



FAR Part 150 Update – Duluth (DLH)

Public Information Workshop | August 2020



Agenda

- Introduction
- Part 150 Study Process
- Short-Term Noise Monitoring Program
- Noise Modeling Methodology
- Existing (2020) Baseline Noise Exposure Map (NEM) Contours
- Future (2025) Baseline NEM Contours
- Elements of a Noise Compatibility Study
- Part 150 Schedule
- Next Steps

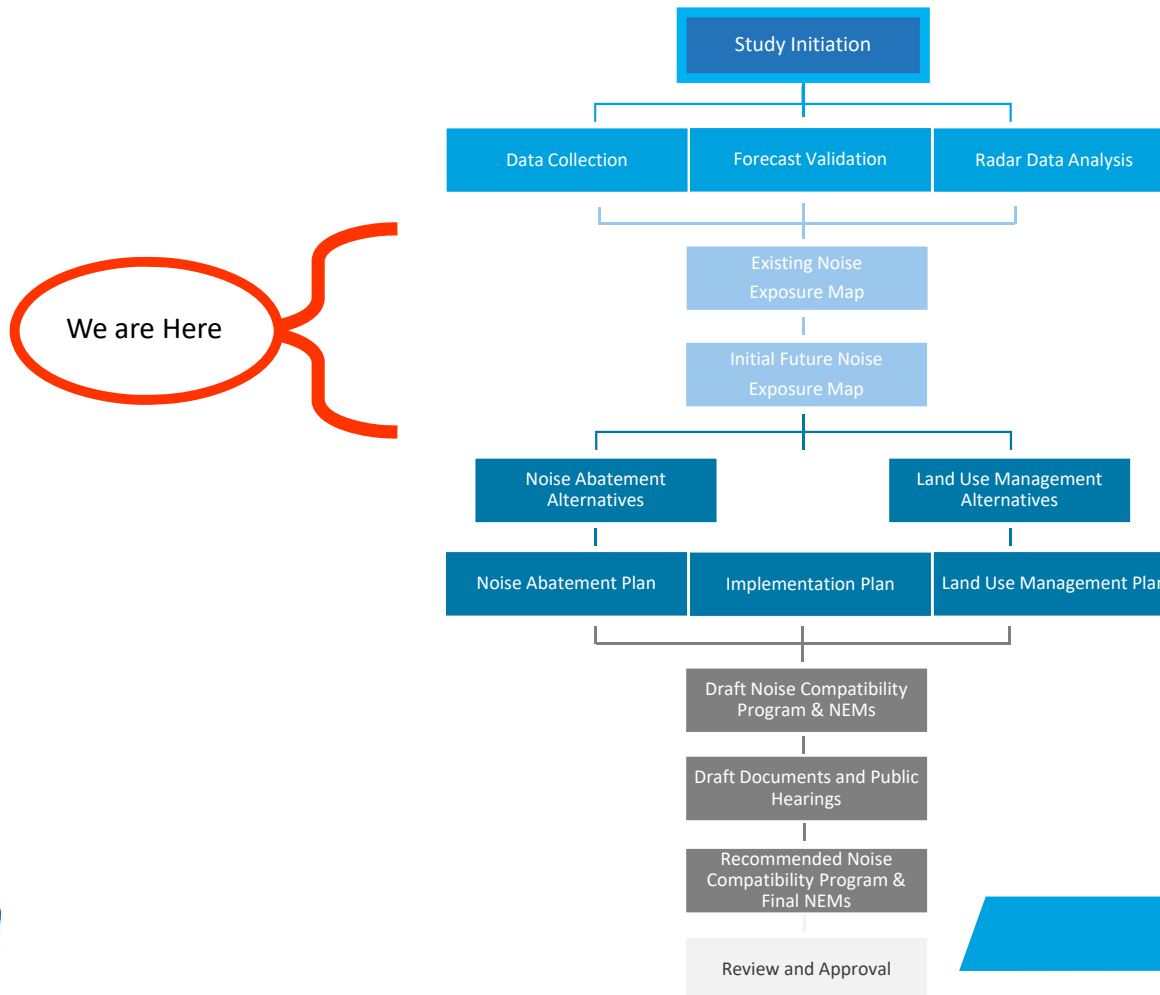
Part 150 Study Process

Essential Elements of a Part 150 Study

- **Noise Exposure Maps**
 - Description of the noise levels for existing and future conditions
 - Future condition should take into account any changes (physical or operational) that may have an effect on the noise levels around the airport
- **Noise Compatibility Program**
 - Recommendations for reducing, minimizing, and/or mitigating aircraft noise and land use conflicts
 - Noise Abatement Alternatives
 - Land Use Mitigation Alternatives
 - Program Management Alternatives
- **Public Involvement**
 - Public information meetings/workshops
 - Public hearings
 - Planning Advisory Committee (PAC)



Part 150 Study Process



Part 150 Study Process

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 Multi-Family Mobile Homes Dorms, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Institutional  Schools Place of Worship Hospitals Nursing Homes Libraries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recreational  Sports/Play Amphitheaters, Music Shells Camping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial* All Uses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Industrial* All Uses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Agricultural All Uses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Appropriate noise level reduction must be incorporated into the design of areas where the public is received, office areas, and other noise-sensitive areas.



Comparison of Noise Levels

COMMON OUTDOOR SOUND LEVELS	NOISE LEVEL dB (A)	COMMON INDOOR SOUND LEVELS
B747-200 Takeoff*	110	Rock Band Inside Subway Train
Gas Lawn Mower at 3 ft.	100	Food Blender Garbage Disposal at 3 ft. Shouting at 3 ft.
Diesel Truck at 150 ft. DC-9-30 Takeoff*	90	Vacuum Cleaner at 10 ft. Normal Speech at 3 ft.
Noisy Urban Daytime B757 Takeoff*	80	Large Business Office Dishwasher Next Room Small Theater Large Conference Room (Background)
Commercial Area	70	Library Bedroom at Night Concert Hall (Background)
Quiet Urban Daytime Quiet Urban Nighttime	60	Broadcast and Recording Studio
Quiet Rural Nighttime	50	
	40	
	30	
	20	
Threshold of Hearing	10	
	0	

* As measured along the takeoff path 2 miles from the overflight end of the runway.

Part 150 Study Process

How Noise Contours are Generated

User Inputs

Inputs	Source
● Airport Information	▶ Airport Layout Plan
● Aircraft Flight Tracks	▶ FAA Radar Data, Minnesota Air National Guard (MnANG)
● Aircraft Fleet	▶ Traffic Flow Management System (TFMS), MnANG
● Number of Operations	▶ Tower, TFMS, Air Traffic Activity Data System (ATADS)
● Runway Utilization	▶ Radar/Wind Data, Radar Data
● Time of Day	▶ Radar Data, TFMS
● Aircraft Climb Profiles	▶ AEDT, Radar Data, MnANG
● Departure Trip Length	▶ TFMS
● Meteorological Data	▶ Climatic Data, AEDT
● Topographic Data	▶ Airport Layout Plan, U.S. Geological Survey



Aviation Environmental Design Tool (AEDT)

