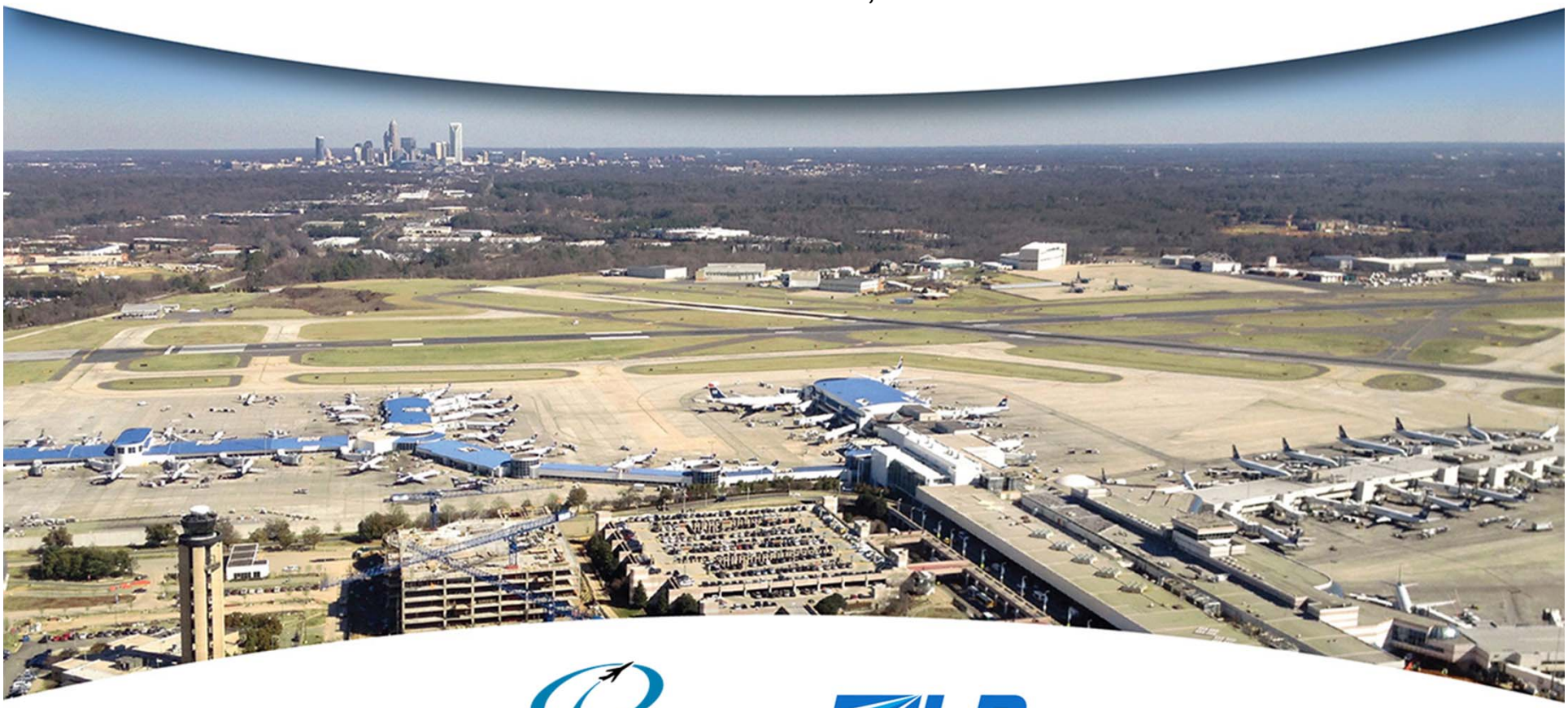
CLT Noise Exposure Map Update

Public Information Meeting

December 3 & 4, 2014



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L&B Aviation Planning at the Leading Edge

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Agenda

- Welcome and Introductions
- Tonight's Meeting Format
- NEM Update Process
- Noise Exposure Maps (NEMs) General Overview
- Review of Previously-Approved NEMs
- Important Facts About NEM Updates
- Noise Contour Modeling Input Data
- Noise Monitoring Program Results
- Preliminary Noise Contours
- Future Meetings

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Public Information Meeting Format

- What is the purpose of tonight's meeting?
  - Present study information/progress to date and gather public input
- Open House with information presented on display boards
  - Study Background and Methodology
  - NEM Input Data
  - Noise Monitoring Program Results
  - Preliminary Draft Noise Exposure contours
- How to get involved in the study?
  - Comments are being accepted tonight and through U.S. Mail/Email through December 19th
  - Consultant and Airport staff are available to answer questions and discuss study process and preliminary findings

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Welcome and Introductions

- Charlotte Douglas International Airport
  - Sponsor of the Noise Exposure Map (NEM) Update
  - Certify the NEMs are accurate
  - NEM Team: Jack Christine, Katherine Dennis, Lauren Scott, Kevin Hennessey
- Consultant Team
  - Landrum & Brown is the lead consultant for the NEM Update
  - 60 years of aviation planning
  - Experts in aircraft noise and land use planning
  - Rob Adams, Principal-in-Charge
- Federal Aviation Administration
  - Developed guidelines for NEMs that must be followed
  - Review NEMs for accuracy and determination that guidelines were met
  - Provide technical support for noise modeling

Noise Exposure Map (NEM) Update

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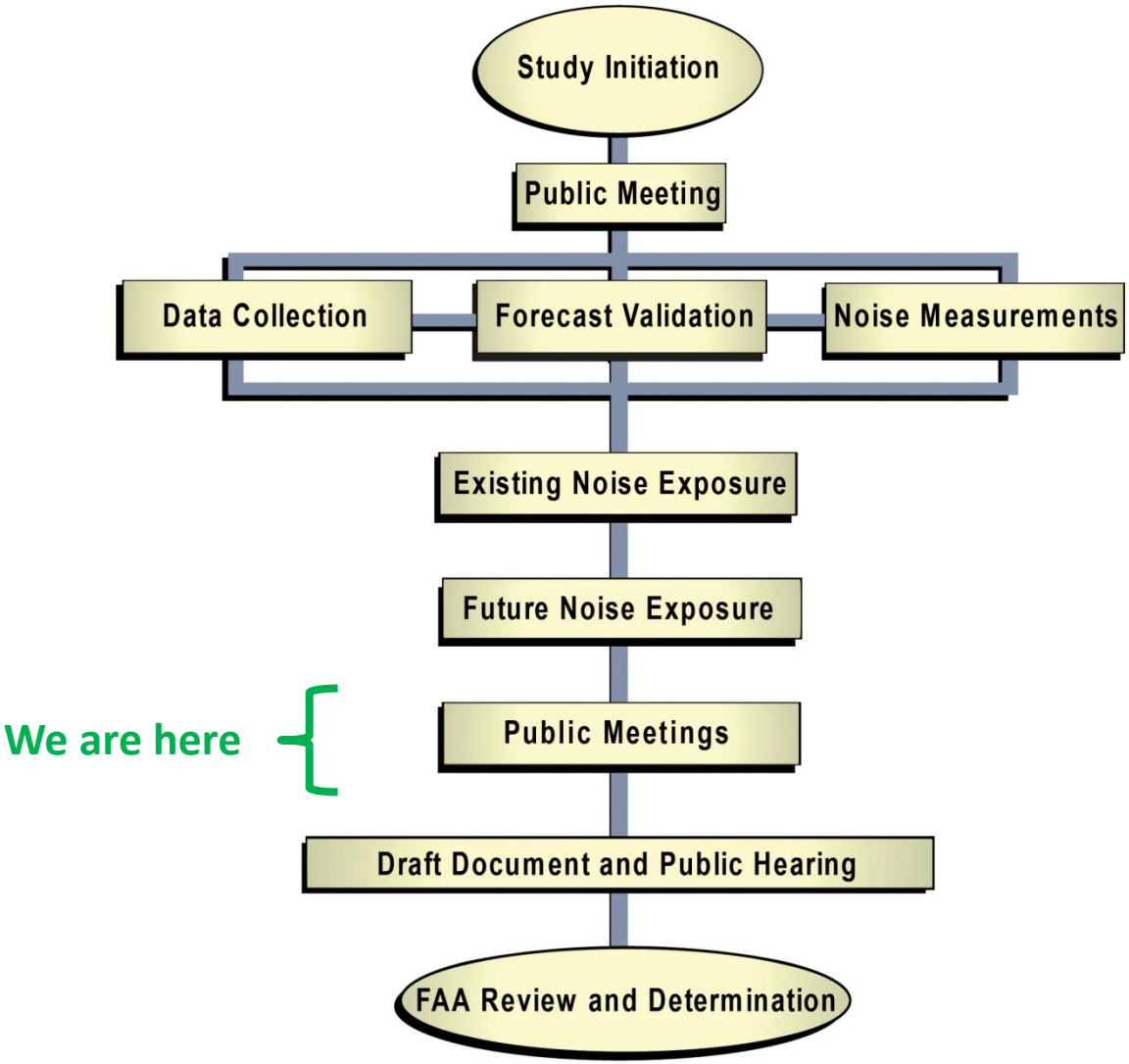
NEM Update Process



