



Client: Duluth Airport Authority
Project: Duluth International Airport – Part 150 Noise Compatibility Study
To: Lindsay Butler, FAA/ADO; Joshua Fitzpatrick, FAA/ADO
From: Jesse Baker, Landrum & Brown
CC: Tom Werner, DAA; Rob Adams / Philip Gwiner, Landrum & Brown; Kaci Nowicki, SEH
Date: 2/21/2020

Subject: Existing (2020) Noise Exposure Map and Future (2025) Baseline Noise Modeling Methodology

The following memo describes the noise modeling methodology and calculations for the Existing (2020) Noise Exposure Map (NEM) and Future (2025) Baseline Noise Exposure Contours for the Duluth International Airport (DLH or Airport) Part 150 Noise Compatibility Study.

The analysis of noise exposure around DLH was prepared using the Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT) Version 3b. Inputs to the AEDT include the runway definitions, the number of aircraft operations during the time period evaluated, the types of aircraft flown, the time of day when they are flown, the frequency in which each runway is used for arriving and departing aircraft, the routes of flight used when arriving to and departing from the runways, and the departure stage length profiles. The AEDT calculates noise exposure for the area around an airport and outputs contours of noise exposure using the Day/Night Average Sound Level (DNL) metric. Noise exposure contours for the levels of 60, 65, 70, and 75 DNL will be calculated to represent average-annual day conditions at DLH. FAA Part 150 compatibility guidelines classify all areas outside of the 65 DNL contour as compatible land use. However, the 60 DNL is calculated and may be shown to give context to the areas that may be recommended for re-zoning as part of the Noise Compatibility Program (NCP).

Existing (2020) NEM Noise Contour Input Data

Runway Definition: DLH has one east/west runway (09/27) and one north/south crosswind runway (03/21). Runway 09/27 is the longest runway on the airfield at 10,591 feet in length and is 150 feet wide. Runway 03/21 is 5,719 feet long and 150 feet wide. Runway ends 09 and 27 are equipped with a CAT I ILS, Runway 09 is also equipped with CAT II ILS. Runway end 27 has a displaced approach threshold of 529 feet. There is also an area on the airfield where helicopter traffic is arriving to and departing from, located near the FAA Airport Traffic Control Tower (ATCT), it is named H1 in this analysis. **Exhibit 1** shows the existing airfield layout. The following provides the current runways and lengths at DLH:

<u>Runway</u>	<u>Length (feet)</u>
09/27	10,591
03/21	5,719



Number of Operations and Fleet Mix: The number of annual operations at DLH was based on FAA ATCT counts for the period from September 2018 through August 2019. These counts are made available through FAA’s Operations Network (OpsNet) database. During that period, 55,254 annual civil (non-military) operations occurred at DLH. When divided by 365, the result is 151.4 average-annual daily operations. Specific aircraft types and times of operation were developed from a combination of Traffic Flow Management System (TFMS) data and National Offload Program (NOP) data for the same period. Military average annual daily operations and runway use was developed from data received from the Minnesota Air National Guard (MnANG) 148th Fighter Wing (FW). The military daily operations are based on 199 flying days as reported by the MnANG 148th FW. **Table 1**, which provides a summary of the average annual daily operations by aircraft category and time of day. General Aviation prop and jet aircraft made up the majority (70 percent) of all operations at DLH for the Existing (2020) NEM condition. **Table 2** shows the average daily number of arrivals and departures by the individual aircraft types.

Table 1 Existing (2020) NEM Summary of Average-Annual Daily Operations

Aircraft Type	Arrivals		Departures		Total	Percent of Total
	Daytime	Nighttime	Daytime	Nighttime		
Large Jets	0.3	2.1	2.2	0.2	4.9	2.8%
Regional / Air Taxi Jets	5.5	2.4	6.1	1.8	15.8	8.9%
Commuter / Air Taxi Props	2.4	0.3	0.7	2.0	5.5	3.1%
General Aviation Jets	17.8	4.5	19.5	2.8	44.6	25.2%
General Aviation Props	29.1	10.5	32.3	8.1	79.3	44.8%
General Aviation Helicopter	0.3	0.4	0.4	0.3	1.3	0.7%
Civil Aircraft Subtotal	55.5	20.3	61.3	14.4	151.4	--
Military Aircraft	12.3	0.4	12.7	--	25.4	14.4%
Grand Total	67.7	20.7	74.0	14.4	176.8	100%

Notes: Totals may not equal sum total due to rounding.
 Daytime = 7:00am – 9:59pm, Nighttime = 10:00pm – 6:59am.
 Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: Federal Aviation Administration (FAA) Operations Network (OpsNet) data, Traffic Flow Management System (TFMS) data, National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