AEDT-Provided Information

- Aircraft Noise Levels
- Aircraft Performance Data



Types of Aircraft Noise Considered within AEDT

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

Output



Noise Contours



















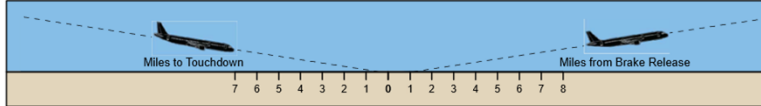
Tabular Reports



Grid Point Analysis

Aircraft Noise Footprints

Cirrus SR22		
De Havilland DHC830		
Embraer EMB190		
Bombardier CRJ-900/700/200		
Airbus A319-100		
Airbus A320-200		
Boeing B737-800		
Lockheed F-16 Fighting Falcon		



Miles to Touchdown Miles from Brake Release

7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8

Short-Term Noise Monitoring Program

Methodology

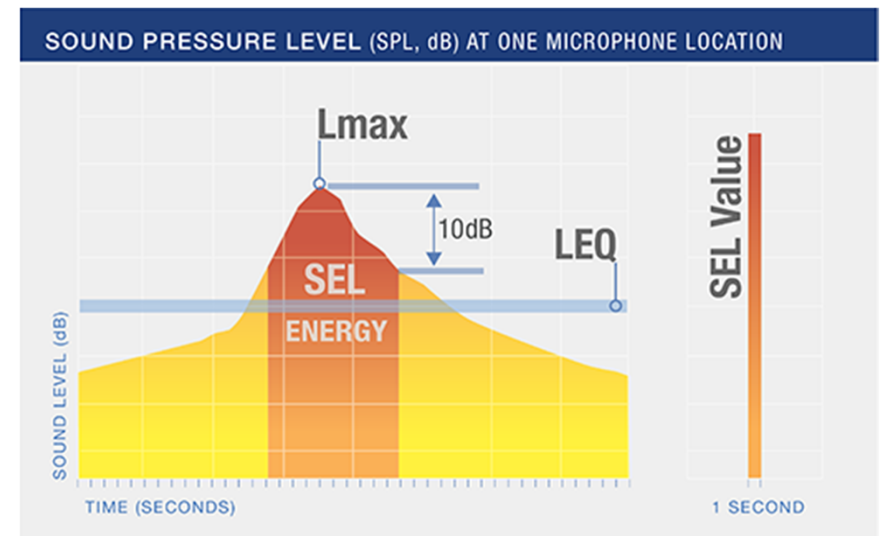
- Twelve (12) sites selected based on public input
- Monitoring occurred at all public recommended sites
- Four (4) additional sites were selected based on location
- Monitoring occurred November 4th – 7th, 2019

Lmax Noise Metric

- Quantifies the peak maximum noise level reached by an entire noise event
- A noise event can be a single aircraft or multiple aircraft at once
- Should not be confused with the Day-Night Average Sound Level (DNL) metric used for calculating Part 150 Noise Exposure Contours

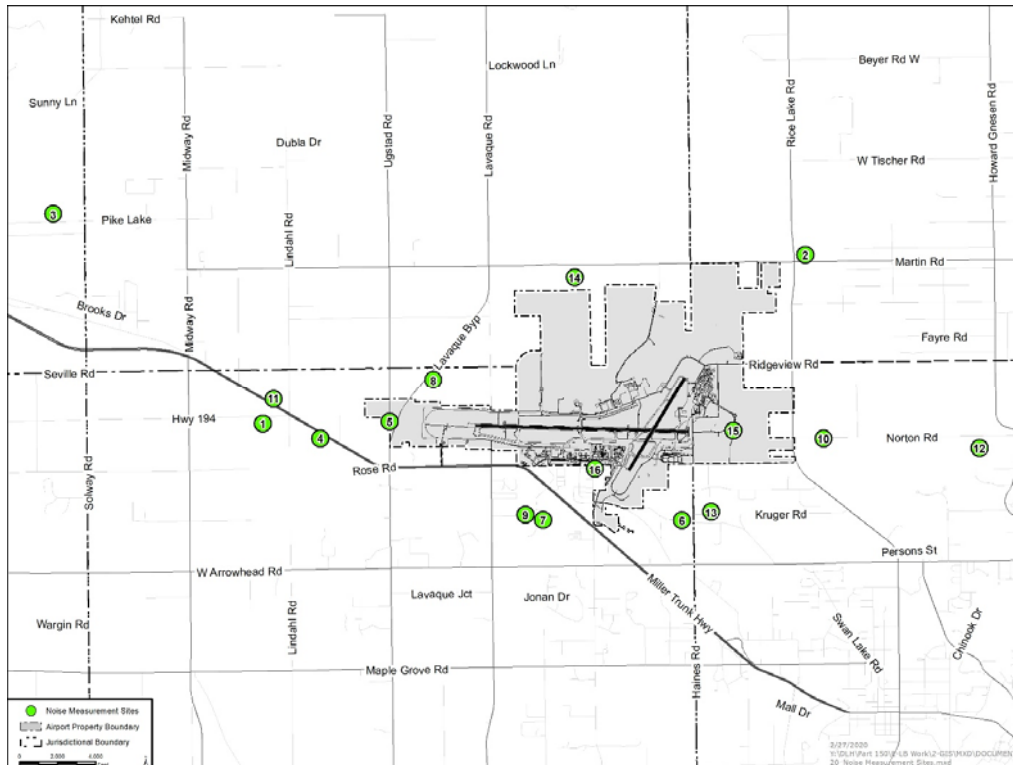
Noise Measurement Results

- Results are analyzed and summarized in report
- Report available at:
https://duluthairport.com/wpcontent/uploads/2020/03/DLH_Temporary_Noise_Measurement_Memo_reduced.pdf
- Noise monitoring data is not used to calibrate the noise model or to make a finding of significant impact



Short-Term Noise Monitoring Program

Noise Measurement Sites



Site	Location	City
1	5560 MN-194	Hermantown
2	4483 Martin Rd	Duluth
3	5963 Helm Rd	Duluth
4	5454 Miller Trunk Rd	Hermantown
5	Old Ugstad Rd	Duluth
6	4725 Swan Lake Rd	Hermantown
7	5006 Timber Hill Ct	Hermantown
8	4670 Lavaque Bypass Rd	Hermantown
9	5025 Silver Leaf St	Hermantown
10	3902 Norton Rd	Duluth
11	5545 Miller Trunk Hwy	Hermantown
12	2220 Norton Rd	Duluth
13	4509 Kruger Rd	Duluth
14	4926 Martin Rd	Duluth
15	Mustang Dr south of Deuce Ave	Duluth
16	4464 Ralston Dr	Duluth