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NEM Update General Overview

- NEM Updates Document Noise Levels
  - The focus of the NEM Update is to quantify noise and identify land use incompatibilities that exist today and in the future
- NEM Updates must Follow FAA Guidelines
- NEM Updates do not:
  - Recommend changes to airport or runway, or implementing mandatory restrictions on aircraft
  - Recommend levying fines for not following procedures
  - Limit access to the airport based on size, type, or noise created by aircraft
  - Alter the noise compatibility measures already in place at the airport

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Previous NEMs at CLT

- 1990 - Part 150 Noise Compatibility Study
- 1996 - Part 150 Study Update
  - Prepared NEMs for 1996 and 2001 conditions
  - 2001 NEM included construction of the third parallel runway

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Important Facts About NEM Updates

- Developing Noise Exposure Maps
  - FAA has established land use compatibility guidelines for identifying aircraft noise impacts
  - Based on Day-Night Average Sound Level (DNL)
  - Required to use Integrated Noise Model (INM)
  - Noise-sensitive uses are considered non-compatible at or above 65 DNL
    - Residential
    - Schools
    - Places of worship
    - Hospitals
    - Nursing homes
    - Daycare facilities where licensed education occurs
    - Libraries

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Important Facts About NEM Updates

- Differences between and NEM Update and a Noise Compatibility Program (NCP)
  - Noise Exposure Map (NEM) Updates prepare existing and future noise exposure contours and land use compatibility analysis.
  - Noise Compatibility Programs (NCPs) prepare existing and future noise exposure contours and land use compatibility analysis PLUS develop new noise abatement and land use mitigation alternatives.
  - NEM Updates and NCPs BOTH include a Public Outreach component to obtain public input.

Noise Exposure Map (NEM) Update

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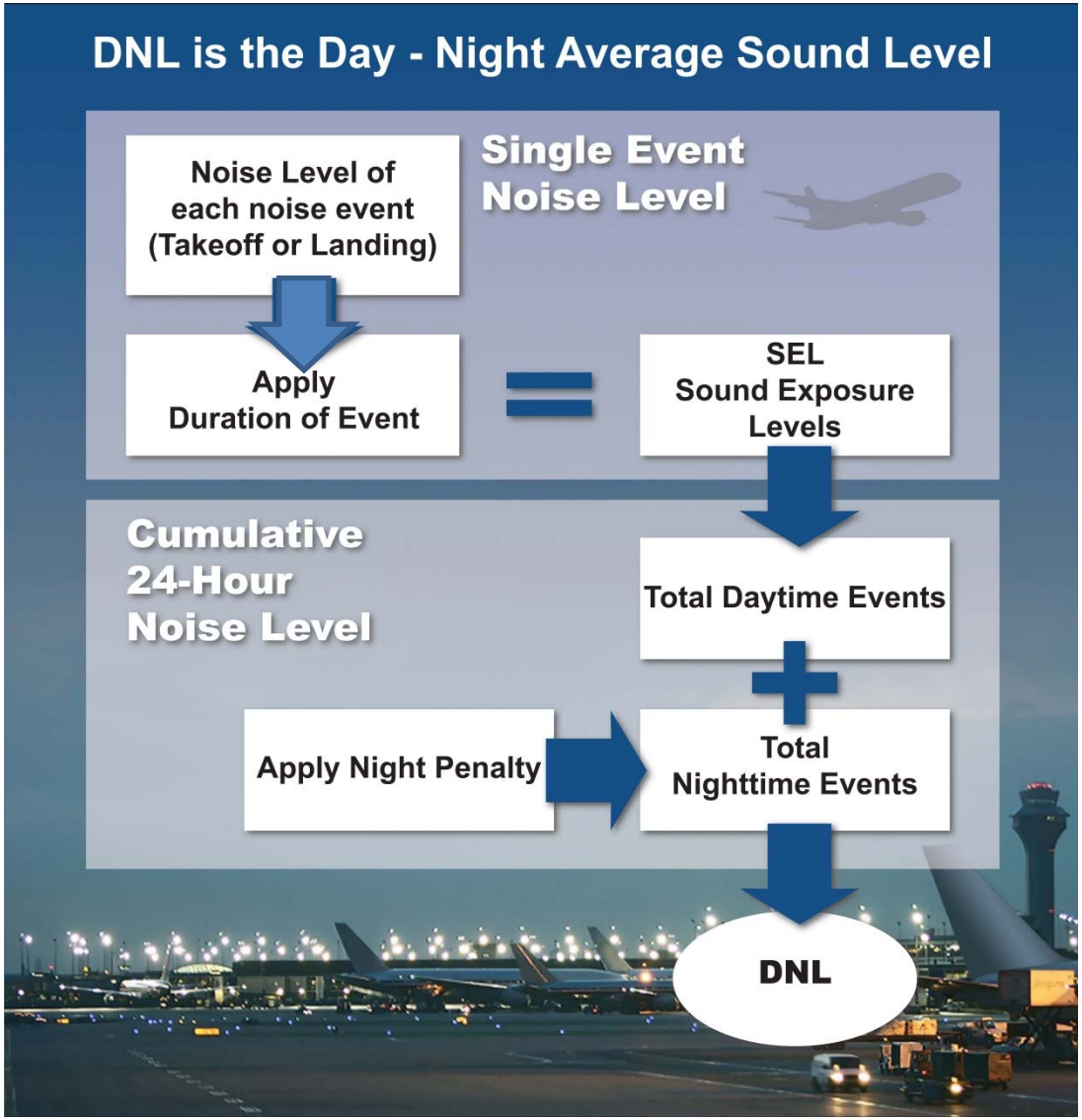
What is DNL?



Noise Exposure Map (NEM) Update

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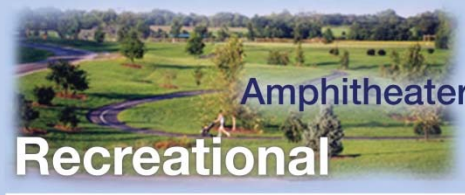
Land Use / Noise Sensitivity Matrix

Per Part 150:

Compatible | Compatible with Sound Insulation | Incompatible

		OUTDOOR NOISE LEVEL		
		< 65 DNL	65-75 DNL	75+ DNL
 Residential	1-2 Family	Compatible	Compatible with Sound Insulation	Incompatible
	Multi-Family	Compatible	Compatible with Sound Insulation	Incompatible
	Mobile Homes	Compatible	Incompatible	Incompatible
	Dorms, etc.	Compatible	Compatible with Sound Insulation	Incompatible
 Institutional	Schools	Compatible	Compatible with Sound Insulation	Incompatible
	Place of Worship	Compatible	Compatible with Sound Insulation	Incompatible
	Hospitals	Compatible	Compatible with Sound Insulation	Incompatible
	Nursing Homes	Compatible	Compatible with Sound Insulation	Incompatible
	Libraries	Compatible	Compatible with Sound Insulation	Incompatible
 Recreational	Sports/Play	Compatible	Compatible	Incompatible
	Amphitheaters, Music Shells	Compatible	Incompatible	Incompatible
	Camping	Compatible	Compatible	Incompatible
Commercial	All Uses	Compatible	Compatible	Compatible
Industrial	All Uses	Compatible	Compatible	Compatible
Agricultural	All Uses	Compatible	Compatible	Compatible

Noise Exposure Map (NEM) Update

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How Noise Contours are Generated

User Inputs

Inputs	Source
Airport Information	Airport Layout Plan
Aircraft Flight Tracks	FAA Radar Data
Aircraft Fleet	Tower, Airport Records, Official Airlines Guide (OAG)
Number of Operations	Tower, Airport Records, OAG
Runway Utilization	Radar/Wind Data, Airport Records
Time of Day	Radar Data, OAG, Airport Records
Aircraft Climb Profiles	INM, Radar Data, Airline Records
Departure Trip Length	OAG
Meteorological Data	Climatic Data, Airport Records
Topographic Data	Airport Layout Plan, U.S. Geological Survey

Integrated Noise Model (INM)

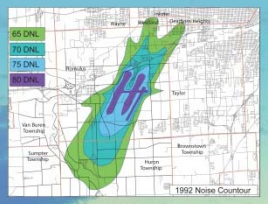
INM-Provided Information

- Aircraft Noise Levels
- Aircraft Performance Data

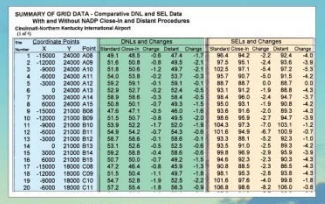
Types of Aircraft Noise Considered within INM

