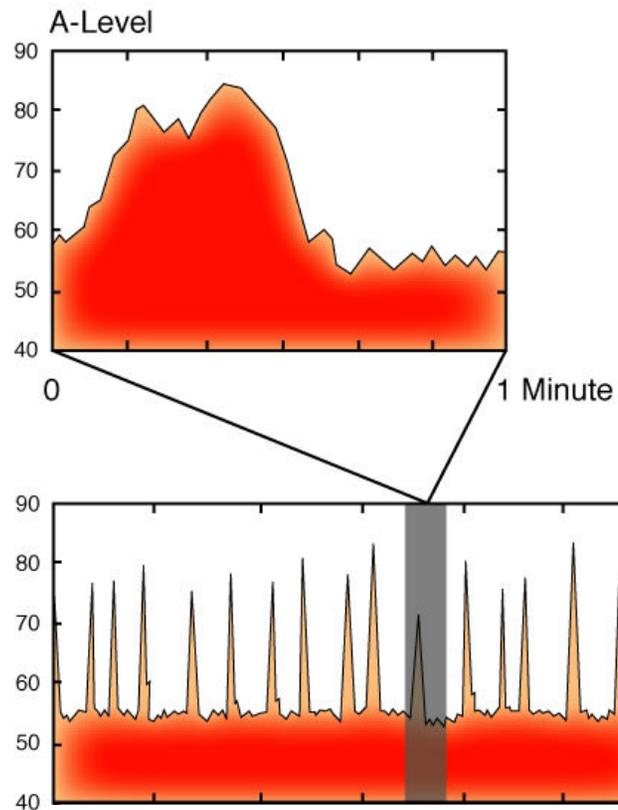
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- Instead of the amount of time, an accounting of the number of times a given sound level is exceeded over a time period
- Does not account for duration, or how loud an event is
- Does provide a meaningful, intuitive indication of activity interference



Noise "Dose" over one hour

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N55 for one hour in this example is 16



Sound Exposure Level (SEL)

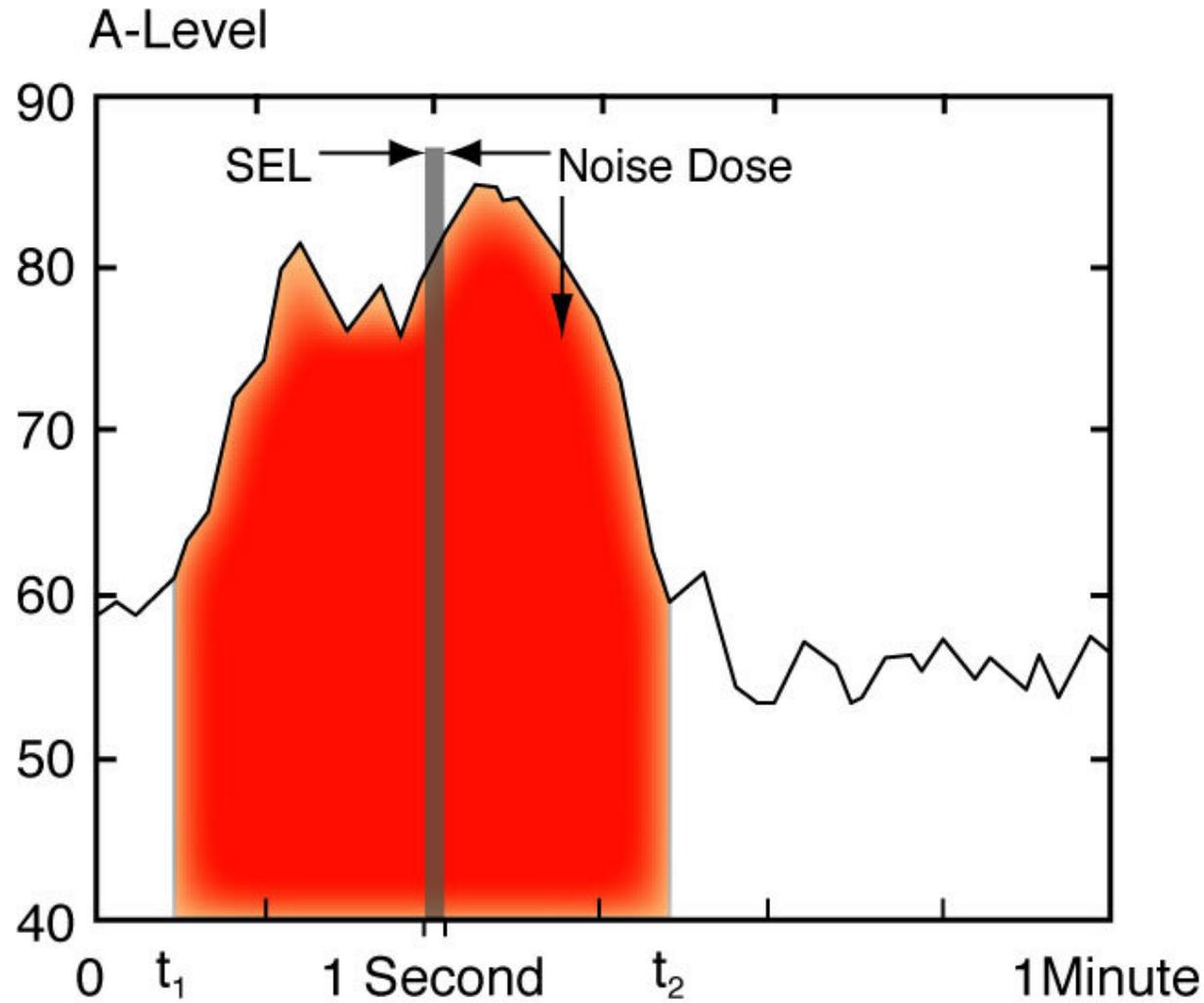
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- A way to describe the “noisiness” of a complete noise event
- Accounts for sound amplitude
- Accounts for noise event duration



Sound Exposure Level (SEL)

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Day-Night Average Sound Level (DNL)