Noise monitoring was conducted at all locations requested by community members

Noise Modeling Methodology

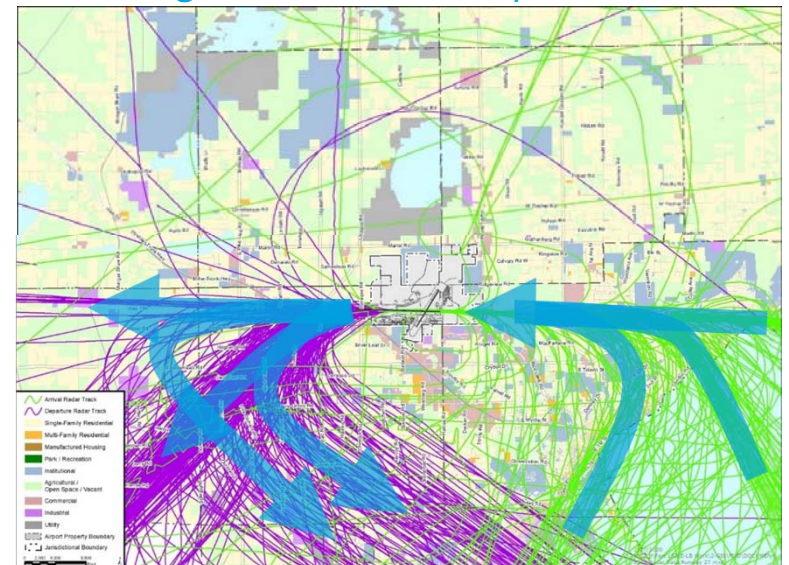
Model and Input Data

- FAA's Aviation Environmental Design Tool (AEDT) Version 3b
- DNL noise metric – required by FAA and Part 150
 - Reflects the cumulative exposure to sound over a 24-hour period
 - Noise level for the average day of the year based on annual aircraft operations
 - Nighttime (10 p.m. – 6:59 a.m.) operations have a 10x penalty
- Began data collection October 2019
 - Data represents previous 12 months (September 2018 – August 2019)
 - Noise Exposure Maps are dated based on the year of submission and five (5) years from the date of submission per Part 150
- Flight Tracks and Runway Utilization
 - FAA's National Offload Program (NOP) data (8 weeks)
 - Flight Tracks are representative tracks based on flight corridors identified in the NOP data
 - Coordination with MnANG 148th Fighter Wing
- Aircraft Fleet Mix , Annual Operations, Stage Length and Time of Day
 - FAA's Traffic Flow Management System (TFMS) – Fleet Mix
 - FAA's Air Traffic Data System (ATADS) – Operations
 - MnANG 148th Fighter Wing – Reported 2,458 Sorties (4,916 Annual Operations) and 199 flying days (24.7 Daily Operations)

Day-Night Average Sound Level (DNL)

