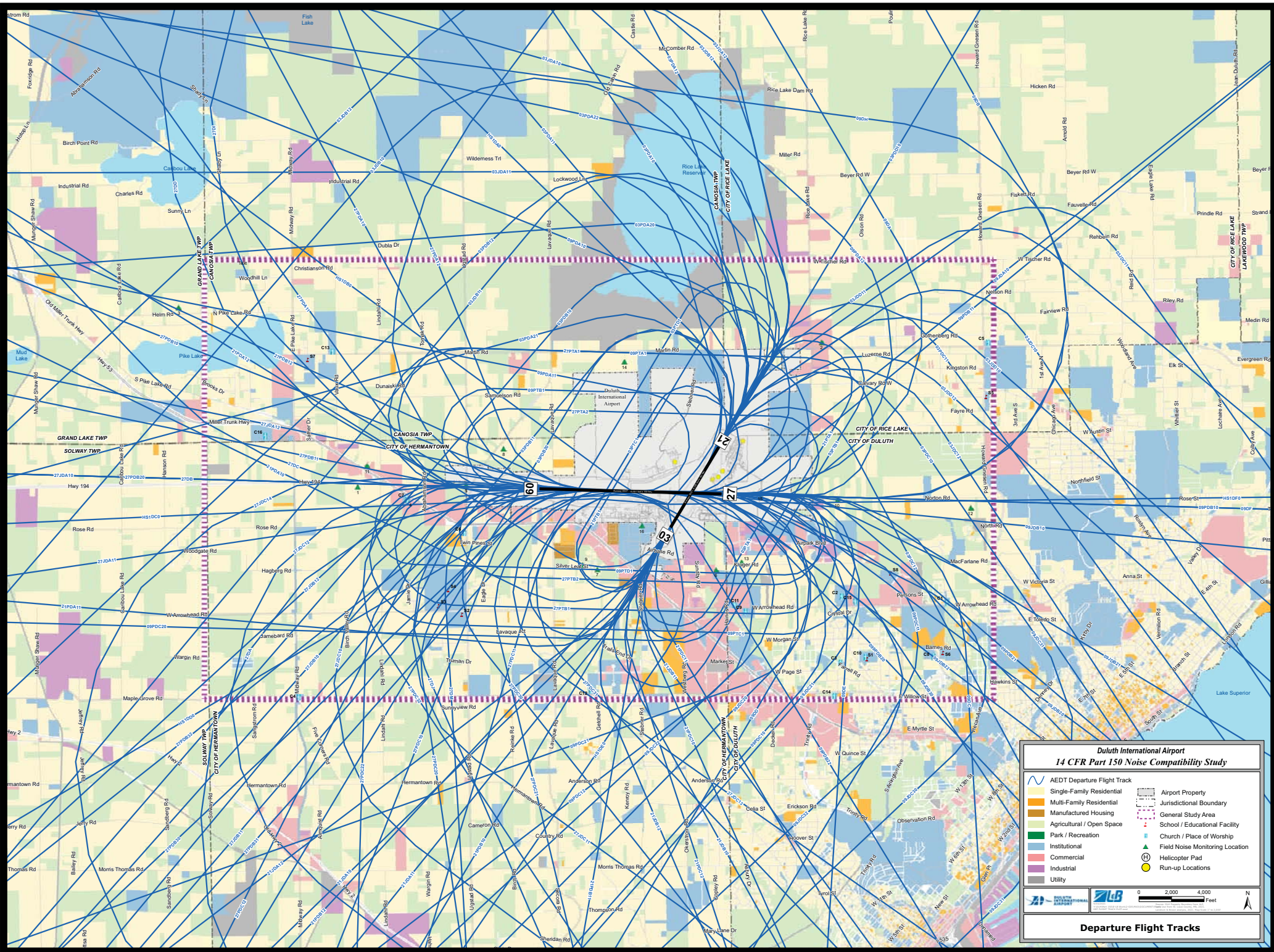


**Duluth International Airport**  
**14 CFR Part 150 Noise Compatibility Study**

	AEDT Arrival Flight Track		Airport Property
	Single-Family Residential		Jurisdictional Boundary
	Multi-Family Residential		General Study Area
	Manufactured Housing		School / Educational Facility
	Agricultural / Open Space		Church / Place of Worship
	Park / Recreation		Field Noise Monitoring Location
	Institutional		Helicopter Pad
	Commercial		Run-up Locations
	Industrial		
	Utility		