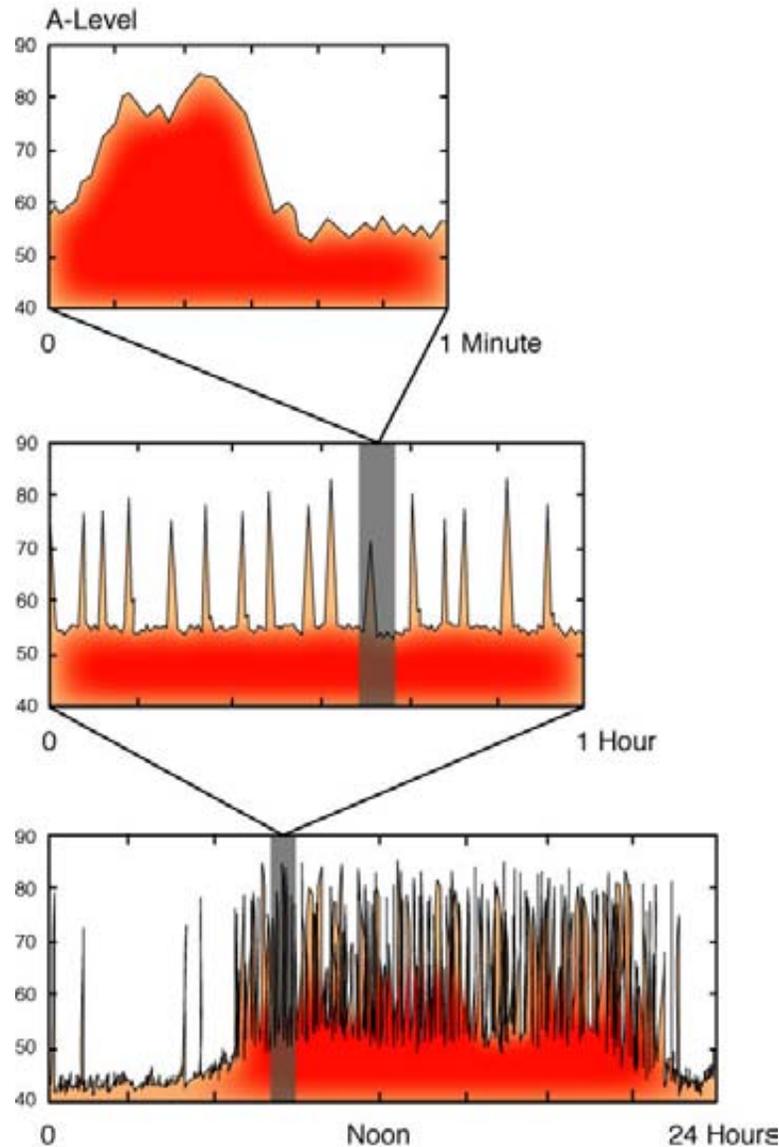
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- A way to describe the noise dose for a 24-hour period
- Accounts for noise event “noisiness” (SEL)
- Accounts for number of noise events
- Provides an additional weighting factor for nighttime operations



A-weighted Fluctuations and Noise “Dose” over 24 hours

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Comparison of Metrics

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- FAA requires use of DNL contours exclusively
- Supplemental metrics provide additional information, especially when they can be related to *effects* on people:
 - Speech interference: estimated number of times speech is interrupted per day
 - Sleep disruption: number of awakenings (of average person) over the course of a night



Noise Modeling: The Integrated Noise Model

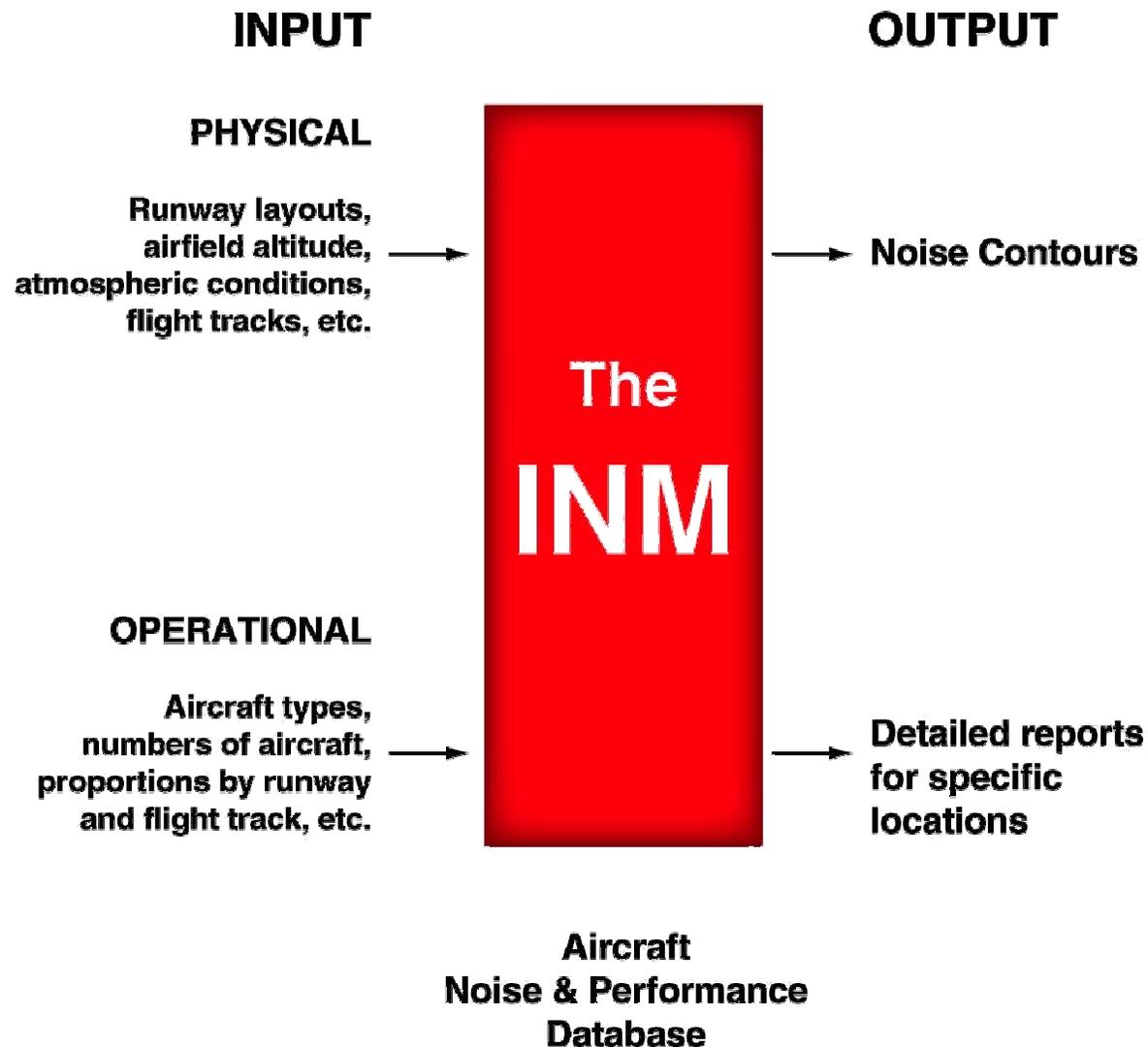
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- First developed by FAA in 1978
- Most recent version (7.0) released in 2007
- International standard for predicting noise in the vicinity of airports
- Agreement with measured data generally within 1 dB DNL
- Flexible tool for evaluating multiple scenarios