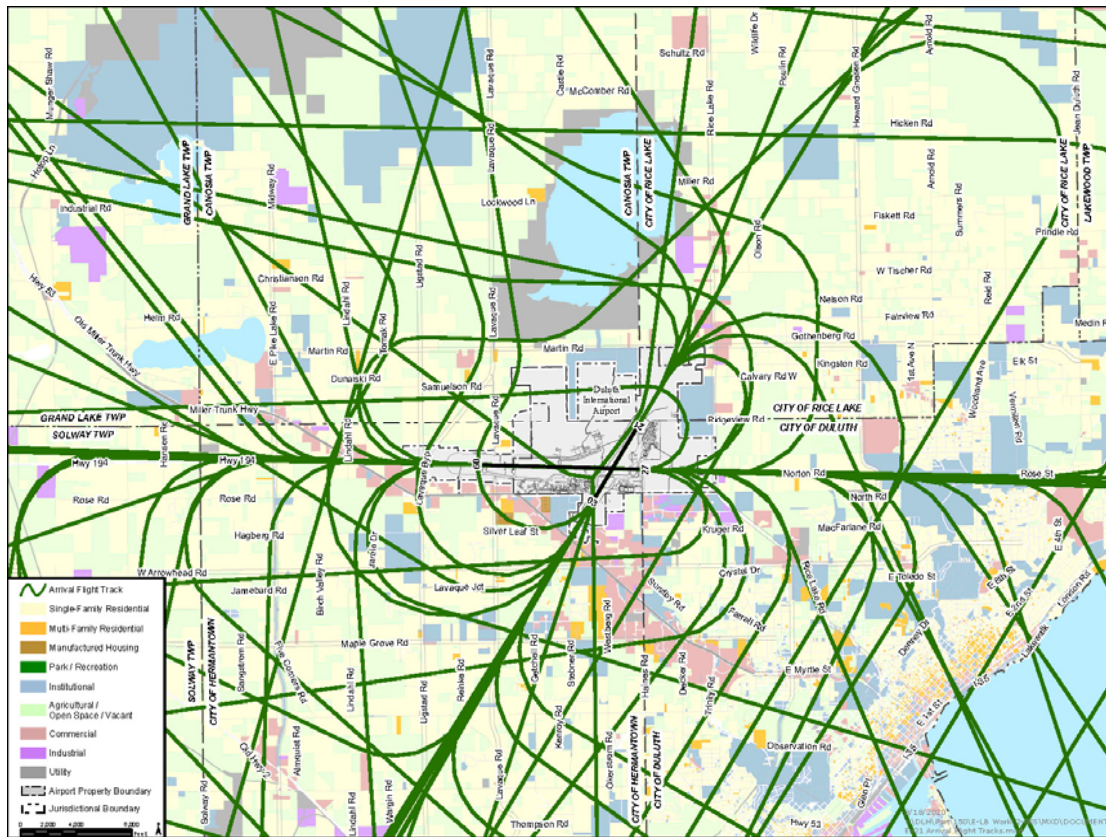


Flight Track Development



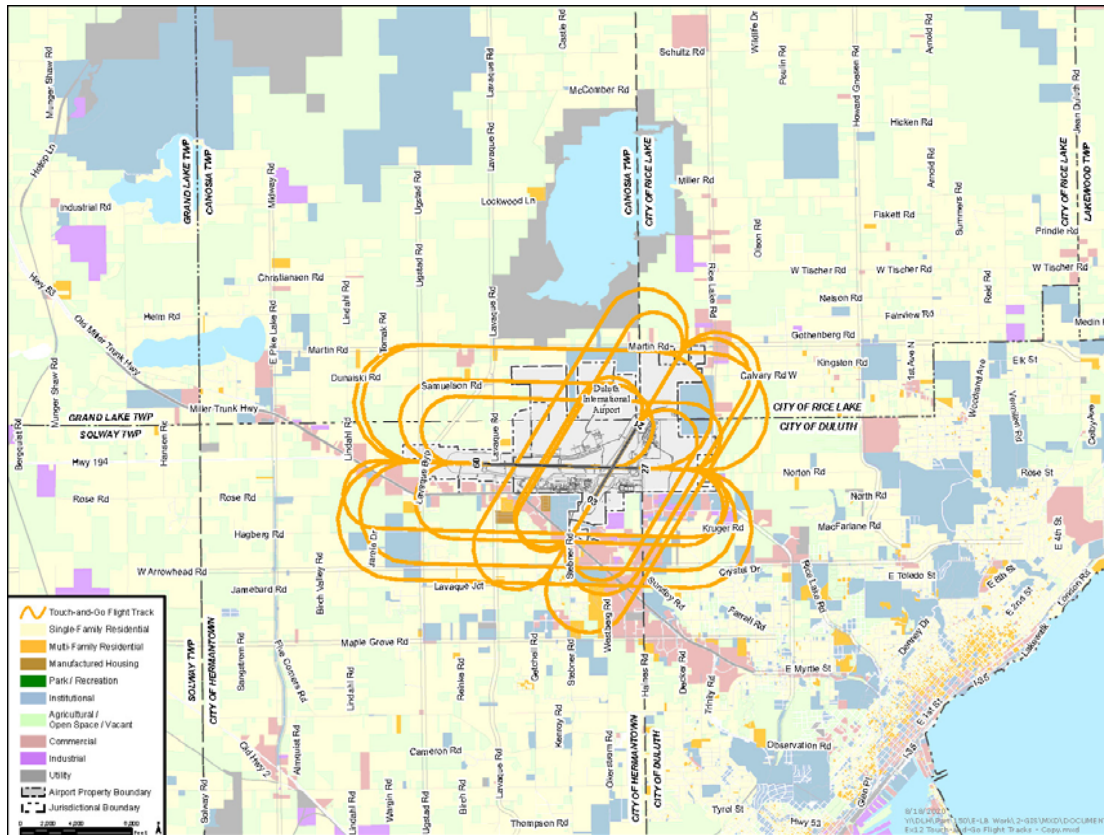
Noise Modeling Methodology

Civilian Arrival Flight Tracks



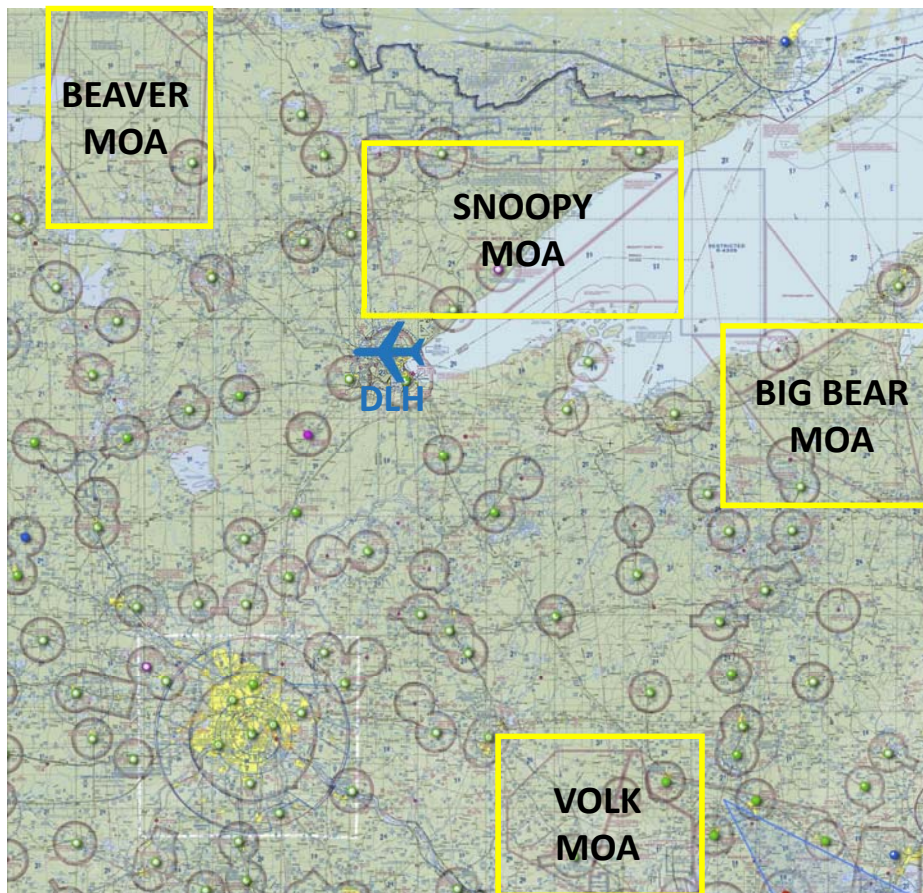
Noise Modeling Methodology

Civilian Touch-and-Go Flight Tracks



Noise Modeling Methodology

Military Operating Area (MOA)



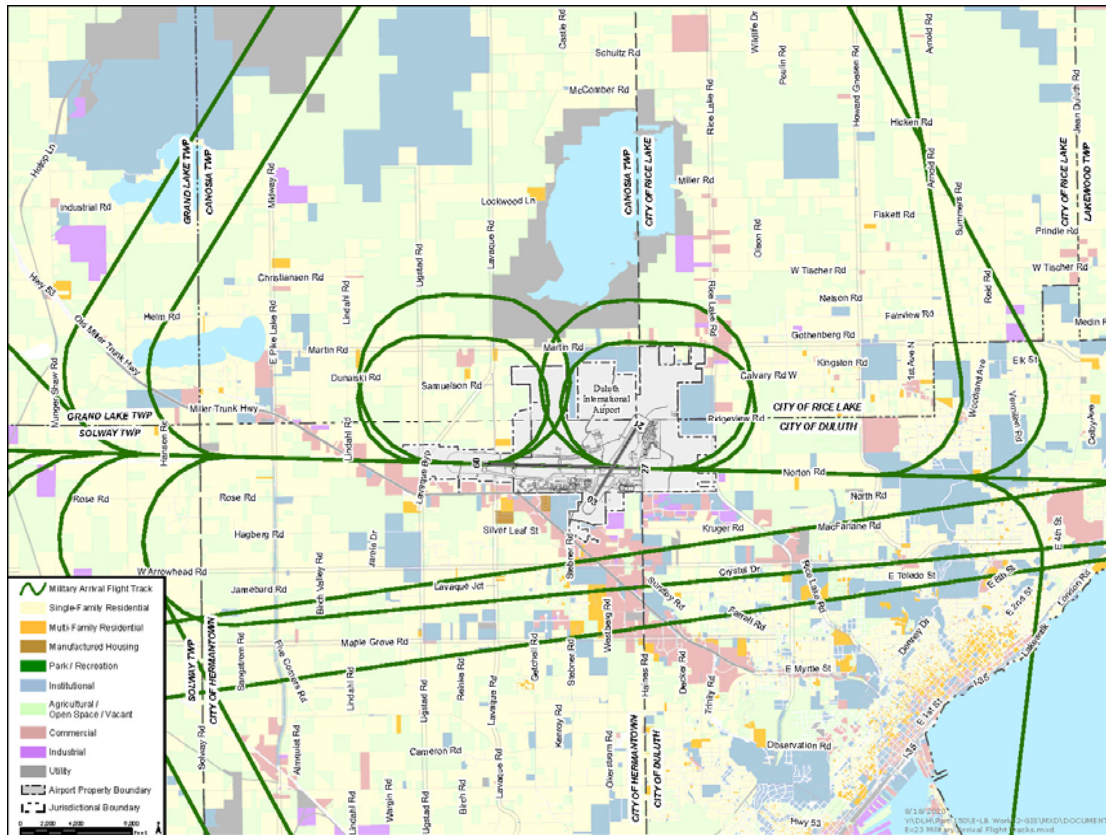
Distance from Duluth

- **BEAVER: 80 miles northwest of DLH**
 - Northwest of Grand Rapids, MN
- **SNOOPY: 20 miles northeast of DLH**
 - North of Two Harbors, MN
- **BIG BEAR: 100 miles east of DLH**
 - East of Ironwood, WI
- **VOLK: 150 miles southeast of DLH**
 - Southeast of Eau Claire, WI

Military activities outside of DLH controlled airspace are beyond the scope of Part 150 studies