**Arrival Flight Tracks**



**Duluth International Airport**  
**14 CFR Part 150 Noise Compatibility Study**

	AEDT Departure Flight Track		Airport Property
	Single-Family Residential		Jurisdictional Boundary
	Multi-Family Residential		General Study Area
	Manufactured Housing		School / Educational Facility
	Agricultural / Open Space		Church / Place of Worship
	Park / Recreation		Field Noise Monitoring Location
	Institutional		Helicopter Pad
	Commercial		Run-up Locations
	Industrial		
	Utility		

**Departure Flight Tracks**



# *Existing (2020) & Future (2026)*

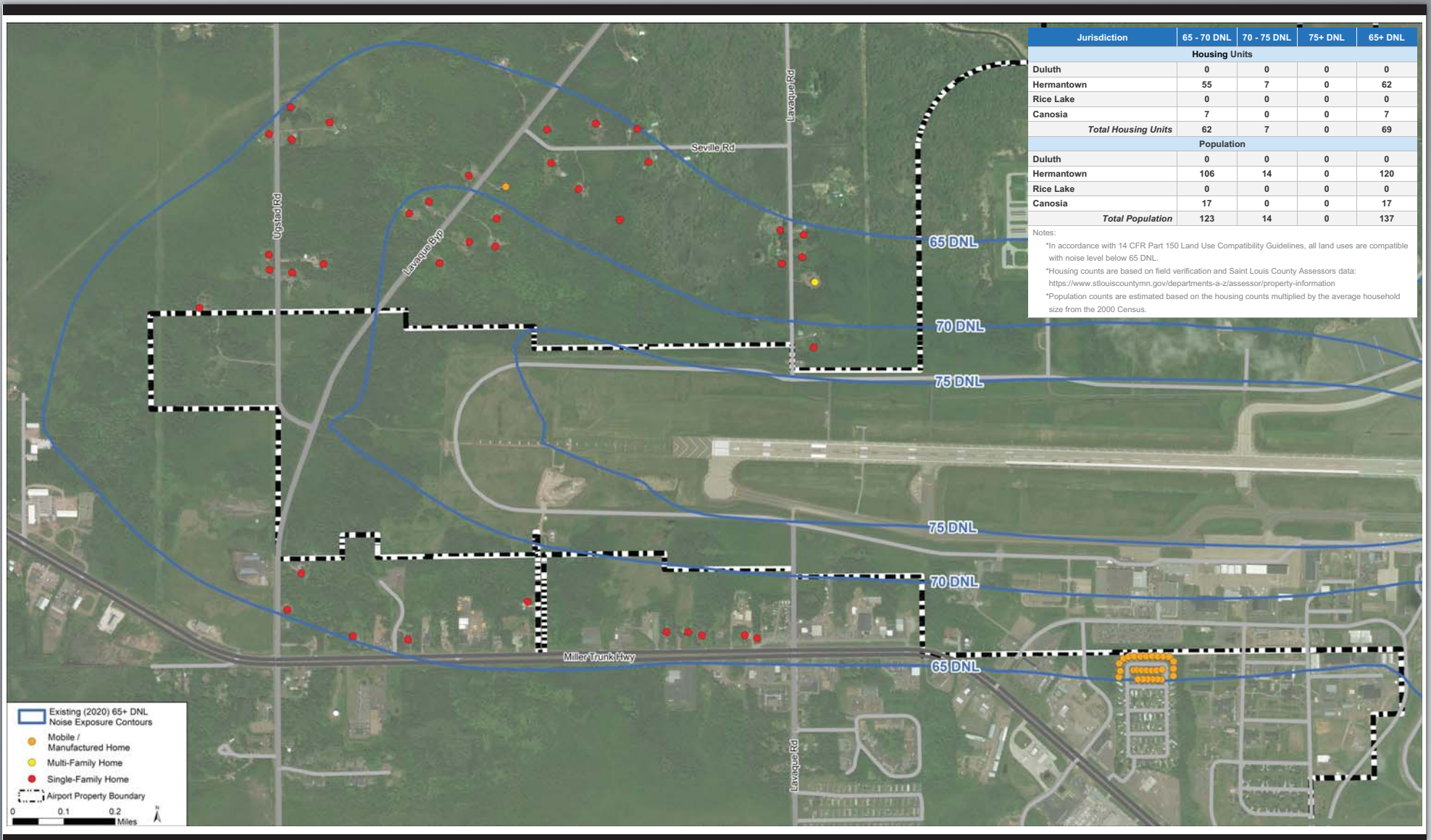
## *Noise Exposure Map (NEM) Operating Levels and Fleet Mix*