How the INM Works

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Preliminary Project Scope

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- **Phase I: Project Definition**
 - Solicit community input
 - Refine project scope
- **Phase II: Technical Study**
 - Compare with neighboring airports
 - Evaluate ALP Alternatives
 - Report to City Councils and communities



Task 1: Regional Airport Overview

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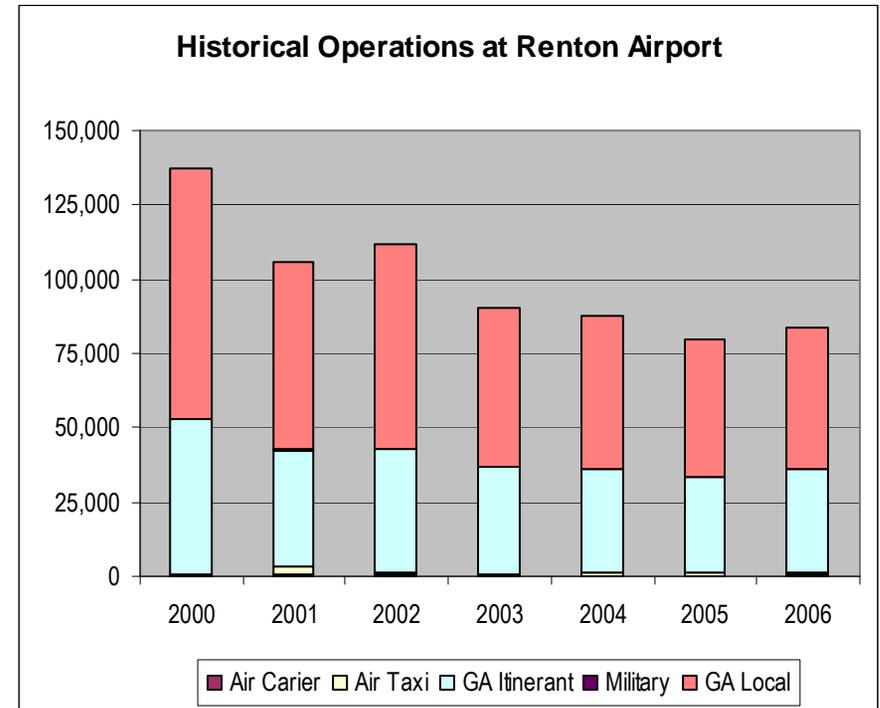
- Historical operations at Renton
- Comparison to other airports in Seattle region



Historical Operations at Renton Airport

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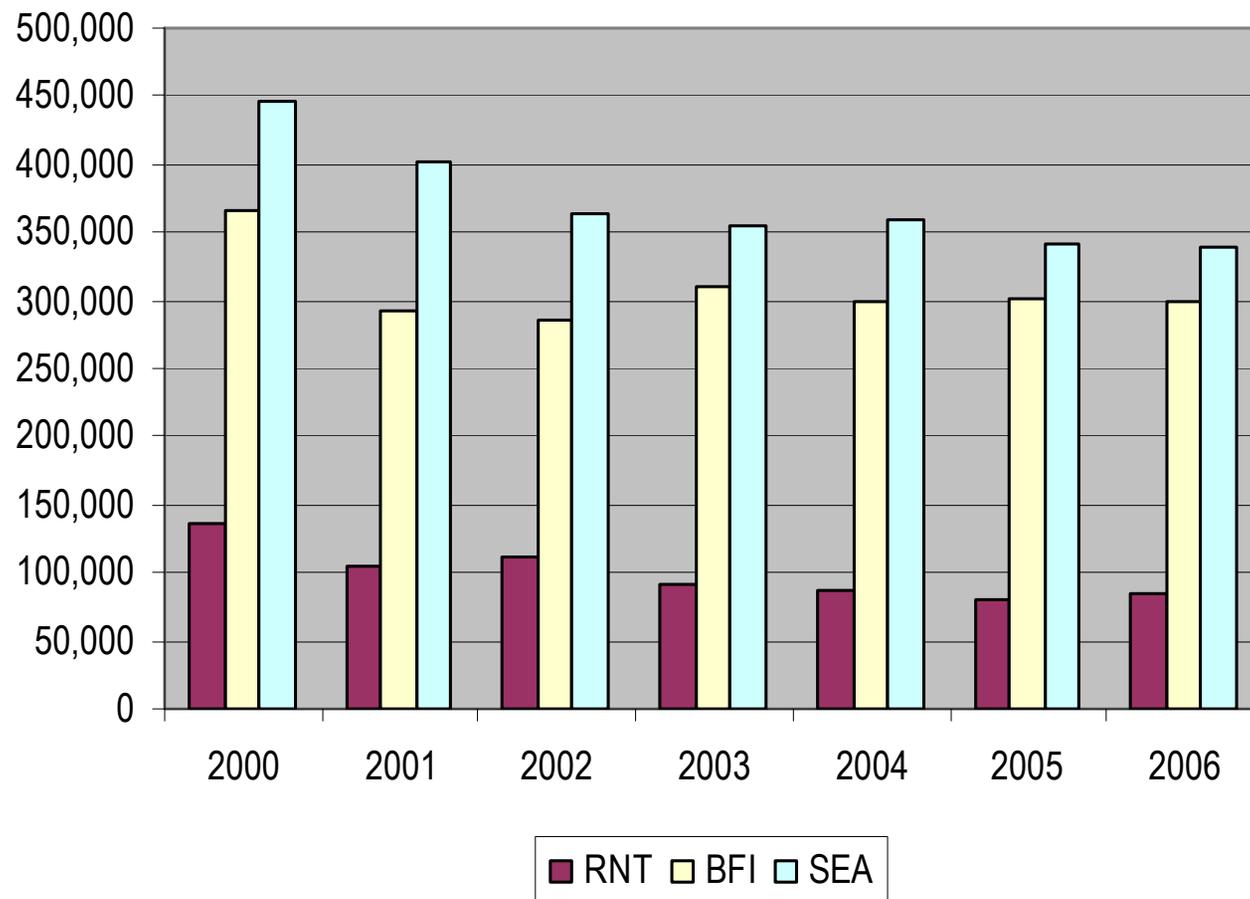
Year	Air Carrier	Air Taxi	GA Itinerant	Military	GA Local	TOTAL
2000	334	616	51,695	118	84,209	136,972
2001	424	2,853	38,972	293	63,346	105,888
2002	393	817	41,817	77	68,719	111,823
2003	186	612	36,181	49	53,539	90,567
2004	215	1,001	35,027	31	51,200	87,474
2005	241	1,027	32,454	31	45,908	79,661
2006	356	1,284	34,751	72	47,298	83,761