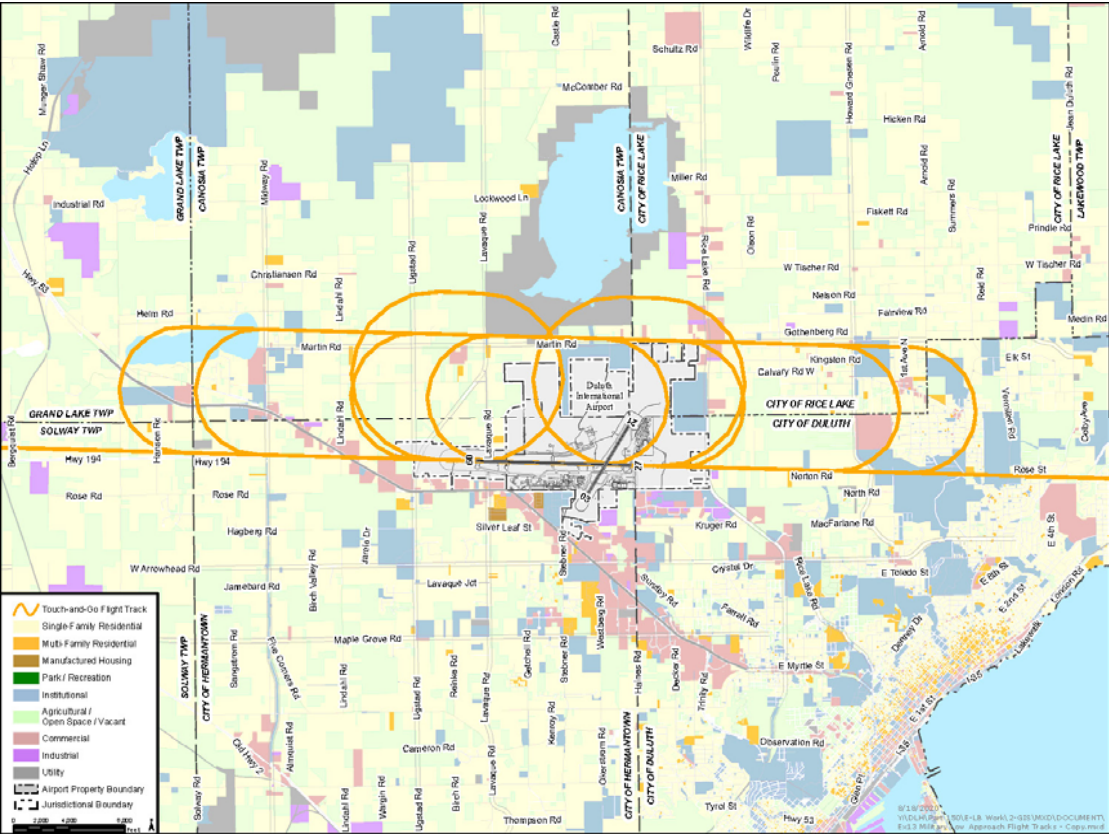
Noise Modeling Methodology

Military Arrival Flight Tracks



Noise Modeling Methodology

Military Low Approach Flight Tracks



Noise Modeling Methodology

Existing (2020) NEM - Operating Levels and Fleet Mix

Aircraft Type	2020 Annual Operations	2020 Average Annual Day			Percent of Total
		Day	Night	Total	
Large Jets	1,792	2.6	2.3	4.9	2.8%
Regional/Air Taxi Jets	5,767	11.6	4.2	15.8	8.9%
Commuter/Air Taxi Props	2,013	3.1	2.4	5.5	3.1%
General Aviation Jets	16,290	37.3	7.3	44.6	25.2%
General Aviation Props	28,925	61.4	17.8	79.3	44.8%
General Aviation Helicopter	468	0.6	0.7	1.3	0.7%
Civil Aircraft Subtotal	55,254	116.8	34.7	151.4	--
Military Aircraft	5,087	25.0	0.4	25.4	14.4%
Grand Total	60,341	141.8	35.1	176.8	100.0%

Note: Military operations are based on flying days in a year and not 365 days, MnANG 148th Fighter Wing reported 199 flying days, while the C130 used 250 flying days (federal holidays and weekends deemed as non-flying days). Totals may not equal sum total due to rounding.

- **Large Jets - Bombardier CRJ-900/700 (53%) and the Airbus 319-131 (30%)**
- **Regional/Air Taxi Jets - Bombardier Challenger 600/CRJ-200 (67%)**
- **Military Aircraft - Lockheed F-16 Fighting Falcon (97%)**

Noise Modeling Methodology

Existing (2020) NEM - Arrival Runway Use

Aircraft Category	Runway End					Total
	03	09	21	27	H1	
Daytime Arrivals						
Large Jets	--	66.7%	--	33.3%	--	100.0%
Regional/Air Taxi Jets	17.2%	28.1%	13.3%	41.4%	--	100.0%
Commuter/Air Taxi Props	27.5%	26.3%	9.7%	36.5%	--	100.0%
General Aviation Jets	17.2%	25.9%	14.1%	42.8%	--	100.0%
General Aviation Props	20.4%	30.3%	15.3%	34.0%	--	100.0%
General Aviation Helicopter	--	--	--	--	100.0%	100.0%
Military Aircraft	--	20.0%	--	80.0%	--	100.0%
Nighttime Arrivals						
Large Jets	11.3%	40.6%	1.9%	46.2%	--	100.0%
Regional/Air Taxi Jets	12.0%	32.0%	--	56.0%	--	100.0%
Commuter/Air Taxi Props	23.4%	30.8%	11.5%	34.3%	--	100.0%
General Aviation Jets	12.0%	32.0%	--	56.0%	--	100.0%
General Aviation Props	20.3%	29.8%	9.6%	40.4%	--	100.0%
General Aviation Helicopter	--	--	--	--	100.0%	100.0%
Military Aircraft	--	20.0%	--	80.0%	--	100.0%

Note: Totals may not equal sum total due to rounding.

- **Runway 09/27 is utilized for 69% of all arrivals**
- **75% of Jet aircraft arrive to Runway 09/27**
- **Military operations only use Runway 09/27**



Noise Modeling Methodology

Existing (2020) NEM - Departure Runway Use

Aircraft Category	Runway End					Total
	03	09	21	27	H1	
Daytime Departures						
Large Jets	9.2%	24.0%	3.3%	63.5%	--	100.0%
Regional/Air Taxi Jets	14.2%	35.2%	10.5%	40.1%	--	100.0%
Commuter/Air Taxi Props	17.6%	28.8%	11.4%	42.2%	--	100.0%
General Aviation Jets	14.9%	36.9%	11.0%	37.2%	--	100.0%
General Aviation Props	14.7%	36.5%	11.1%	37.7%	--	100.0%
General Aviation Helicopter	--	--	--	--	100.0%	100.0%
Military Aircraft	--	20.0%	--	80.0%	--	100.0%
Nighttime Departures						
Large Jets	--	40.0%	--	60.0%	--	100.0%
Regional/Air Taxi Jets	20.0%	33.3%	3.3%	43.3%	--	100.0%
Commuter/Air Taxi Props	28.0%	19.0%	6.9%	46.1%	--	100.0%
General Aviation Jets	20.0%	33.3%	3.3%	43.3%	--	100.0%
General Aviation Props	19.1%	25.4%	10.0%	45.6%	--	100.0%
General Aviation Helicopter	--	--	--	--	100.0%	100.0%
Military Aircraft	--	--	--	--	--	--

Note: Totals may not equal sum total due to rounding.