Aircraft Type	2020 Annual Operations	2020 Average Annual Day			Percent of Total
		Day	Night	Total	
Large Jets	1,792	2.5	2.3	4.9	2.9%
Regional/Air Taxi Jets	5,767	11.6	4.2	15.8	9.6%
Commuter/Air Taxi Props	2,013	3.1	2.3	5.5	3.3%
General Aviation Jets	16,290	37.3	7.3	44.6	27.0%
General Aviation Props	28,925	61.4	17.8	79.3	48.0%
General Aviation Helicopter	468	0.6	0.7	1.3	0.8%
Civil Aircraft Subtotal	55,254	116.8	34.7	151.4	--
Military Aircraft	5,087	13.7	0.2	13.9	8.4%
Grand Total	60,341	130.5	34.8	165.3	100.0%

Aircraft Type	2026 Annual Operations	2026 Average Annual Day			Percent of Total
		Day	Night	Total	
Large Jets	3,092	3.6	4.8	8.5	4.4%
Regional/Air Taxi Jets	5,746	11.6	4.2	15.7	8.2%
Commuter/Air Taxi Props	2,006	3.1	2.4	5.5	2.9%
General Aviation Jets	18,893	43.3	8.5	51.8	27.2%
General Aviation Props	33,548	71.3	20.6	91.9	48.2%
General Aviation Helicopter	575	0.8	0.8	1.6	0.8%
Civil Aircraft Subtotal	63,859	133.6	41.3	175.0	--
Military Aircraft	5,650	15.2	0.2	15.5	8.1%
Grand Total	69,509	148.9	41.6	190.4	100.0%

Note: Military operations are based on 365 day calendar year not annual flying days.  
Totals may not equal sum due to rounding

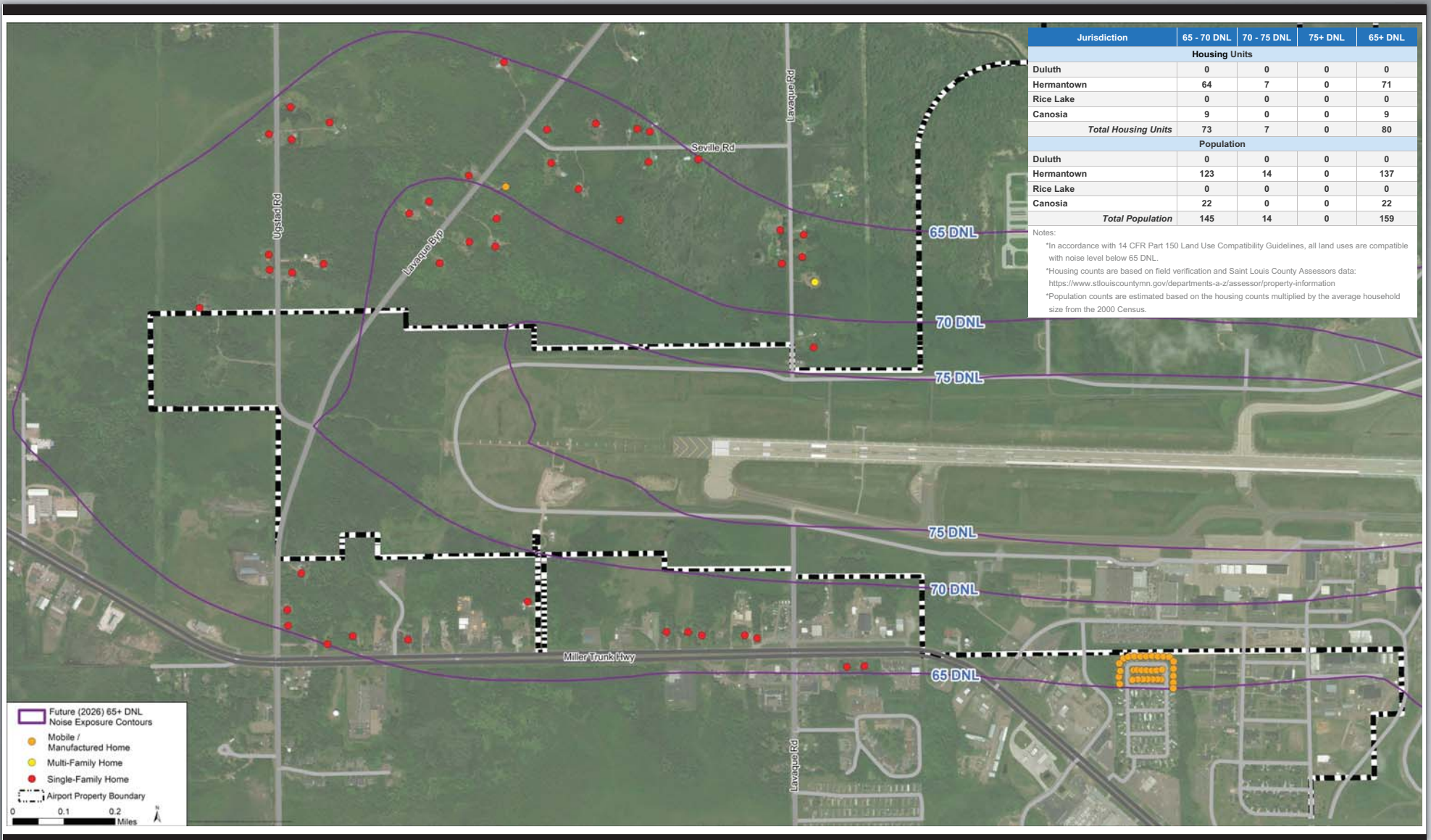
# Existing (2020) Noise Exposure Contour Housing & Population Impacts