- Arrival
- Departure
- Flyover
- Reverse Thrust (Braking)
- Run-up Noise

Output



Noise Contours



Tabular Reports

Grid Point Analysis

Noise Exposure Map (NEM) Update

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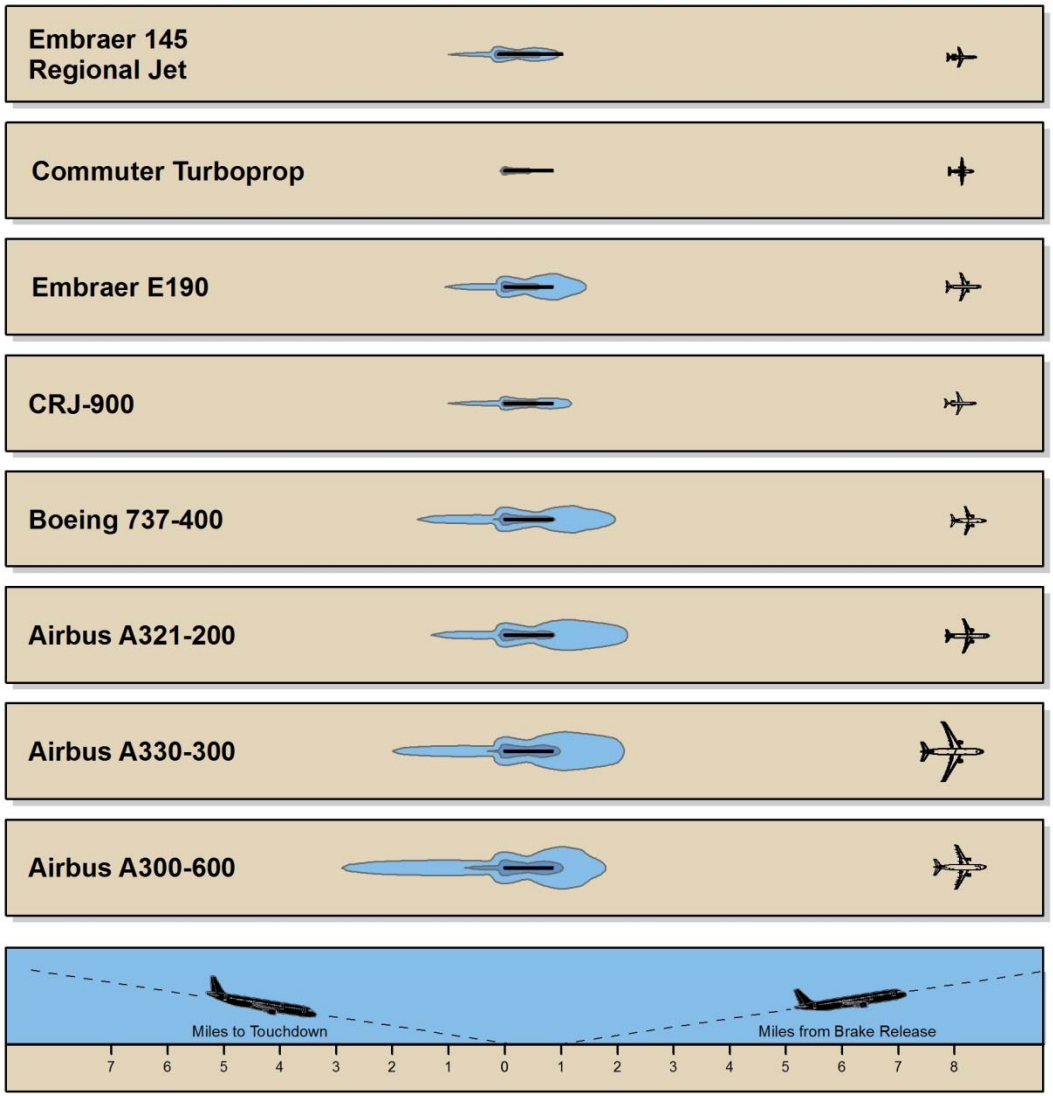
Aircraft Noise Footprints



Noise Exposure Map (NEM) Update

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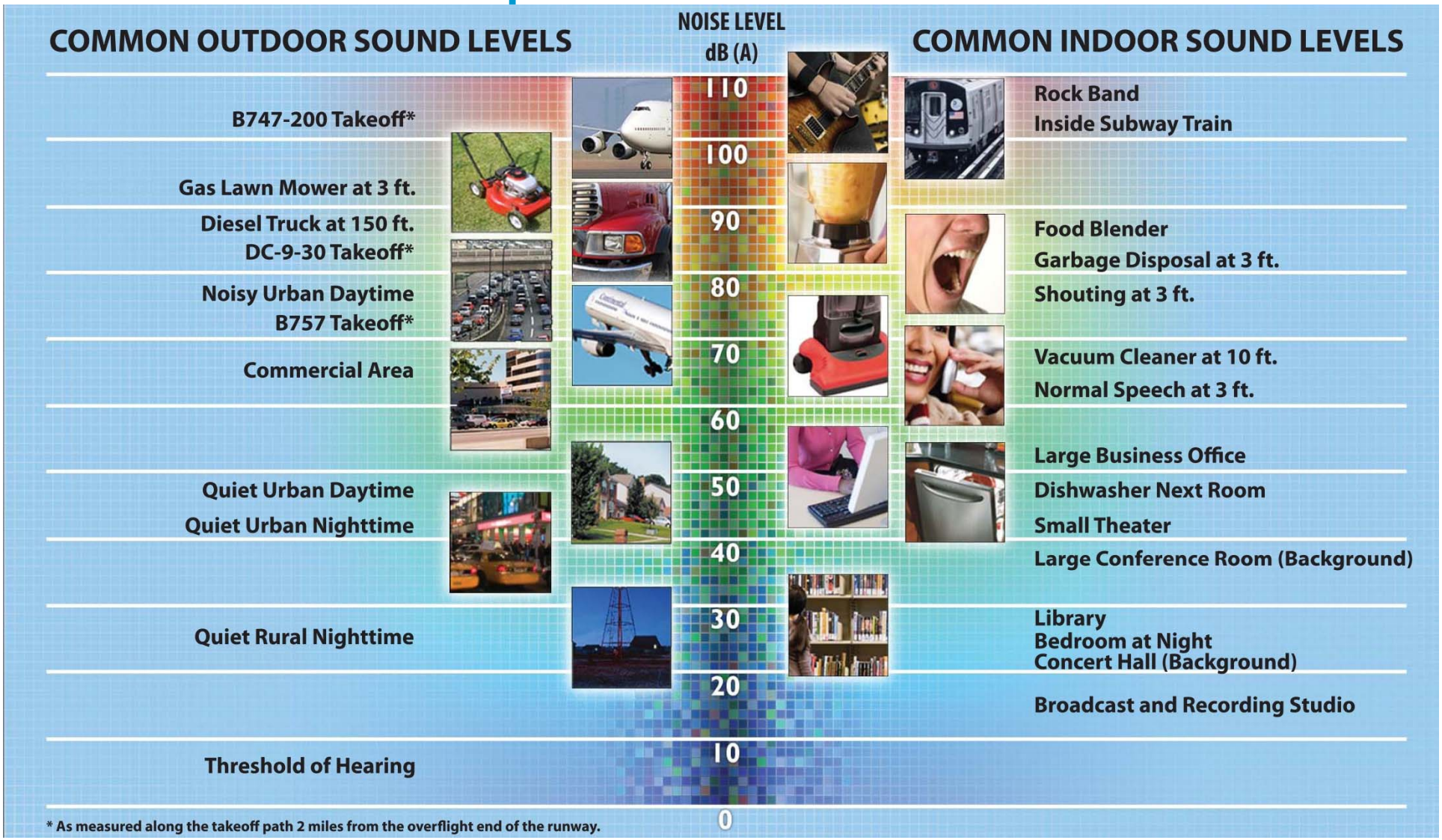
Comparison of Noise Levels



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Important Facts About NEM Updates

- Factors That May Affect the Size or Shape of Noise Exposure Contours
  - Levels of aircraft activity
  - Significant changes in fleet mix
  - Ratio of Daytime (7:00 a.m. to 9:59 p.m.) to Nighttime (10:00 p.m. to 6:59 a.m.) activity
  - Runway use patterns
  - Flight track location and percentage of use

Noise Exposure Map (NEM) Update

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Operating Levels and Fleet Mix