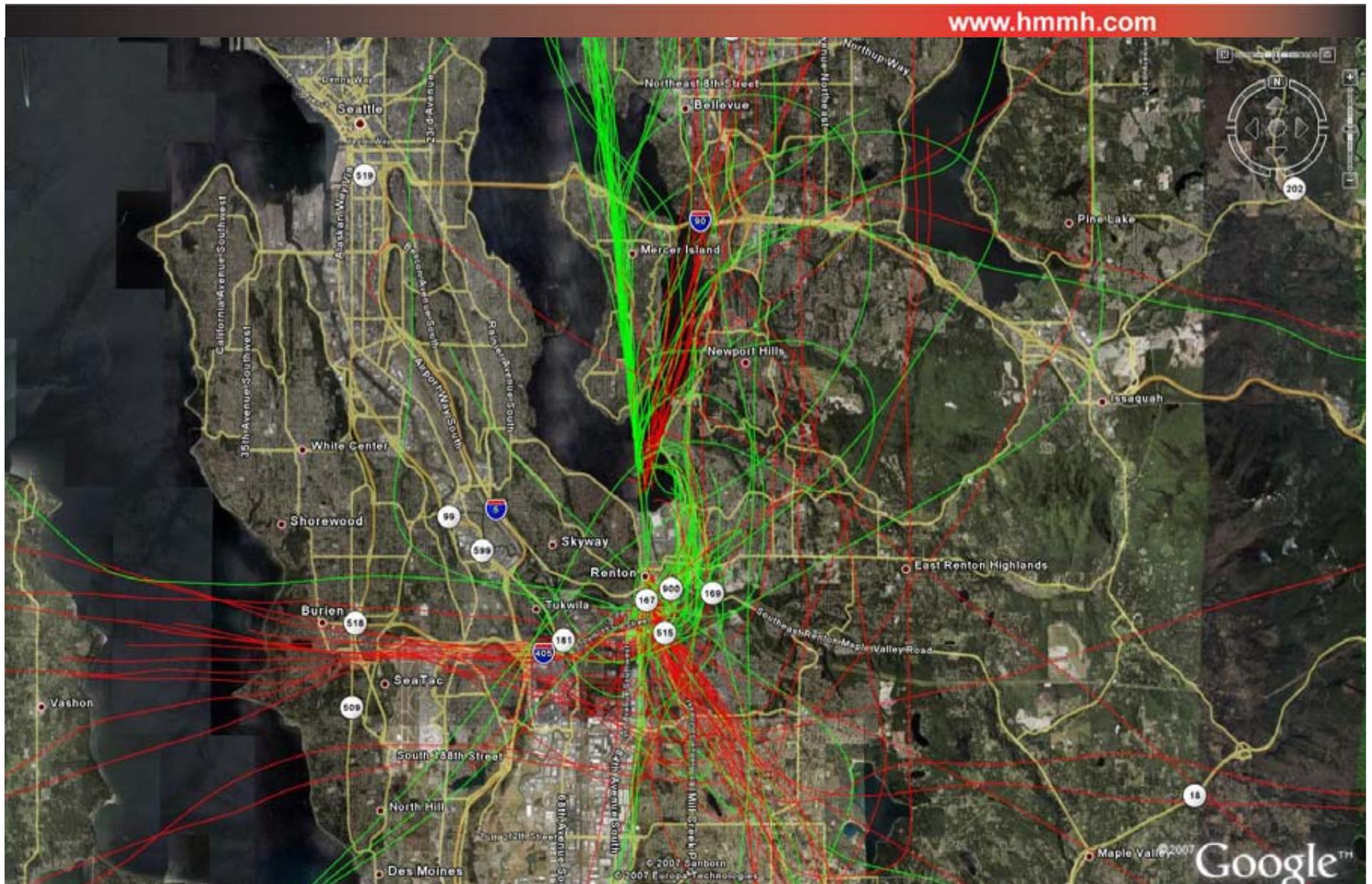
Context of Renton Airport in Seattle Region