Jurisdiction	65 - 70 DNL	70 - 75 DNL	75+ DNL	65+ DNL
<b>Housing Units</b>				
Duluth	0	0	0	0
Hermantown	55	7	0	62
Rice Lake	0	0	0	0
Canosia	7	0	0	7
<b>Total Housing Units</b>	<b>62</b>	<b>7</b>	<b>0</b>	<b>69</b>
<b>Population</b>				
Duluth	0	0	0	0
Hermantown	106	14	0	120
Rice Lake	0	0	0	0
Canosia	17	0	0	17
<b>Total Population</b>	<b>123</b>	<b>14</b>	<b>0</b>	<b>137</b>

Notes:  
 \*In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise level below 65 DNL.  
 \*Housing counts are based on field verification and Saint Louis County Assessors data: <https://www.stlouiscountymn.gov/departments-a-z/assessor/property-information>  
 \*Population counts are estimated based on the housing counts multiplied by the average household size from the 2000 Census.

# Future (2026) Noise Exposure Contour Housing & Population Impacts



Jurisdiction	65 - 70 DNL	70 - 75 DNL	75+ DNL	65+ DNL
<b>Housing Units</b>				
Duluth	0	0	0	0
Hermantown	64	7	0	71
Rice Lake	0	0	0	0
Canosia	9	0	0	9
<b>Total Housing Units</b>	<b>73</b>	<b>7</b>	<b>0</b>	<b>80</b>
<b>Population</b>				
Duluth	0	0	0	0
Hermantown	123	14	0	137
Rice Lake	0	0	0	0
Canosia	22	0	0	22
<b>Total Population</b>	<b>145</b>	<b>14</b>	<b>0</b>	<b>159</b>

Notes:  
 \*In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise level below 65 DNL.  
 \*Housing counts are based on field verification and Saint Louis County Assessors data: <https://www.stlouiscountymn.gov/departments-a-z/assessor/property-information>  
 \*Population counts are estimated based on the housing counts multiplied by the average household size from the 2000 Census.