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Heavy Passenger Jets			
Boeing 767-300	767300	0.1	3.0
Airbus A330-300	A330-301	6.0	7.5
Airbus A330-300	A330-343	5.7	7.4
Airbus A340-200	A340-211	0.2	0.3
Airbus A340-600	A340-642	0.9	1.2
Airbus A350	7773ER	0.0	6.2
Subtotal		*12.9*	*25.6*
Heavy / Large Cargo Jets			
Boeing 727-200 (hushkitted)	727EM2	0.9	<0.1
Boeing 767-200	767CF6	8.8	3.7
Airbus A300-600	A300-622R	5.3	5.2
Airbus A310-300	A310-304	0.1	<0.1
Douglas DC10-10	DC1010	0.5	<0.1
Douglas DC10-30	DC1030	<0.1	<0.1
Subtotal		*15.5*	*8.8*
Large Passenger Jets			
Boeing 717-200	717200	1.5	3.4
Boeing 737-300	737300	1.7	0.6
Boeing 737-400	737400	76.2	<0.1
Boeing 737-700	737700	9.1	10.6
Boeing 737-800	737800	1.1	10.5
Boeing 737-900	737900	0.2	0.2
Boeing 757-200	757PW	0.3	12.6
Boeing 757-200	757RR	18.4	8.3
Boeing 757-300	757300	0.0	0.1
Airbus A319-100	A319-131	171.7	207.1
Airbus A320-200	A320-211	21.6	27.6
Airbus A320-200	A320-232	64.8	82.7
Airbus A321-200	A321-232	189.2	348.2
Canadair CRJ701	CRJ701	129.5	169.8
Canadair CRJ900	CRJ9-ER	165.3	276.5
Douglas DC9-30 (hushkitted)	DC93LW	0.1	<0.1
Douglas DC9-50 (hushkitted)	DC95HW	1.4	0.8
Embraer EMB-170	EMB170	9.8	6.1
Embraer EMB-175	EMB175	50.8	92.3
Embraer EMB-190	EMB190	10.3	11.9
McDonnell-Douglas MD82	MD82	7.4	<0.1
McDonnell-Douglas MD83	MD83	2.3	0.4
McDonnell-Douglas MD88	MD88	11.0	4.4
McDonnell-Douglas MD90	MD9025	7.1	15.4
Subtotal		*950.7*	*1,289.3*

Aircraft Type	INM ID	2015 Average-Annual Daily Operations	2020 Average-Annual Daily Operations
Regional / Business Jets			
Business Jet	CIT3	0.6	0.9
Business Jet	CL600	3.9	5.7
Business Jet	CL601	2.6	3.9
Canadair Regional Jet CRJ-200	CLREGJ	258.6	263.5
Business Jet	CNA500	2.3	3.4
Business Jet	CNA510	1.3	1.8
Business Jet	CNA55B	1.6	2.4
Business Jet	CNA750	1.3	1.9
Dornier 328 Jet	D328J	0.0	1.1
Embraer EMB-140	EMB140	1.0	21.9
Embraer EMB-145	EMB145	57.2	41.8
Embraer EMB-145	EMB14L	21.6	<0.1
Business Jet	FAL20	3.9	5.7
Business Jet	GIV	4.0	6.0
Business Jet	GV	2.6	3.9
Business Jet	LEAR35	13.0	20.0
Business Jet	MU3001	12.0	16.9
Subtotal		*387.8*	*400.9*
Propeller Aircraft			
Twin-Engine Piston	BEC58P	4.8	4.7
Single-Engine Piston	CNA172	0.4	0.3
Single-Engine Piston	CNA206	0.5	0.3
Single-Engine Piston	CNA208	1.9	0.9
Single-Engine Piston	CNA210	0.8	1.3
Twin-Engine Turboprop	CNA441	2.7	2.6
DASH 6	DHC6	4.2	4.1
DASH 8-100	DHC8	40.5	42.0
DASH 8-300/400	DHC830	77.8	85.2
Single-Engine Piston	GASEPF	6.6	4.1
Single-Engine Piston	GASEPV	4.6	2.9
Twin-Engine Piston	PA31	1.1	0.6
Subtotal		*145.9*	*149.0*
Military Aircraft			
Lockheed C130 Hercules	C130HP	2.5	3.8
Subtotal		*2.5*	*3.8*
Helicopters			
Augusta A-109	A109	1.7	1.7
Bell 407 Jet Ranger	B407	0.3	0.3
Subtotal		*2.0*	*2.0*
Grand Total		**1,517.4**	**1,879.5**

Noise Exposure Map (NEM) Update

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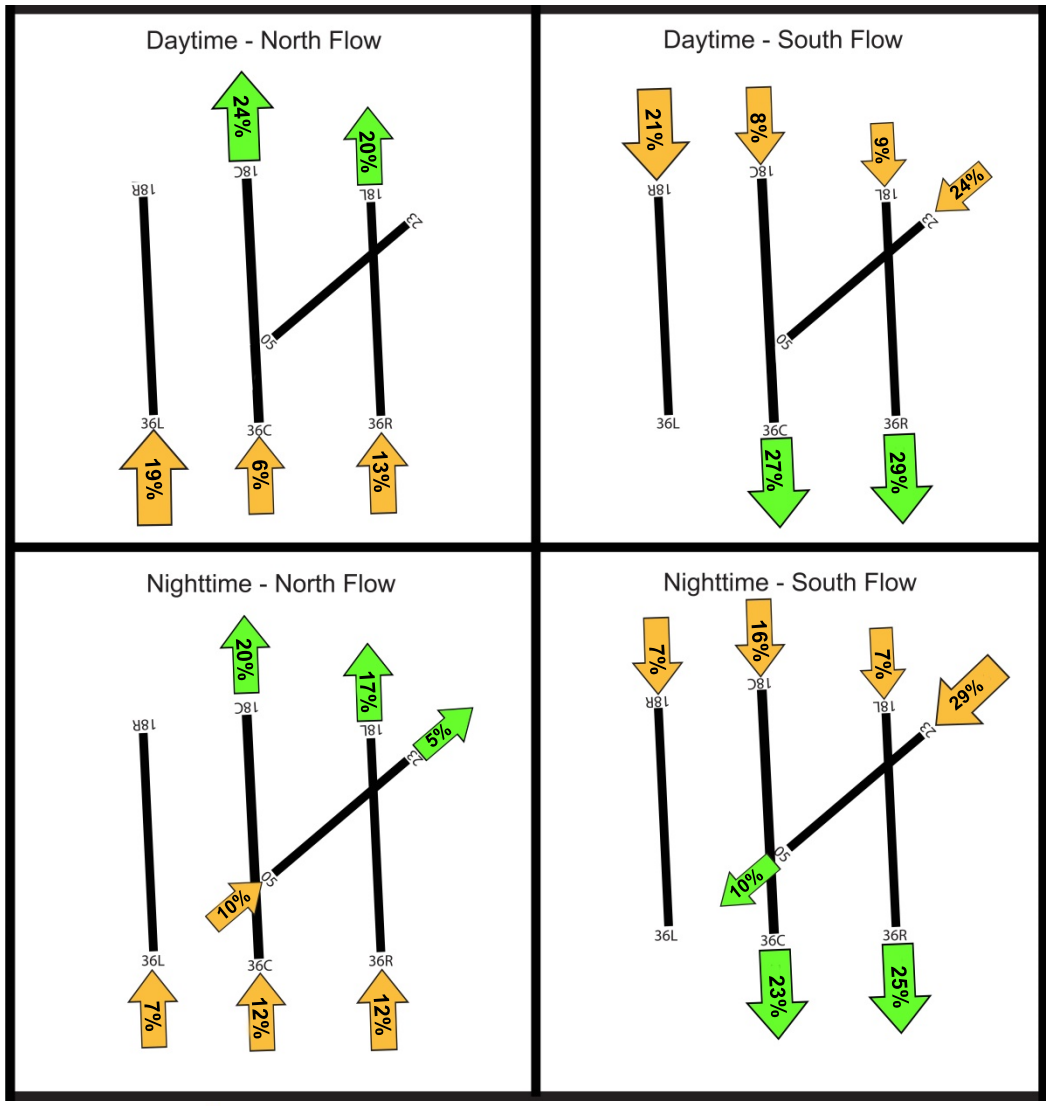
Existing Runway Use Patterns