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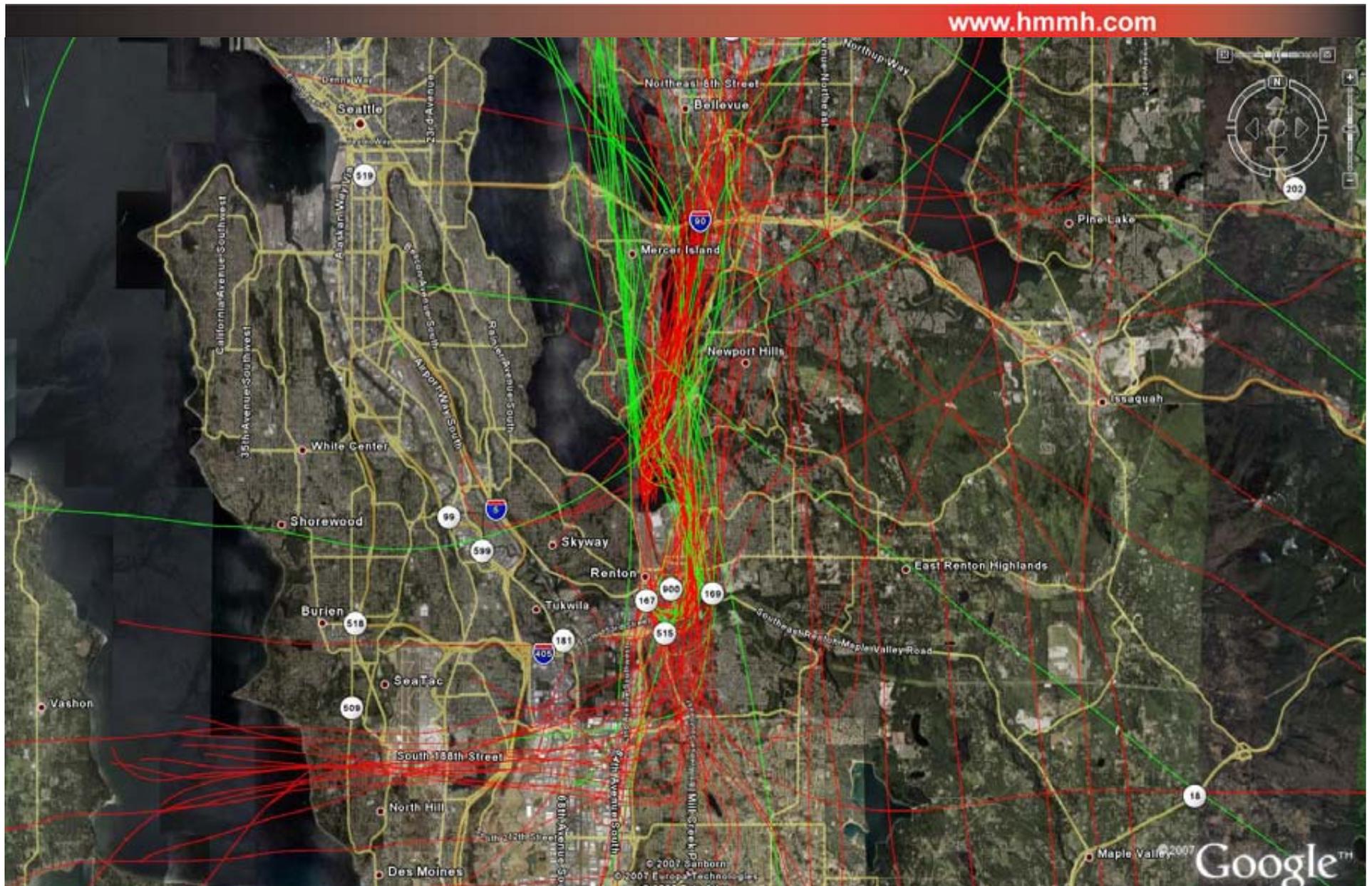
Comparison of Operations in Seattle Region