▭ Future (2026) 65+ DNL Noise Exposure Contours  
● Mobile / Manufactured Home  
● Multi-Family Home  
● Single-Family Home  
 Airport Property Boundary

0 0.1 0.2 Miles

# How Noise Contours are Generated

## User Inputs

### Inputs

- Airport Information
- Aircraft Flight Tracks
- Aircraft Fleet
- Number of Operations
- Runway Utilization
- Time of Day
- Aircraft Climb Profiles
- Departure Trip Length
- Meteorological Data
- Topographic Data

### Source

- ▶ Airport Layout Plan
- ▶ FAA Radar Data, Minnesota Air National Guard (MnANG)
- ▶ Traffic Flow Management System (TFMS), MnANG
- ▶ Tower, TFMS, Air Traffic Activity Data System (ATADS)
- ▶ Wind Data, Radar Data
- ▶ Radar Data, TFMS
- ▶ AEDT, Radar Data, MnANG
- ▶ TFMS
- ▶ Climatic Data, AEDT
- ▶ Airport Layout Plan, U.S. Geological Survey



## Aviation Environmental Design Tool (AEDT)

### AEDT-Provided Information

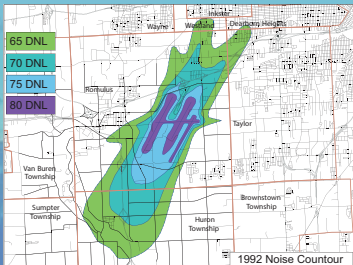
- Aircraft Noise Levels
- Aircraft Performance Data



### Types of Aircraft Noise Considered within AEDT

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

## Output

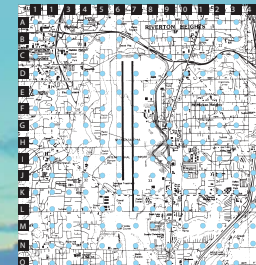


Noise Contours

SUMMARY OF GRID DATA - Comparative DNL and SEL Data  
With and Without NADP Close-In and Distant Procedures  
Chandler-Norfolk Kentucky International Airport  
(1 of 9)

Seq	Coordinate Points		DNLs and Changes				SELS and Changes						
	X	Y	Point	Standard Class	Change	Distant	Change	Standard Class	Change	Distant	Change		
1	-15000	24000	A08	40.1	48.5	-0.6	47.4	-1.7	96.4	94.2	-2.2	92.4	-4.0
2	-12000	24000	A09	51.6	50.8	-0.8	49.5	-2.1	97.6	95.1	-2.4	93.6	-3.9
3	-9000	24000	A10	51.8	50.6	-1.2	49.7	-2.1	102.5	97.1	-5.4	97.2	-5.3
4	-6000	24000	A11	54.0	53.8	-0.2	53.7	-0.3	95.7	90.7	-5.0	91.5	-4.2
5	-3000	24000	A12	59.2	59.1	-0.1	59.1	-0.1	88.7	88.7	0.0	88.7	0.0
6	0	24000	A13	52.9	52.7	-0.2	52.4	-0.5	93.1	91.2	-1.9	88.8	-4.3
7	3000	24000	A14	58.9	58.6	-0.3	58.4	-0.5	98.4	96.0	-2.4	94.7	-3.7
8	6000	24000	A15	50.8	50.1	-0.7	49.3	-1.5	95.0	93.1	-1.9	90.8	-4.2
9	-15000	21000	B08	47.6	47.1	-0.5	46.0	-1.6	93.6	91.6	-2.0	89.3	-4.3
10	-12000	21000	B09	51.5	50.7	-0.8	49.5	-2.0	98.6	95.9	-2.7	94.7	-3.9
11	-9000	21000	B10	53.9	52.2	-1.7	52.0	-1.9	104.3	97.3	-7.0	103.1	-1.2
12	-6000	21000	B11	54.9	54.2	-0.7	54.3	-0.6	101.6	94.9	-6.7	100.9	-0.7
13	-3000	21000	B12	58.7	58.6	-0.1	58.6	-0.1	93.3	88.1	-5.2	92.3	-1.0
14	0	21000	B13	53.1	52.6	-0.5	52.5	-0.6	93.5	91.0	-2.5	89.3	-4.2
15	3000	21000	B14	59.2	58.8	-0.4	58.6	-0.6	99.9	95.9	-4.0	95.9	-4.0
16	6000	21000	B15	50.7	50.0	-0.7	49.2	-1.5	94.6	92.3	-2.3	90.3	-4.3
17	-15000	18000	C08	47.2	46.4	-0.8	45.9	-1.3	90.9	88.5	-2.4	85.5	-4.3
18	-12000	18000	C09	51.5	50.4	-1.1	49.7	-1.8	98.1	95.3	-2.8	93.8	-4.3
19	-9000	18000	C10	54.7	52.8	-1.9	52.5	-2.2	101.6	97.6	-4.0	96.8	-1.8
20	-6000	18000	C11	57.2	55.4	-1.8	56.3	-0.9	106.8	98.6	-8.2	100.0	-6.8