Noise Exposure Map (NEM) Update

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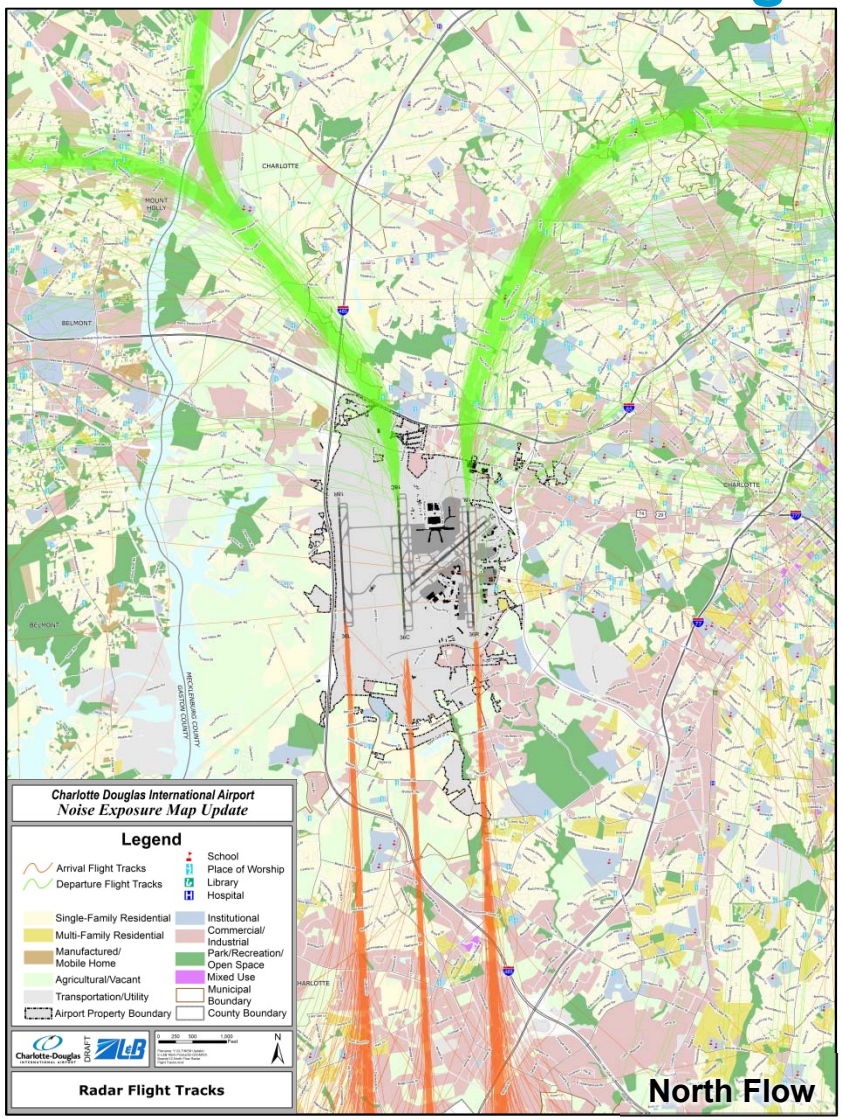
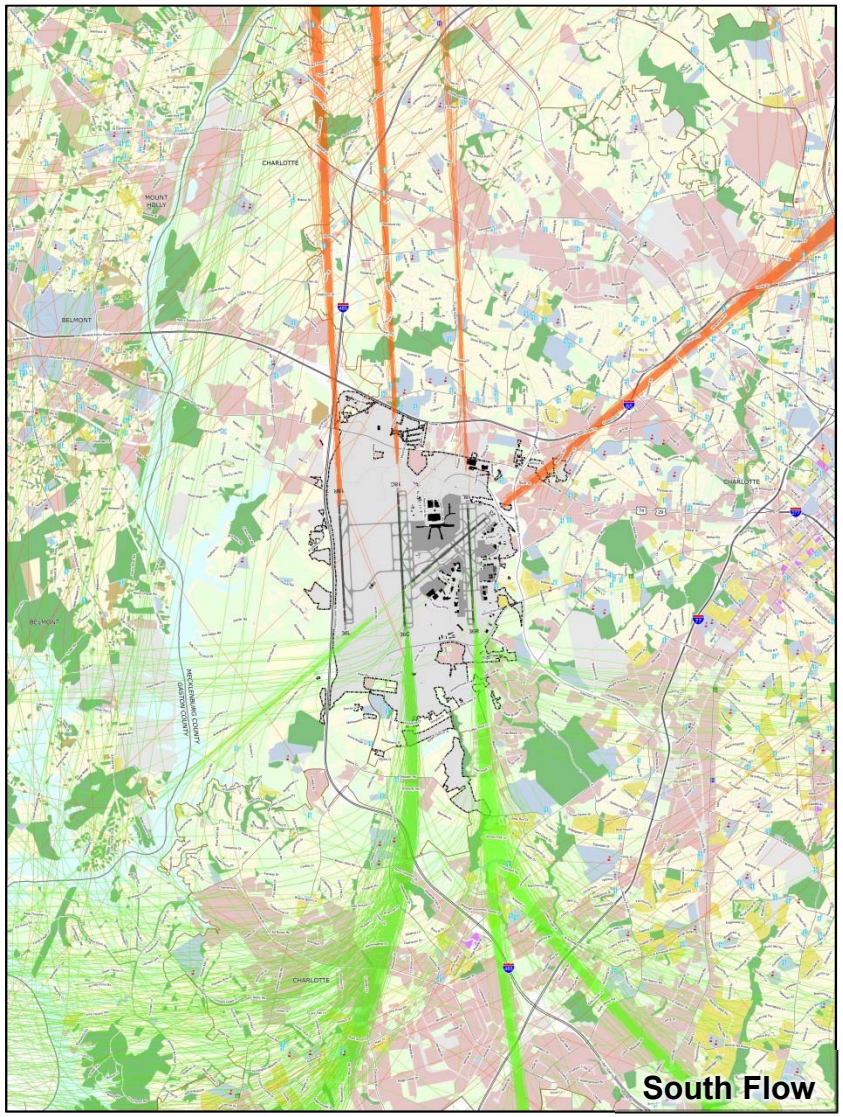
Flight Tracks

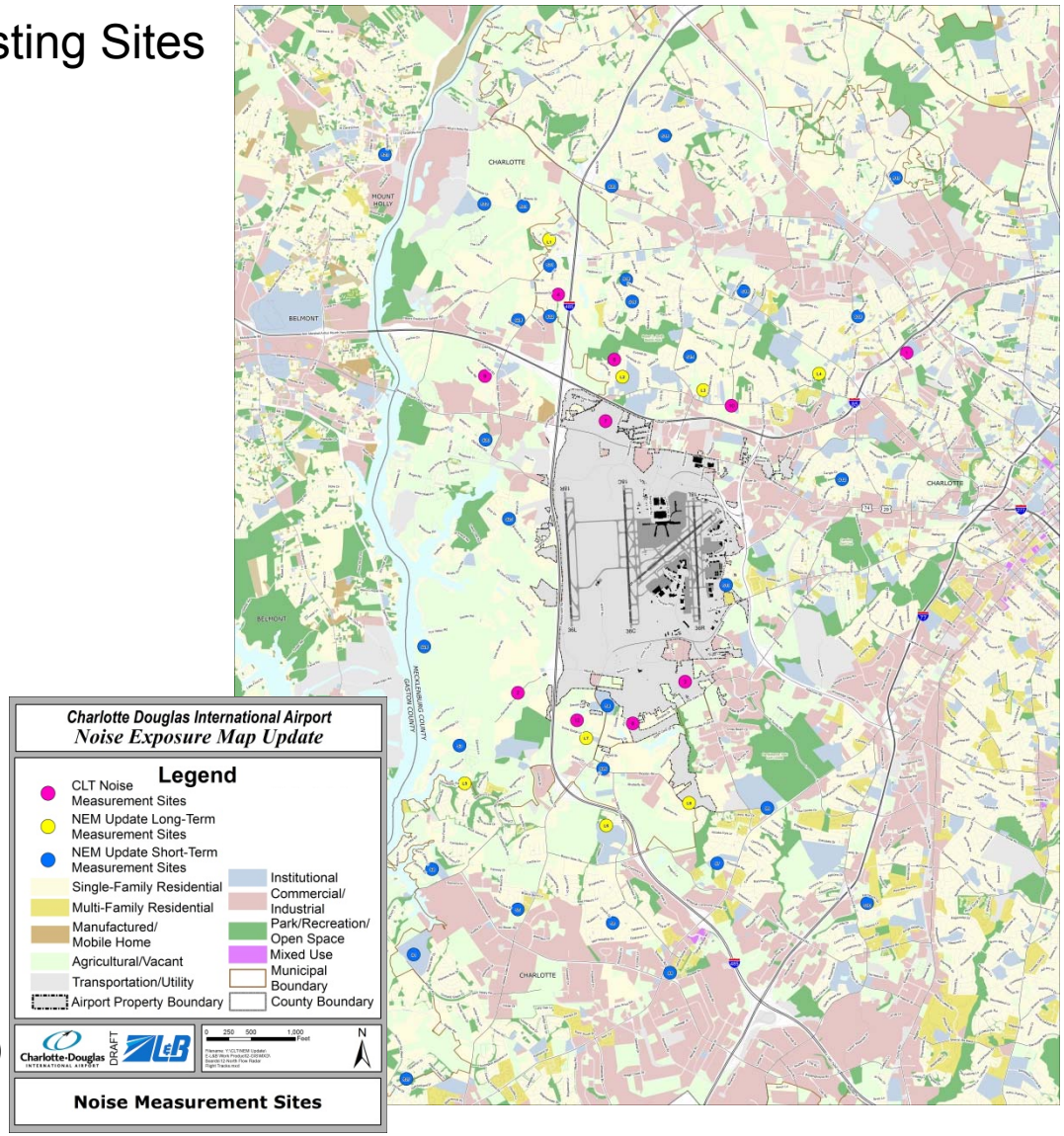




Noise Exposure Map (NEM) Update

Noise Monitoring Program

- Collected Data from 10 Existing Sites
  1. 601 Dewolfe Street
  2. 10300 Garrison Road
  3. Whippoorwill Drive
  4. 1924 Wildwood Drive
  6. 2900 Westerwood Drive
  7. Moores Lake
  8. McAlpine Drive
  9. 3515 Farhill Drive
  10. 6101 Tuckaseegee Road
  12. 9401 Markswood Road
- Conducted Monitoring from other sites
  - 8 Long-Term Sites (5 days)
  - 33 Short-Term Sites (~ 1 hour)



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Long-Term Noise Monitoring Results