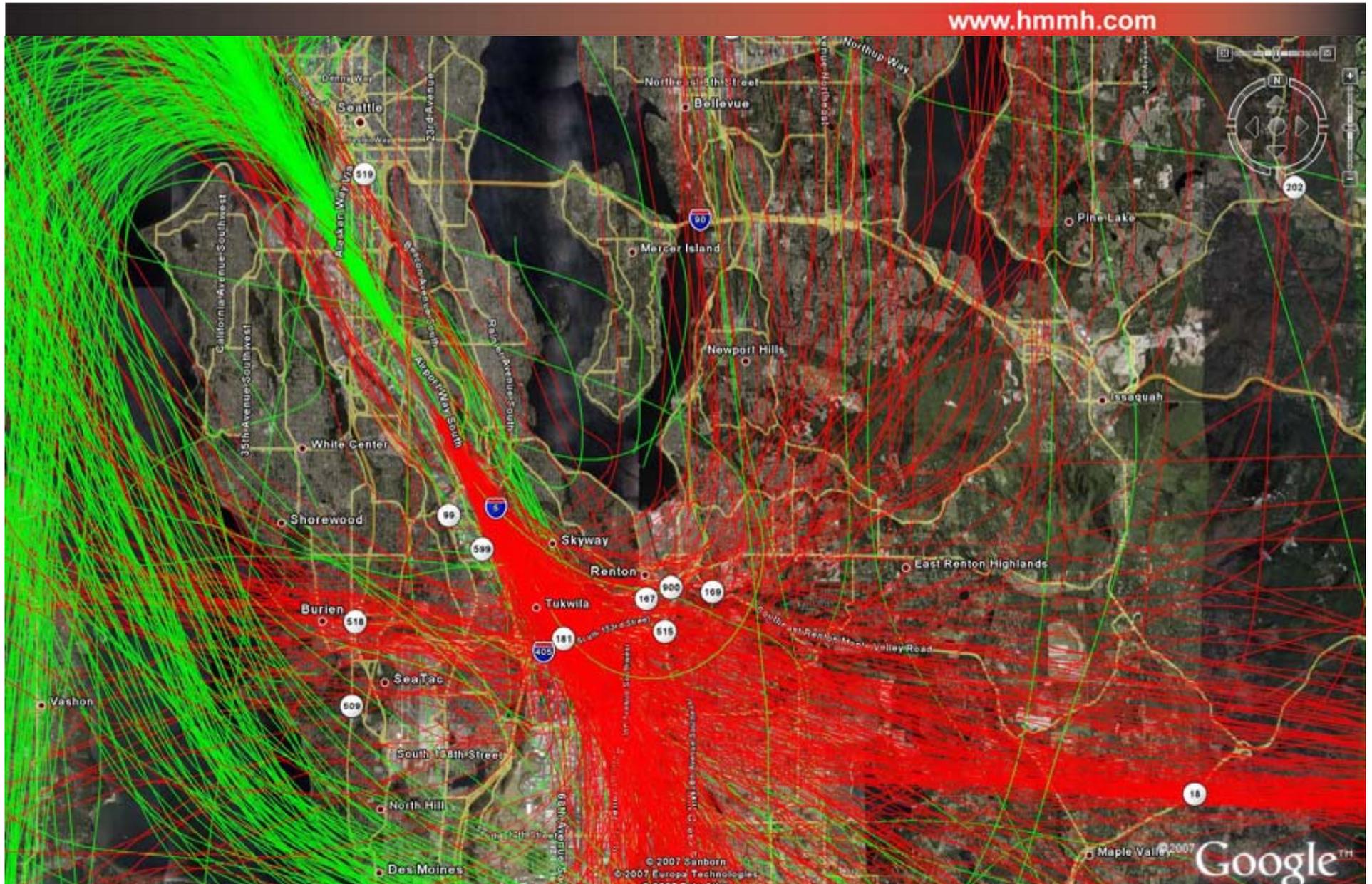
Renton Airport Operations: South Flow



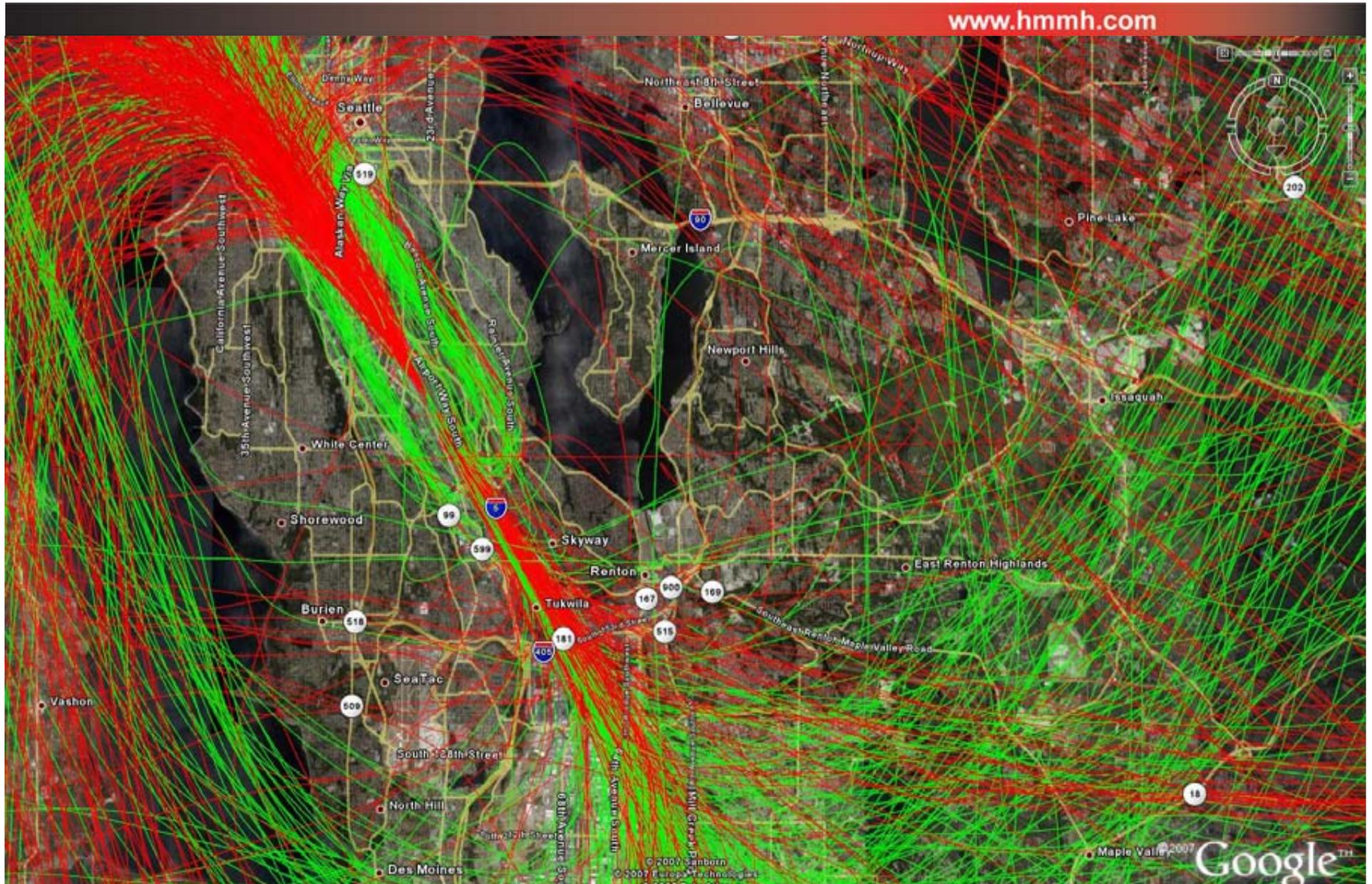
Renton Airport Operations: North Flow



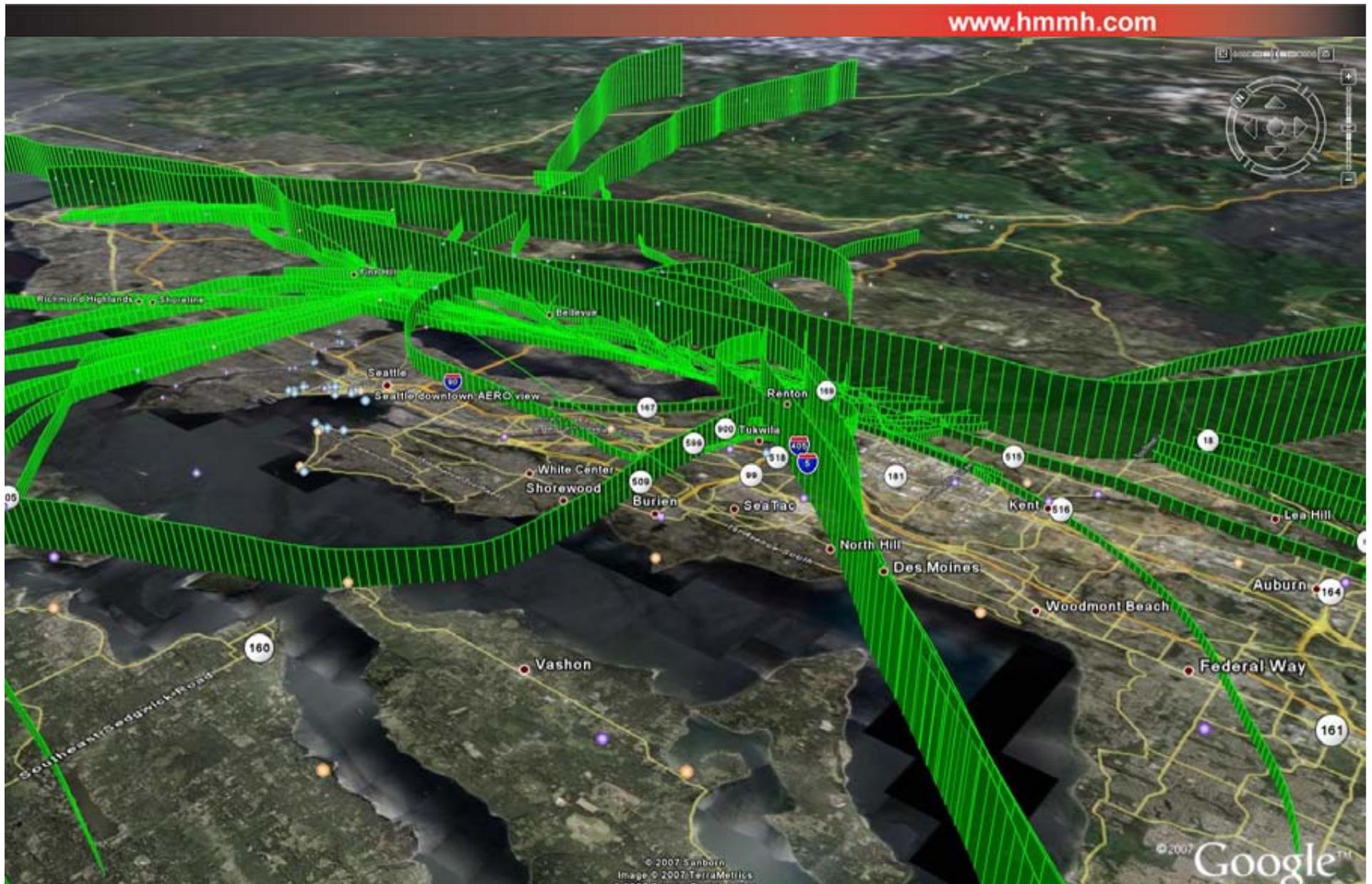
Boing Field Operations: South Flow



Boing Field Operations: North Flow



3-D Flight Tracks: Renton, south flow



Other data that will be collected

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- **Comparison of Noise impacts for RNT, SEA, BFI**
 - Noise Contours
 - Number of people considered “significantly impacted”



Task 2: Evaluation of ALP Alternatives