Tabular Reports



Grid Point Analysis

# Noise Exposure Map (NEM) Modeling Methodology

## ● Model and Noise Metric

- FAA's Aviation Environmental Design Tool (AEDT) Version 3b
- Day-Night Average Sound Level (DNL) - 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

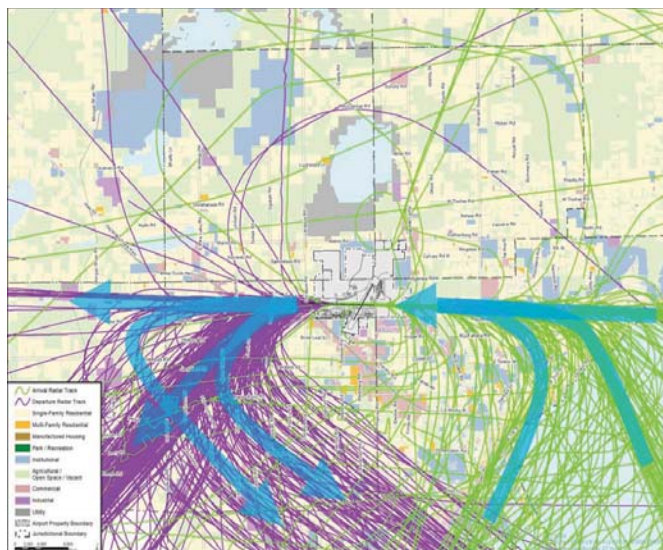


## ● Data Collection

- Began data collection October 2019
  - Data represents previous 12 months (September 2018 - August 2019)
  - NEMs are dated based on the year of submission and five (5) years from the date of submission per Part 150