Site ID	Site Description	Date of Measurements	Time of Measurements	Ambient Noise Level	Type of Events	Average Number of Events per Hour	Loudest Event (Lmax)	Loudest Aircraft
Long-Term Sites (5+ Days)								
L1	Shady Brook Baptist Church 2940 Belmeade Drive	8/1/2014 to 8/7/2014	Continuous	51.4	Arrivals and Departures	17	90.6	Airbus A321
L2	West Mecklenburg High School 7400 Tuckaseegee Road		Continuous	56.0	Arrivals and Departures	20	94.3	Airbus A319
L3	Mulberry Baptist Church 6450 Tuckaseegee Road		Continuous	53.3	Arrivals and Departures	8	88.2	Business Jet
L4	Tuckaseegee Park 4820 Tuckaseegee Road		Continuous	55.1	Arrivals and Departures	9	93.4	Boeing 727-200
L5	Windygap Road		Continuous	47.1	Arrivals and Departures	1	93.7	Turboprop
L6	Olympic High School 4301 Sandy Porter Road		Continuous	53.5	Arrivals and Departures	16	84.9	Airbus A321
L7	Airport-Owned Property near 9209 Snow Ridge		Continuous	51.4	Arrivals and Departures	16	89.8	Airbus A321
L8	Airport-Owned Property on Shopton near Lebanon Drive		Continuous	53.5	Arrivals and Departures	21	83.6	Canadair CRJ-900

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Noise Monitoring Results

- The monitoring was conducted from July 31, 2014 through August 13, 2014
- Long-term noise monitoring was conducted at 8 sites for over five days at each site
  - DNL noise levels ranged from 59.1 to 64.9 DNL and were consistent with INM predictions
- Short-term noise monitoring was conducted at 33 sites for approximately on hour per site

Noise Exposure Map (NEM) Update

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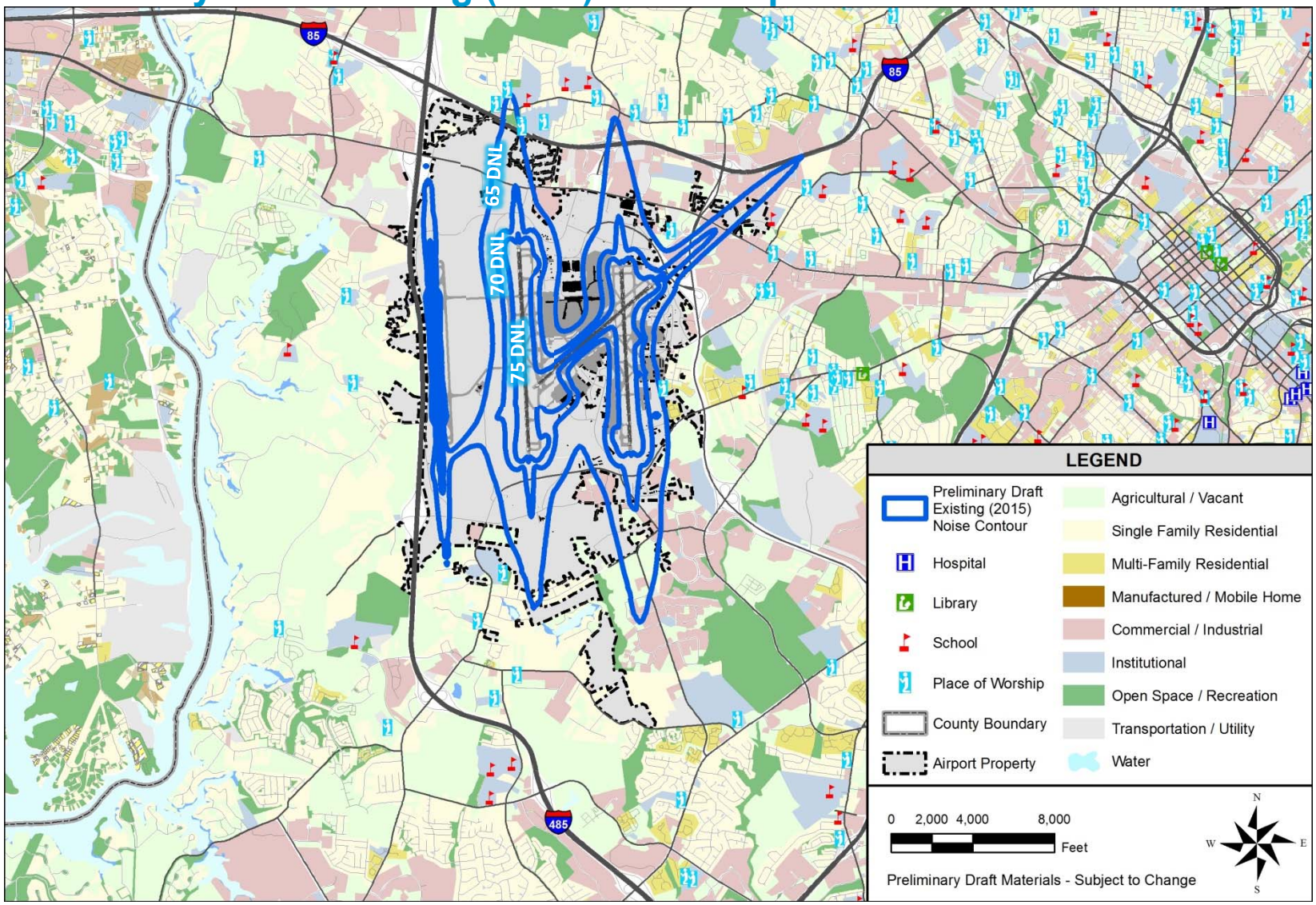
Preliminary Draft Existing (2015) Noise Exposure Contour



Noise Exposure Map (NEM) Update

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Preliminary Draft Noise Contour / Land Use Incompatibilities
Existing (2015) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	0
Previously Eligible for Sound Insulation	41
Sound Insulated	3
Total Housing Units	**44**
Population	
Total Population	**113**
Noise-Sensitive Facilities	
Schools	0
Churches	0
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**0**

Noise Exposure Map (NEM) Update

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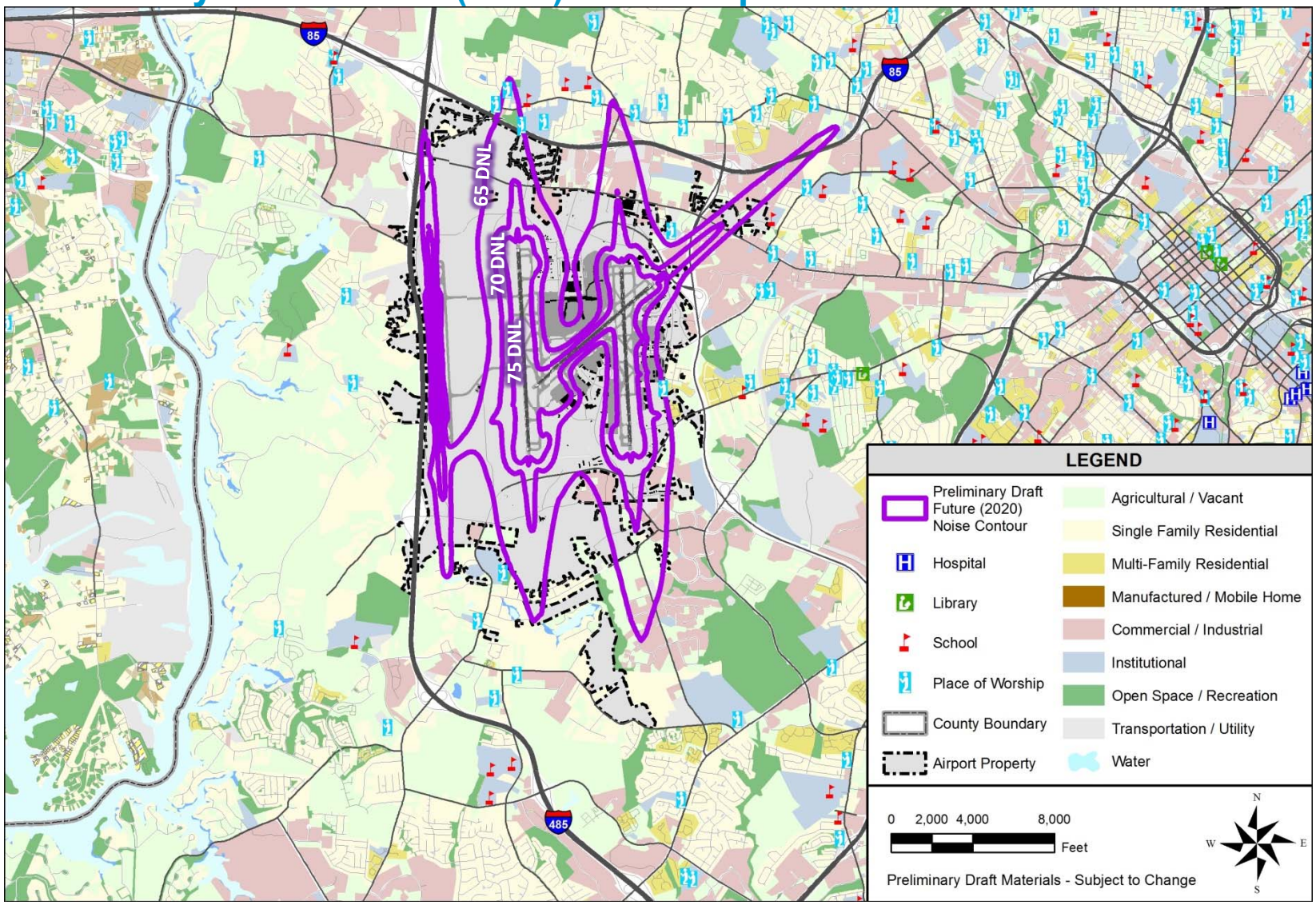
Preliminary Draft Future (2020) Noise Exposure Contour