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- Aircraft
- Operations
- Approaches



Task 2a: Evaluation of ALP Alternatives

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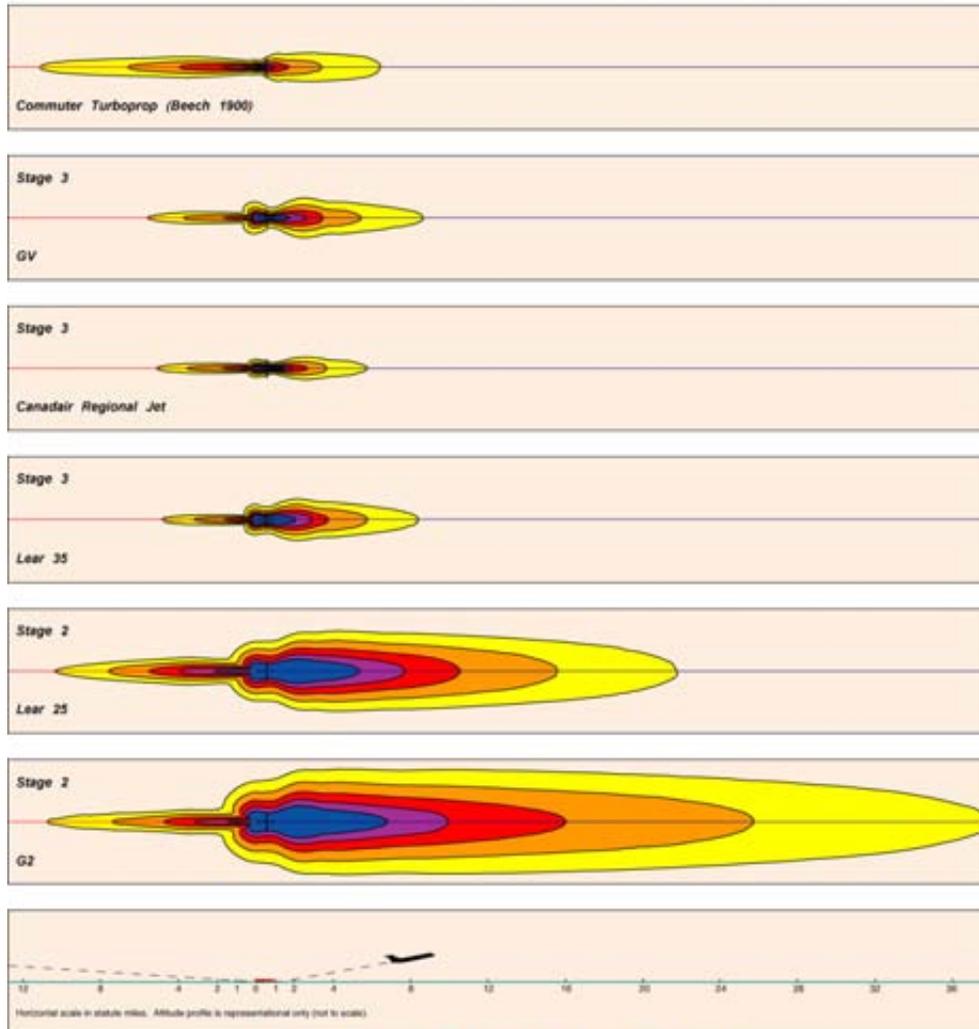
- **Aircraft:** comparison of different aircraft types currently operating at RNT, and potentially operating at RNT (e.g., VLJ's)
 - Sound exposure level contours
 - Virtual soundscapes



Sound Exposure Level Contours

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Single Event Comparison
(Sound Exposure Level, SEL, for Landing-Takeoff Cycle)