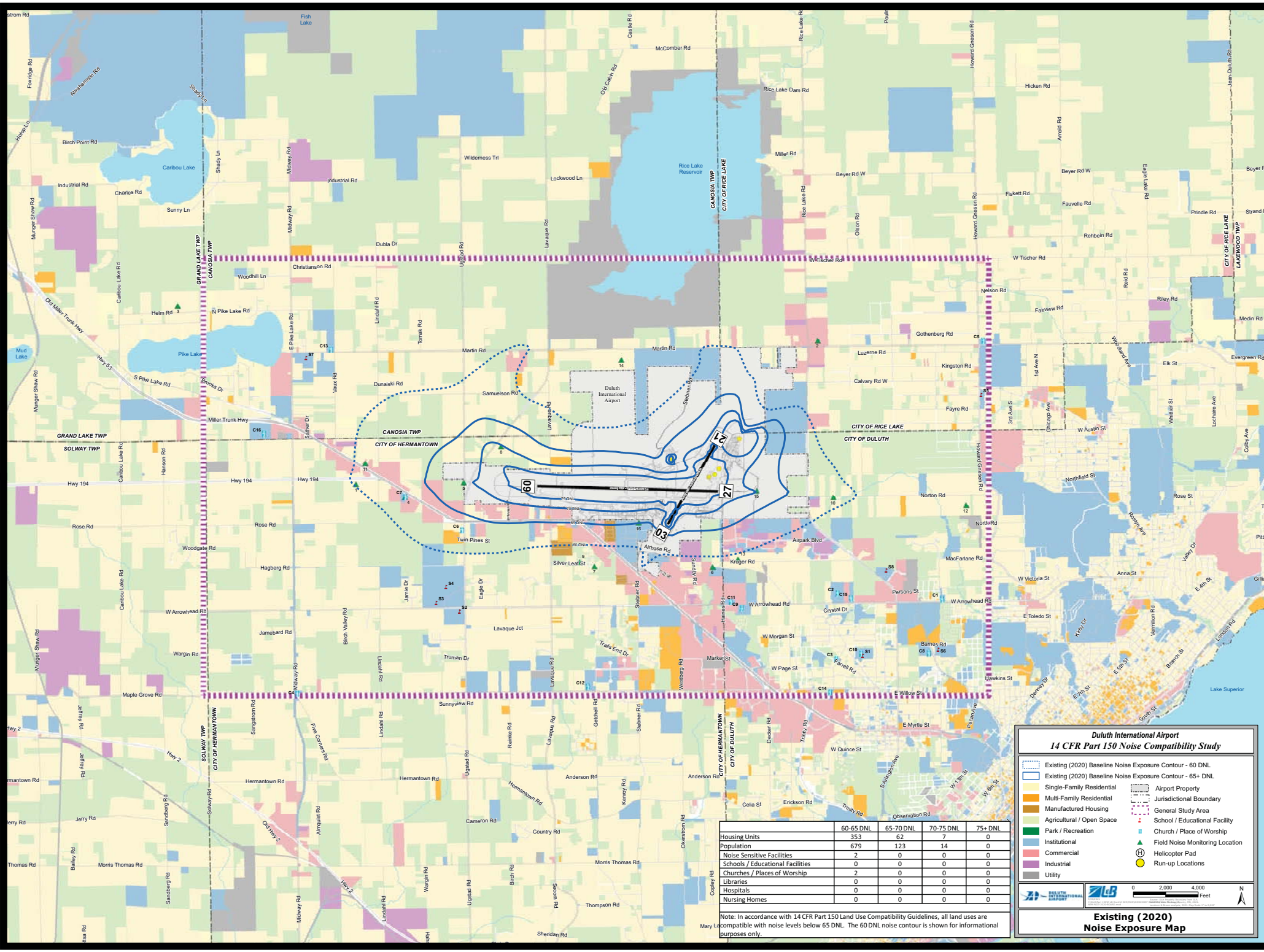
## ● Flight Tracks

- FAA's National Offload Program (NOP) radar data (8 weeks)
- Flight Tracks are representative tracks based on flight corridors identified in the NOP data
- Coordination with MnANG 148th Fighter Wing to develop military arrival, departure and low approach flight tracks



## ● Fleet Mix and Average Annual Day (AAD) Operations

- FAA's Traffic Flow Management System (TFMS) - Civilian Fleet Mix
- FAA's Air Traffic Data System (ATADS) - Civilian Operations
- MnANG 148th - Military Operations, Flight Tracks & Profiles
- DLH Master Plan Activity Forecast - Future Operations & Fleet Mix



	60-65 DNL	65-70 DNL	70-75 DNL	75+ DNL
Housing Units	353	62	7	0
Population	679	123	14	0
Noise Sensitive Facilities	2	0	0	0
Schools / Educational Facilities	0	0	0	0
Churches / Places of Worship	2	0	0	0
Libraries	0	0	0	0
Hospitals	0	0	0	0
Nursing Homes	0	0	0	0