Noise Exposure Map (NEM) Update

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Preliminary Draft Noise Contour / Land Use Incompatibilities
Future (2020) Noise Exposure Contour

Properties by Mitigation Area	65+ DNL
Housing Units	
Unmitigated	3
Previously Eligible for Sound Insulation	53
Sound Insulated	5
Total Housing Units	**61**
Population	
Total Population	**160**
Noise-Sensitive Facilities	
Schools	0
Churches	2
Libraries	0
Hospitals	0
Nursing Homes	0
Total Noise-Sensitive Facilities	**2**

Noise Exposure Map (NEM) Update

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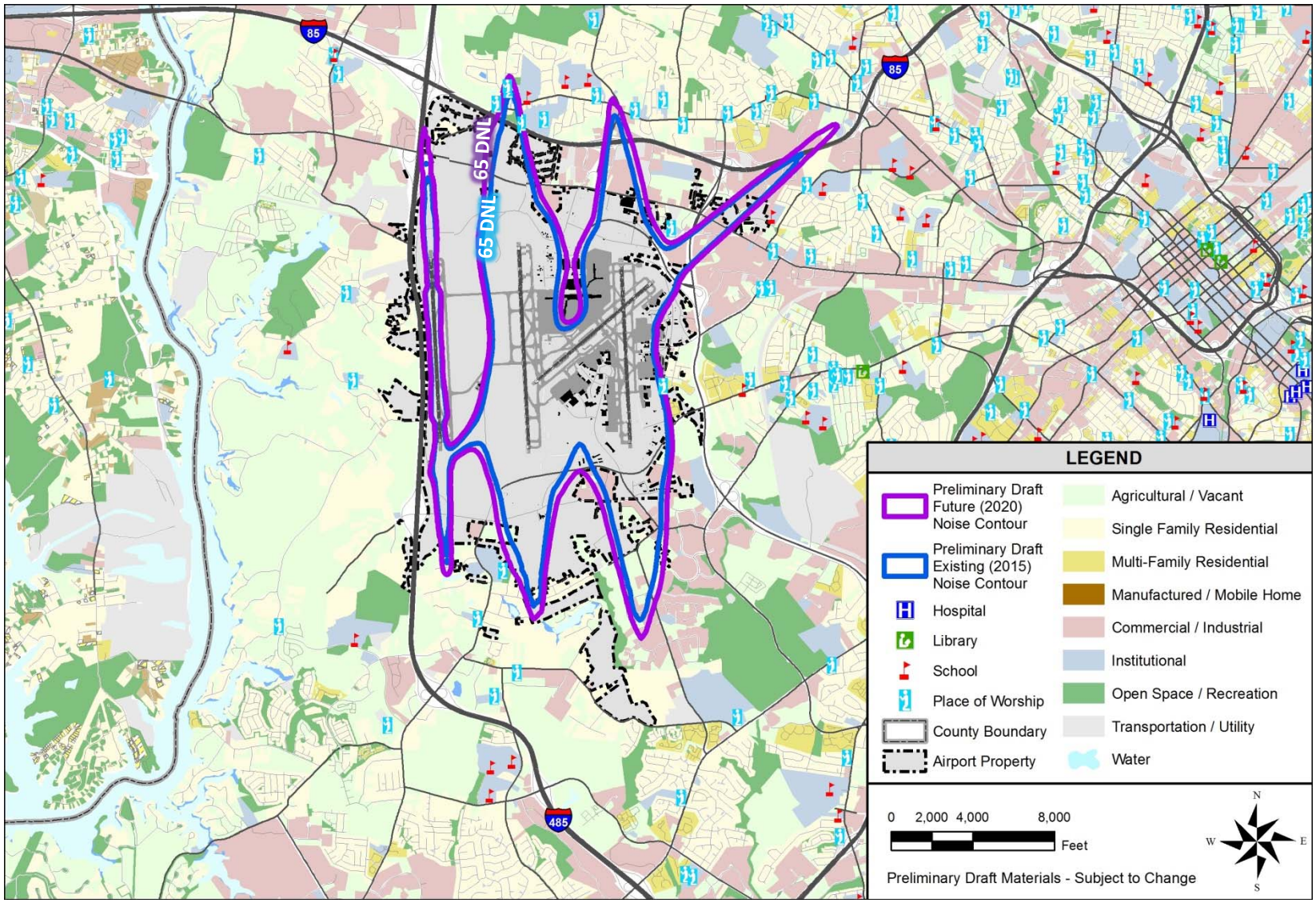
Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



Noise Exposure Map (NEM) Update

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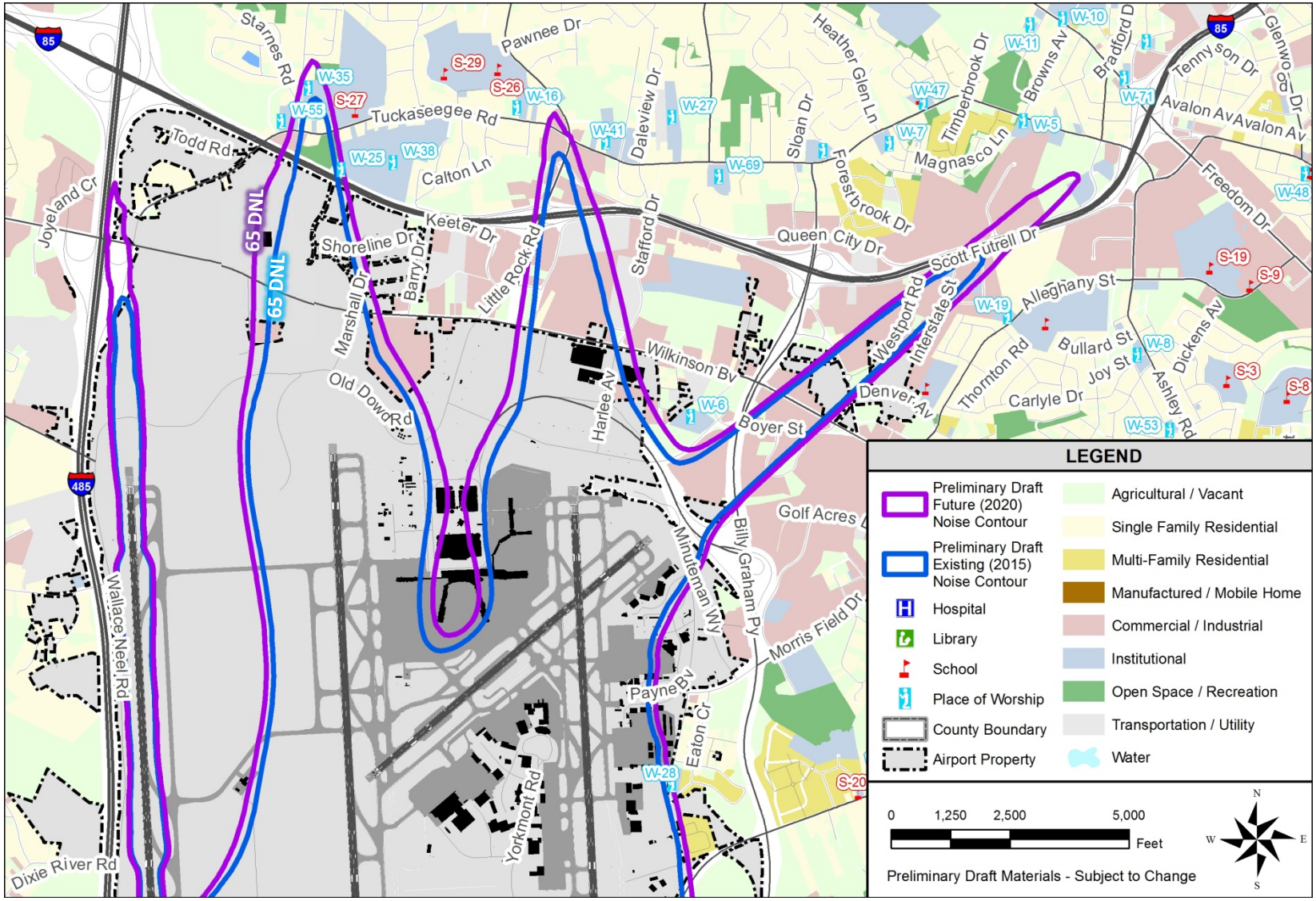
Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