- **Runway 09/27 is utilized for 74% of all departures**
- **77% of Jet aircraft depart from Runway 09/27**
- **Military operations only use Runway 09/27**



Noise Modeling Methodology

Existing (2020) NEM - Run-up Activity

Run-Up Location	Aircraft AEDT ANP ID	Annual Runups			Daily Total	Duration (minutes)	Heading (degrees)	Thrust / Setting
		Daytime	Nighttime	Annual Total				
Hush House	F16PW0	87.4	--	87.4	0.44	50.0	211	65%
Hush House	F16PW0	87.4	--	87.4	0.44	7.6	211	78%
Hush House	F16PW0	87.4	--	87.4	0.44	7.6	211	82%
Hush House	F16PW0	87.4	--	87.4	0.44	7.6	211	89%
Hush House	F16PW0	87.4	--	87.4	0.44	2.1	211	AB
Hangar	F16PW0	4.6	--	4.6	0.02	30.0	180	70%
Flight Line	F16PW0	182.0	--	182.0	0.91	10.0	270	70%
Departure Arm Pad	F16PW0	2,458.0	--	2,458.0	12.35	30.0	90	67%
Arrival De-Arm Pad	F16PW0	2,379.3	78.7	2,458.0	12.35	10.0	90	67%
AAR	A319-131	38.3	--	38.3	0.10	30.0	270	80%
AAR	A320-232	13.7	--	13.7	0.04	30.0	270	80%

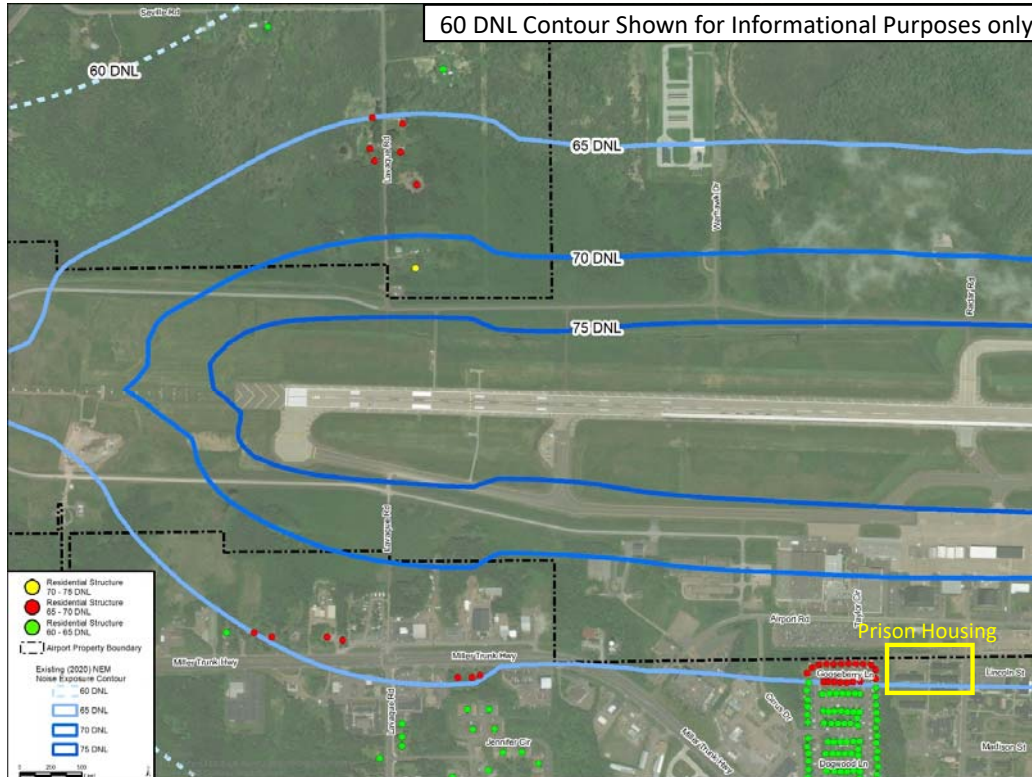
Note: Daily military run-up operations are based on flying days in a year and not 365 days, MnANG 148th Fighter Wing reported 199 flying days.

- Run-ups conducted at five (5) locations
- Run-up activity at hush house non-attenuated in the model
- AAR maintenance facility - Airbus 319/320



Existing (2020) Baseline Noise Exposure Map (NEM) Contours

Existing (2020) Baseline NEM Contours – Impacted Homes



Category	Type	DNL 65-70 dB	DNL 70-75 dB	DNL 75+ dB
Housing	Single-Family Residential	13	1	0
	Multi-Family Residential	0	0	0
	Manufactured Housing	19	0	0
	Total Housing Units	32	1	0
Population	Single-Family Residential	25	2	0
	Multi-Family Residential	0	0	0
	Manufactured Housing	36	0	0
	Total Population	60	2	0

Note: Population estimates are based on the United States Census Bureau 2017 American Community Survey (ACS) average household size per number of housing units per census block group. Prison Housing statistics are not included in impacted housing or population counts.



Future (2025) Baseline NEM Contours

Future (2025) NEM Input Data

- No airfield changes
- No airspace changes
- **Future (2025) Baseline modeling methodology**
 - Master Plan Aviation Forecast
 - 63,560 forecasted operations at DLH by 2025
 - Boeing 717-200 added for new Delta Airlines service
 - Military arm and de-arm run up activity increase (+190.0 Annually/0.95 Daily)
 - AAR maintenance facility likely to be used for similar purpose
 - No change to runway utilization, track utilization, stage length distribution and time of day utilization
- **Lockheed Martin F-35 Lightning II**
 - Part 150 stipulates the Future (2025) fleet mix is designed from an FAA approved aviation forecast
 - Potential deployment after Future (2025) Baseline
 - If deployed to DLH the Air National Guard would conduct an Environmental Analysis
 - Airport is currently conducting additional analysis using Department of Defense modeling software to compare noise generated from single event existing F-16 and potential F-35 arrival and departure operations at DLH



Future (2025) Baseline NEM Contours

Future (2025) Baseline Operating Levels and Fleet Mix

Aircraft Type	2025 Annual Operations	2025 Average Annual Day			Percent of Total
		Day	Night	Total	
Large Jets	3,092	3.6	4.9	8.5	4.2%
Regional/Air Taxi Jets	5,746	11.6	4.2	15.7	7.8%
Commuter/Air Taxi Props	2,006	3.1	2.4	5.5	2.7%
General Aviation Jets	18,893	43.2	8.5	51.8	25.5%
General Aviation Props	33,548	71.2	20.7	91.9	45.3%
General Aviation Helicopter	575	0.7	0.8	1.6	0.8%
Civil Aircraft Subtotal	63,859	133.5	41.4	175.0	--
Military Aircraft	5,650	27.6	0.4	28.0	13.8%
Grand Total	69,509	161.1	41.8	203.0	100.0%