For representative aircraft types operating at RNT:

- Single engine piston
- Twin piston
- Turboprop
- Corporate jet
- Very Light Jet (VLJ)

Prepared by HMMH using FAA 5.0b (2017)

95 SEL 90 SEL 85 SEL 80 SEL 75 SEL

Virtual Soundscapes: Listen to Aircraft Noise Levels

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- Indoors or out?
- Aircraft type?
- Type operation?
- *Other sounds?*
- *Listen!*

Where Am I?	Outside	Inside Window Open	Inside Window Closed	Inside Sound Insulated
Which Aircraft Type?	Turboprop	Regional Jet	Small Air Carrier	Large Air Carrier
What Type of Operation?	Departure		Arrival	
What Else Do I Hear?	Highway Traffic	Motorbike	Television	Air Conditioner

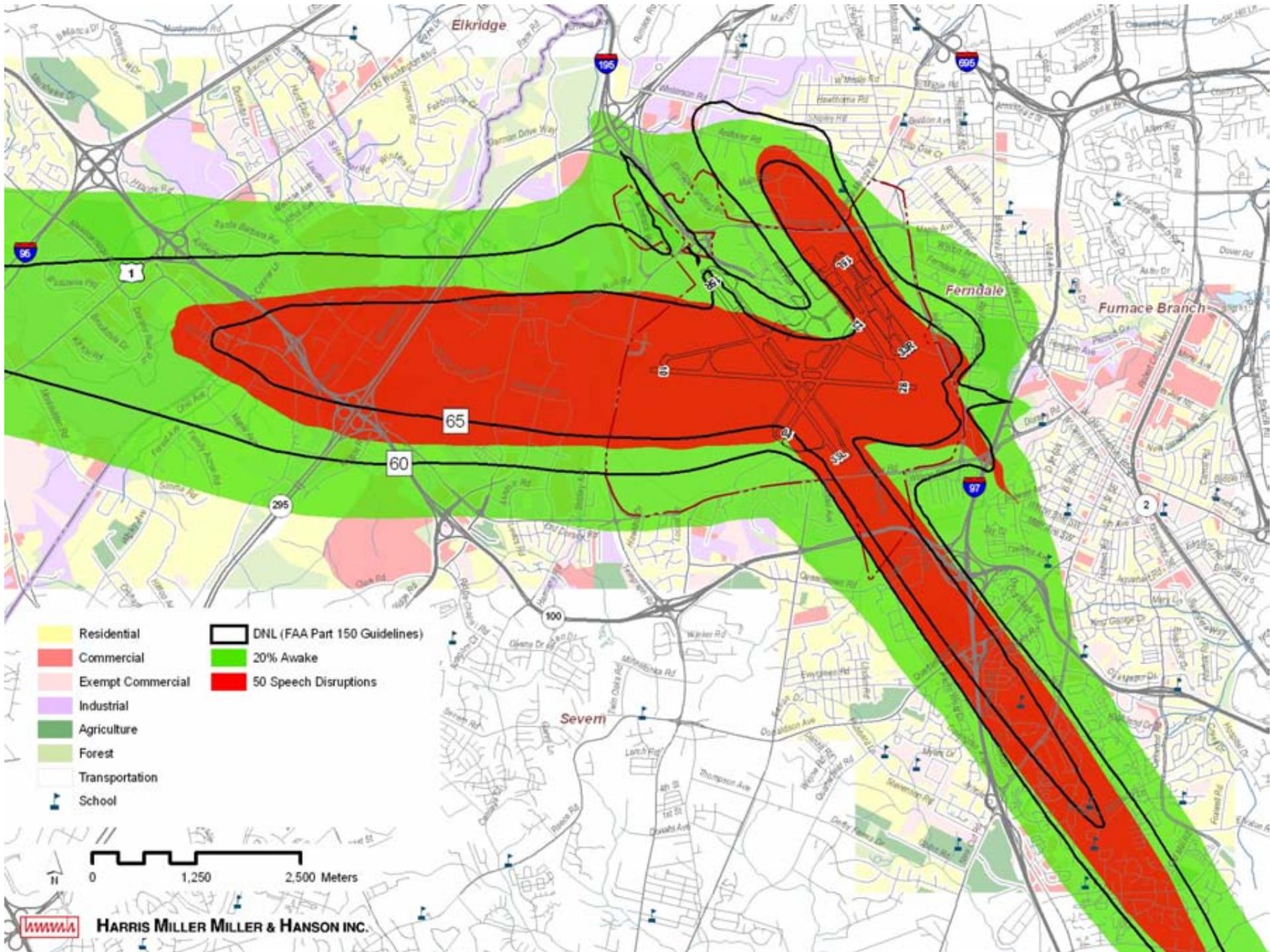
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Task 2b: Operations Analysis

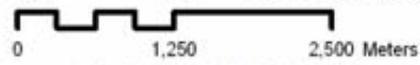
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- **Compare Development Alternatives by:**
 - Total number of operations
 - Day v. night operations
 - Types of Operations
- **Present in terms of Noise Effects:**
 - Awakenings
 - Speech Interference





- | | |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
|  Residential |  DNL (FAA Part 150 Guidelines) |
|  Commercial |  20% Awake |
|  Exempt Commercial |  50 Speech Disruptions |
|  Industrial | |
|  Agriculture | |
|  Forest | |
|  Transportation | |
|  School | |



Task 2c: Approach Alternatives

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- **Analyze noise impacts for range of approaches:**
 - Existing NDB/GPS (all development options)
 - Proposed WAAS/LVP (all development options)
 - Conceptual RNP (3a/Hybrid option only)



Comparison of Proposed Procedures to Existing RNAV/GPS

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Approach	Benefits to Neighbors	Benefits to Pilots	Cost to implement	Aircraft able to use
Existing NDB/GPS	n/a	n/a	n/a	Most
Gradual Descent LPV/WAAS	Reduced noise from higher altitude and lower thrust	Lower approach min altitude over Lake	Requires procedural changes and FAA survey/design	Most
“Curved Approach” RNP	Reduced noise from moving track to Lake Washington	Lower approach min altitude over Lake	Requires design of approach and special equipment	New technology turboprop/turbo-jet aircraft only

Discussion

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- Clarifying questions
- Scope modification