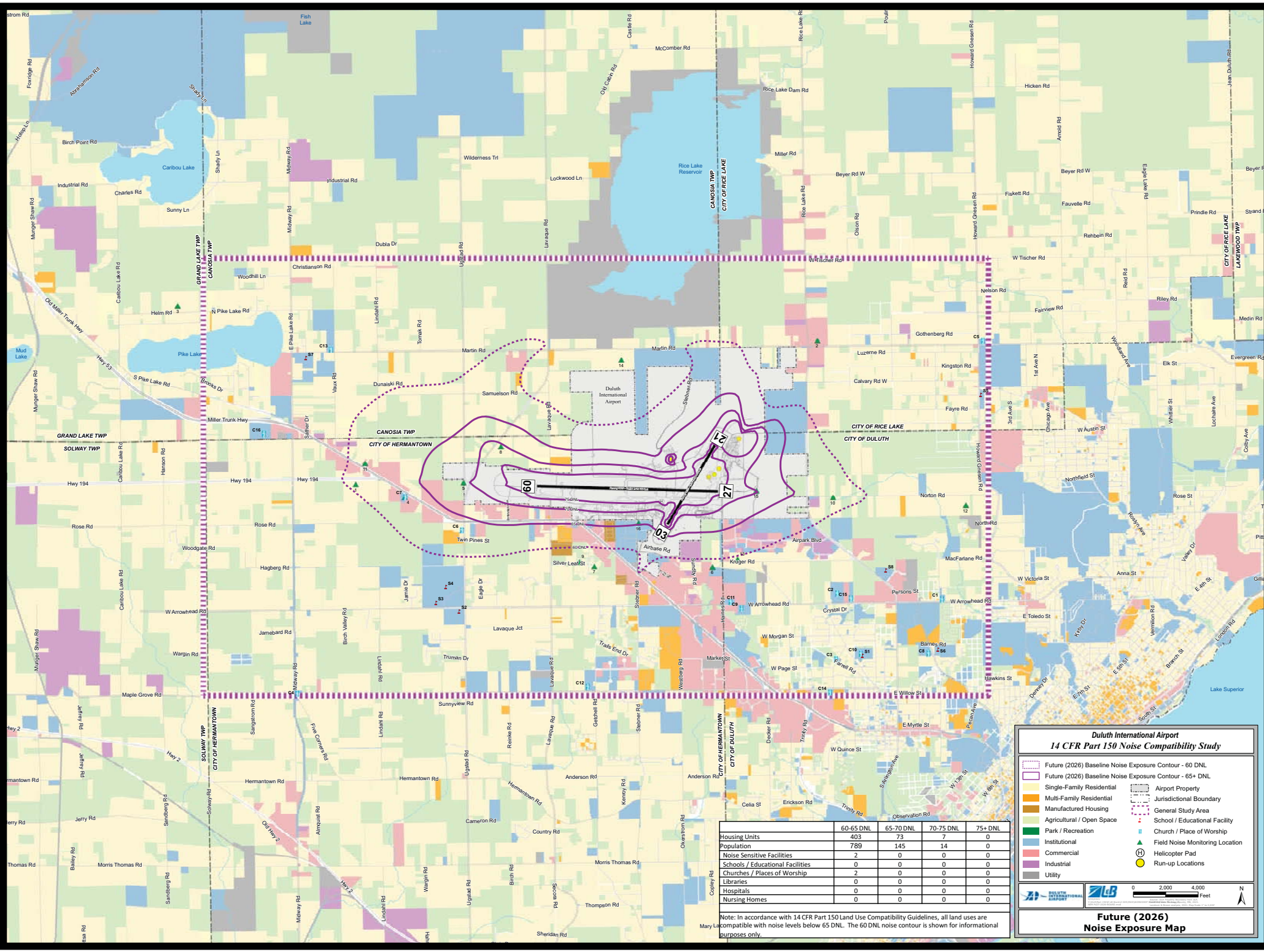
**Duluth International Airport**  
**14 CFR Part 150 Noise Compatibility Study**

- Existing (2020) Baseline Noise Exposure Contour - 60 DNL
- Existing (2020) Baseline Noise Exposure Contour - 65+ DNL
- Single-Family Residential
- Multi-Family Residential
- Manufactured Housing
- Agricultural / Open Space
- Park / Recreation
- Institutional
- Churches / Places of Worship
- Commercial
- Industrial
- Utility

- Airport Property
- Jurisdictional Boundary
- General Study Area
- School / Educational Facility
- Church / Place of Worship
- ▲ Field Noise Monitoring Location
- ▲ Helicopter Pad
- Run-up Locations

**Existing (2020) Noise Exposure Map**

Note: In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise levels below 65 DNL. The 60 DNL noise contour is shown for informational purposes only.



	60-65 DNL	65-70 DNL	70-75 DNL	75+ DNL
Housing Units	403	73	7	0
Population	789	145	14	0
Noise Sensitive Facilities	2	0	0	0
Schools / Educational Facilities	0	0	0	0
Churches / Places of Worship	2	0	0	0
Libraries	0	0	0	0
Hospitals	0	0	0	0
Nursing Homes	0	0	0	0

**Duluth International Airport**  
**14 CFR Part 150 Noise Compatibility Study**

- Future (2026) Baseline Noise Exposure Contour - 60 DNL
- Future (2026) Baseline Noise Exposure Contour - 65+ DNL
- Single-Family Residential
- Multi-Family Residential
- Manufactured Housing
- Agricultural / Open Space
- Park / Recreation
- Institutional
- Commercial
- Industrial
- Airport Property
- Jurisdictional Boundary
- General Study Area
- School / Educational Facility
- Church / Place of Worship
- Field Noise Monitoring Location
- Helicopter Pad
- Run-up Locations

**Future (2026) Noise Exposure Map**

Note: In accordance with 14 CFR Part 150 Land Use Compatibility Guidelines, all land uses are compatible with noise levels below 65 DNL. The 60 DNL noise contour is shown for informational purposes only.