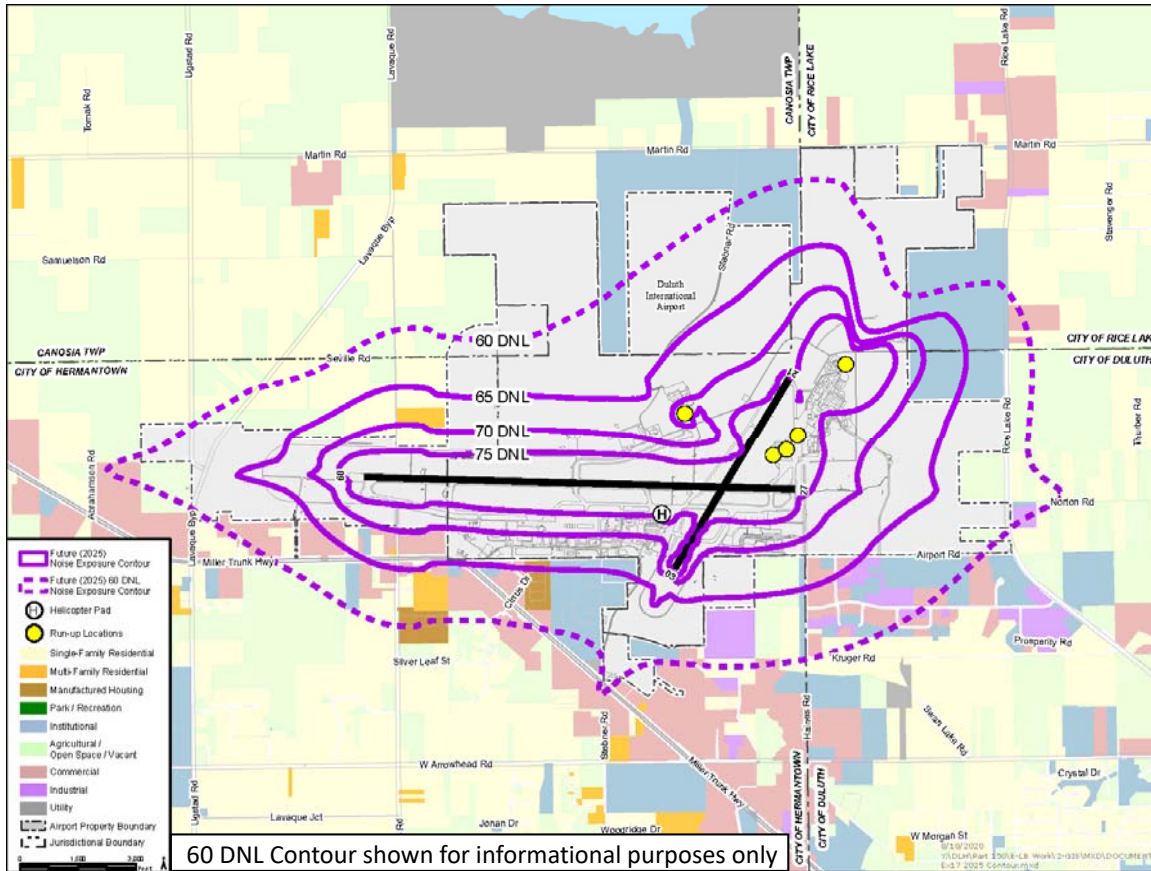
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- **Large Jets - Bombardier CRJ-900/700 (63%), Airbus 319-131 (23%)**
- **Regional/Air Taxi Jets - Bombardier Challenger 600/CRJ-200 (67%)**
- **Military Aircraft - Lockheed F-16 Fighting Falcon (94%)**
- **Increase of 9,168 annual operations (26.2 daily operations)**