Noise Exposure Map (NEM) Update

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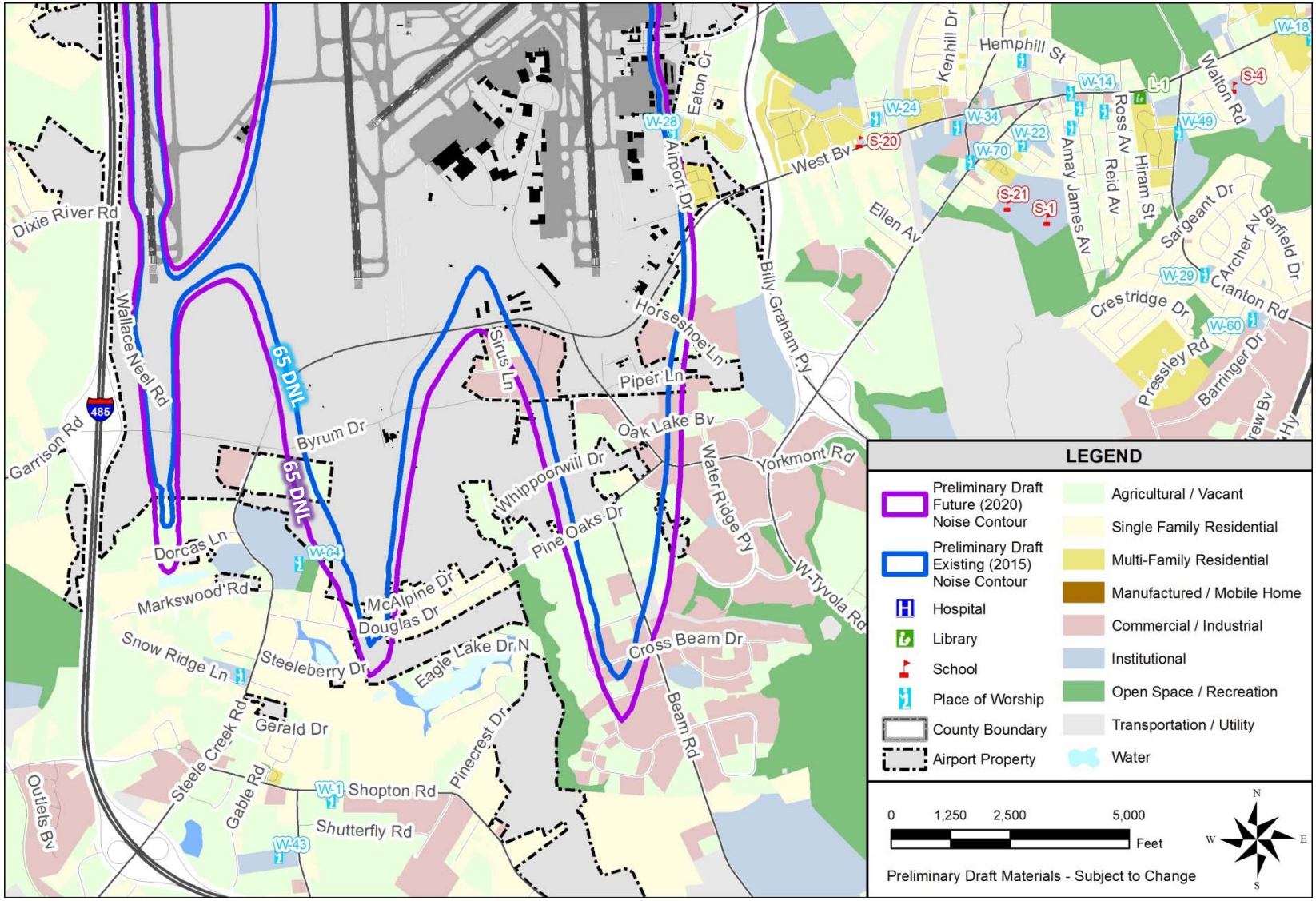
Preliminary Draft Existing (2015) Compared to Future (2020) Noise Exposure Contours



Noise Exposure Map (NEM) Update

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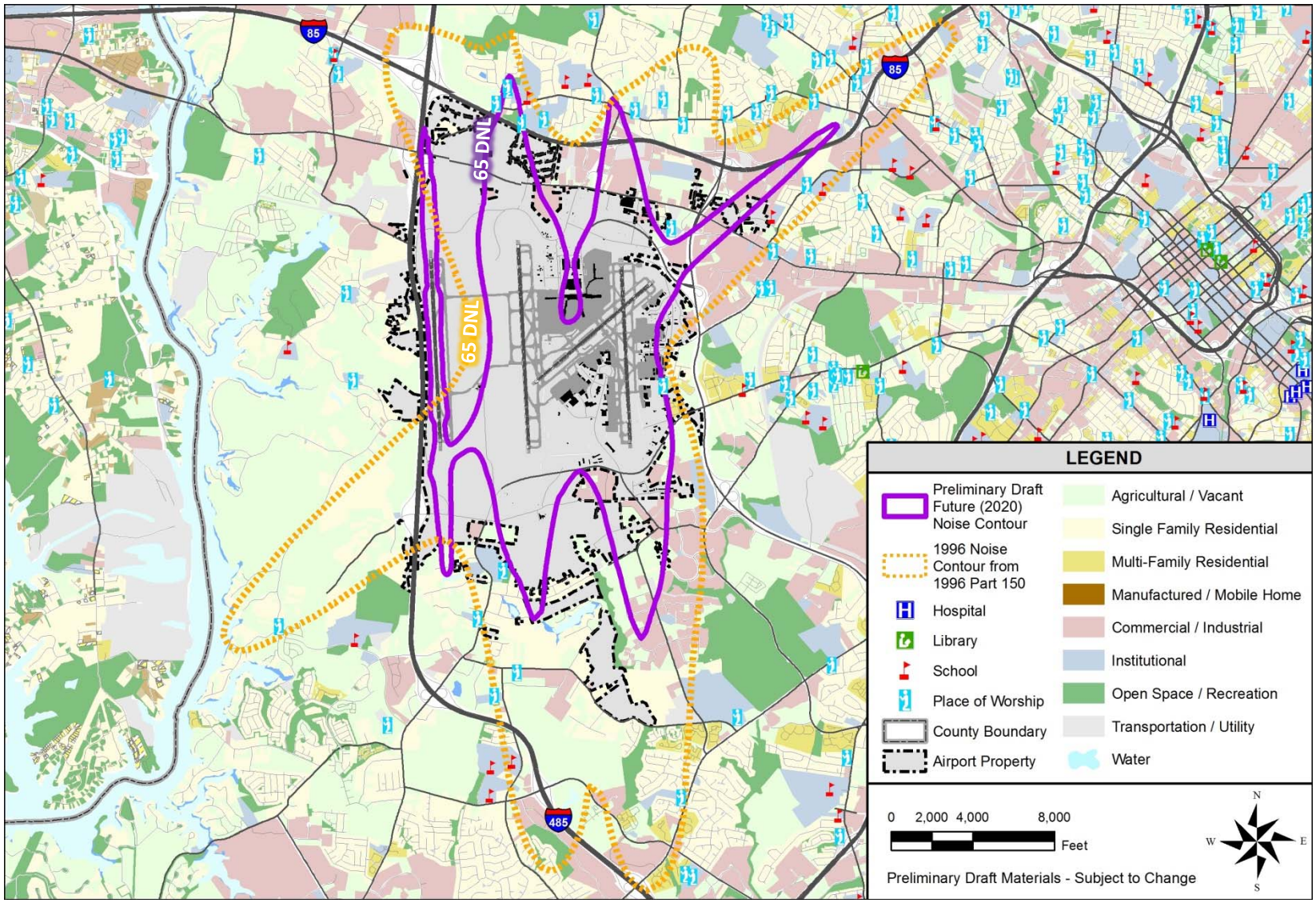
Preliminary Draft Future (2020) Noise Exposure Contours compared to 1996 Noise Contour



Noise Exposure Map (NEM) Update

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Preliminary Draft Noise Contour / Land Use Incompatibilities

Properties by Mitigation Area	1996 Noise contour	2015 Noise Contour	2020 Noise Contour
	65+ DNL		
Housing Units			
Unmitigated	n/a	0	3
Previously Eligible for Sound Insulation	n/a	41	53
Sound Insulated	n/a	3	5
Total Housing Units	**2,773**	**44**	**61**
Population			
Total Population	**6,700**	**113**	**160**
Noise-Sensitive Facilities			
Schools	4	0	0
Churches	15	0	2
Libraries	0	0	0
Hospitals	0	0	0
Nursing Homes	0	0	0
Total Noise-Sensitive Facilities	**19**	**0**	**2**

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Next Meetings

- Next Public Information Meetings
  - Planned for Spring 2015