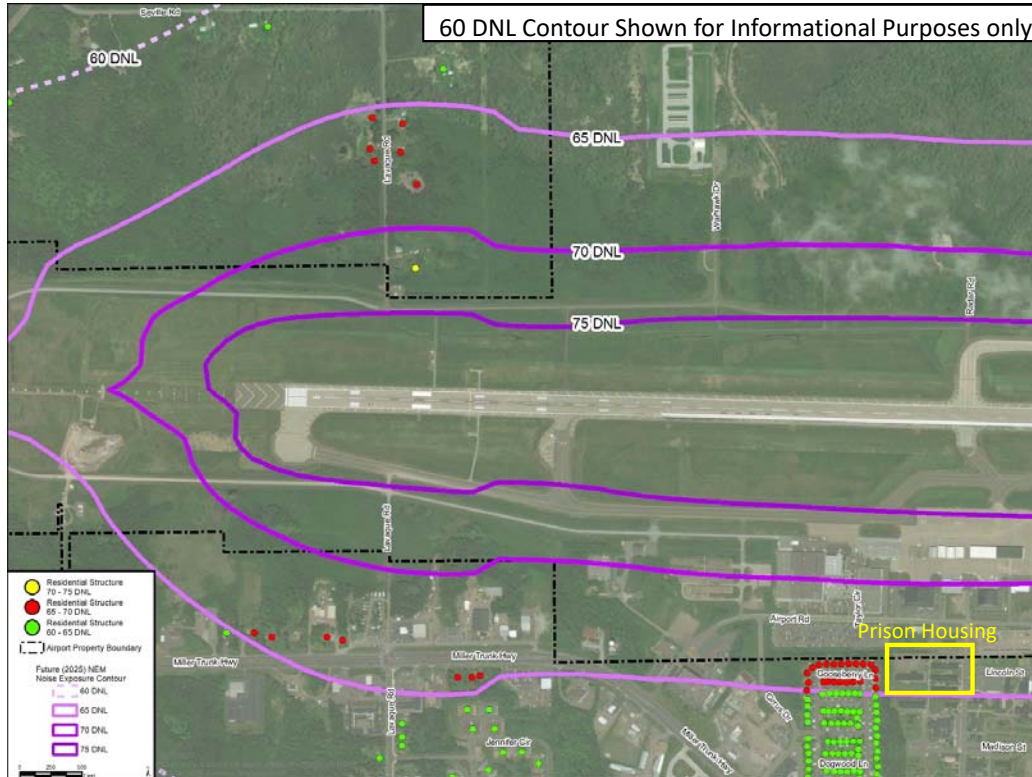
Future (2025) Baseline NEM Contours

Future (2025) Baseline NEM Contours



Future (2025) Baseline NEM Contours

Future (2025) Baseline NEM Contours – Impacted Homes

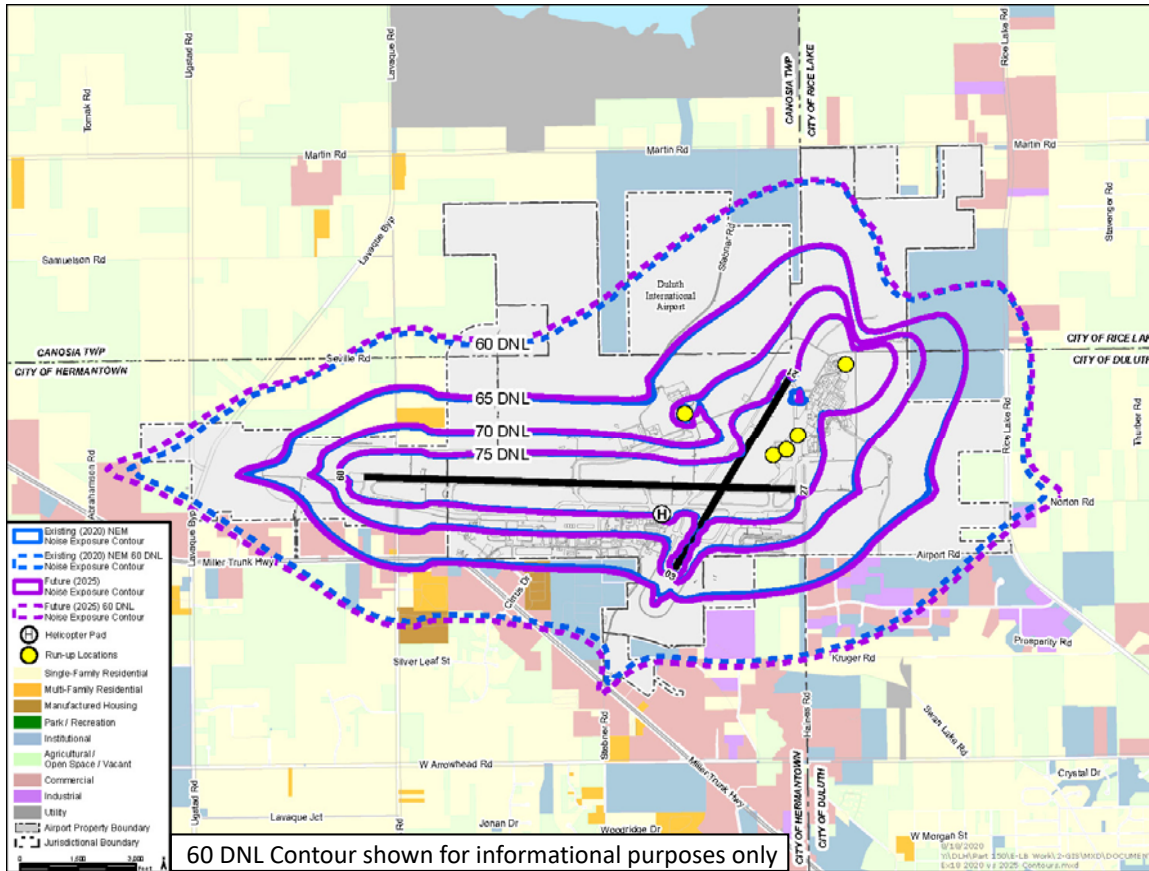


Category	Type	DNL 65-70 dB	DNL 70-75 dB	DNL 75+ dB
Housing	Single-Family Residential	13	1	0
	Multi-Family Residential	0	0	0
	Manufactured Housing	22	0	0
	Total Housing Units	35	1	0
Population	Single-Family Residential	25	2	0
	Multi-Family Residential	0	0	0
	Manufactured Housing	41	0	0
	Total Population	66	2	0

Note: Population estimates are based on the United States Census Bureau 2017 American Community Survey (ACS) average household size per number of housing units per census block group. Prison Housing statistics are not included in impacted housing or population counts.

Future (2025) Baseline NEM Contours

Existing (2020) Baseline NEM vs. Future (2025) Baseline NEM



Elements of a Noise Compatibility Program

Noise Abatement Alternatives

- Purpose: To *reduce* noise levels in surrounding communities
- Types of noise abatement alternatives
 - Flight Location (e.g., moving arrival and departure flight corridors)
 - Runway Use Program (e.g., how often runway ends are used)
 - Ground Activity Restrictions (e.g., maintenance run-up location/times)
 - Facility Development (e.g., runway extension, noise barriers)
 - Flight Restrictions (e.g., mandatory curfews/restrictions – would require a Part 161 Study)

Land Use Mitigation Alternatives

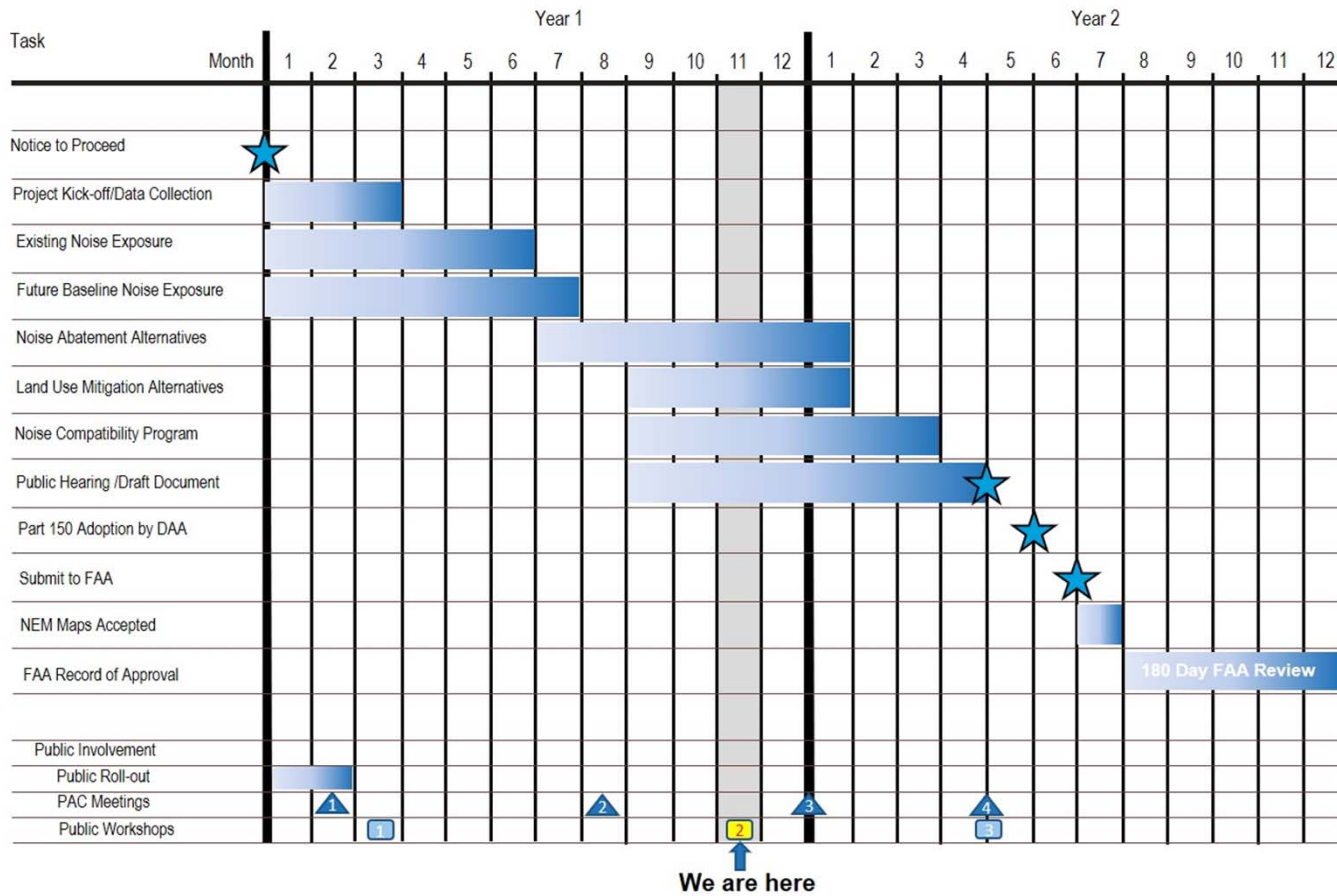
- Purpose: To *mitigate* noise levels in surrounding communities
- Types of land use mitigation alternatives
 - Corrective (e.g., sound insulation, land acquisition)
 - Preventative (e.g., re-zoning program, land use management overlay/plan)

Program Management Alternatives

- Purpose: To *recommend* community outreach programs
- Types of program management alternatives
 - Community roundtable/noise abatement committee
 - Noise complaint website or telephone hotline
 - Regular update of NEM and review of NCP



Part 150 Study Schedule



Next Steps

- **Next Public Workshop – Late Fall 2020**
- **Compile suggested noise abatement and land use mitigation alternatives**
 - Input from FAA, Public Advisory Committee, airport staff and public
- **Begin evaluation of noise abatement alternatives**
 - Determine feasibility of recommended alternatives
 - Determine safety issues related to recommended alternatives
 - Determine operational impacts of recommended alternatives
 - Perform a Noise Impact Assessment of recommended alternatives if necessary
- **Begin evaluation of land use mitigation alternatives**
 - Determine feasibility of recommended alternatives
 - Coordination with local municipalities
 - Develop overlay district and land use management plan
- **Prepare draft documentation**
- **Comments and questions related to the Public Information Workshop may be submitted for a period of 30 days online at: <https://DuluthAirport.com/noise-study/> or emailed to DAA@DuluthAirport.com**