EXHIBIT 1 CURRENT AIRFIELD LAYOUT

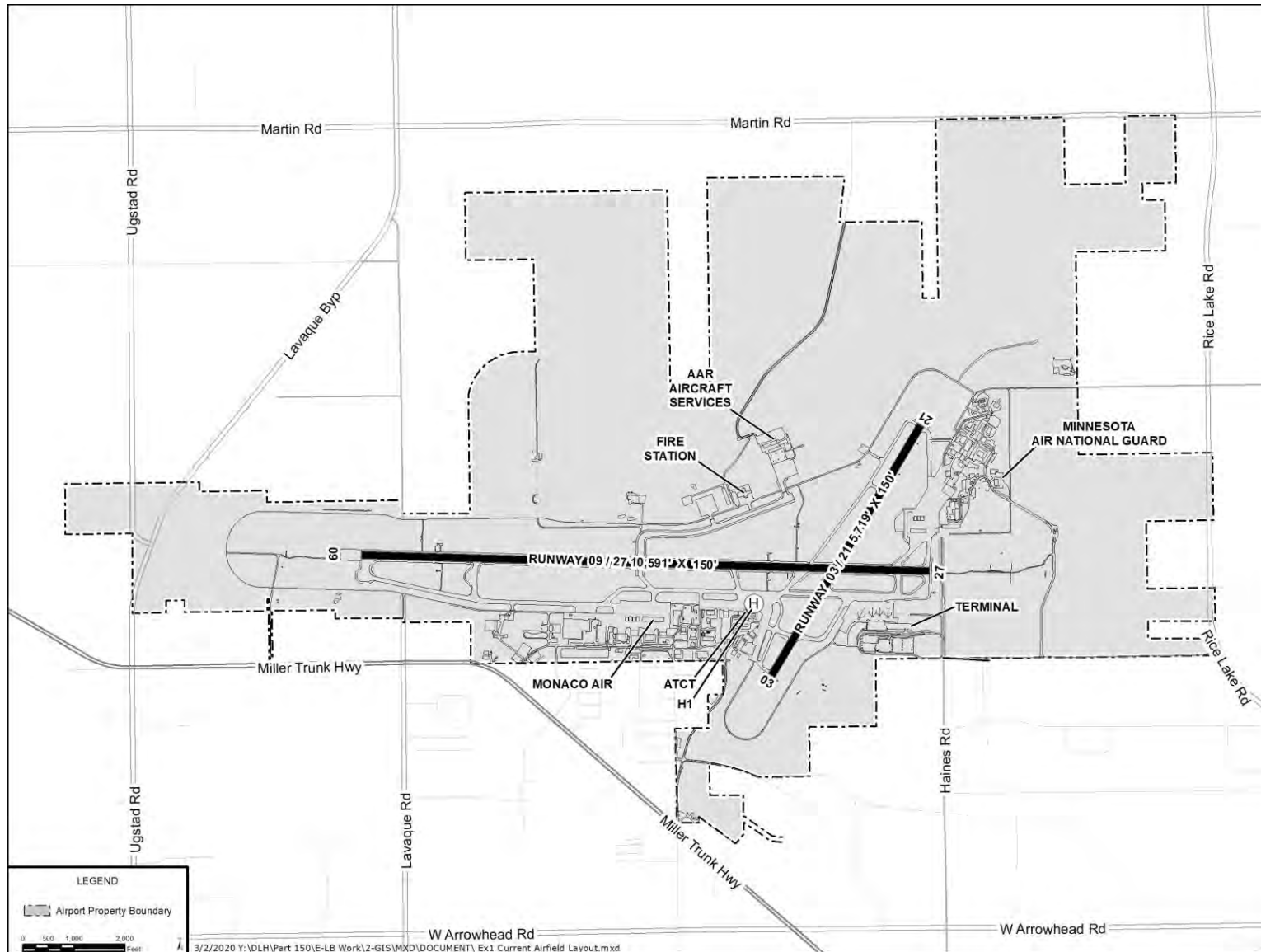




Table 2 Existing (2020) NEM Average-Annual Day Operations by Aircraft Type

Aircraft Type	AEDT ANP ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Large Passenger Jets						
Boeing 737-400	737400	0.04	0.00	0.03	0.01	0.08
Boeing 737-800	737800	0.05	0.06	0.06	0.04	0.21
Airbus 319-131	A319-131	0.02	0.71	0.72	0.01	1.47
Airbus 320-232	A320-232	0.14	0.13	0.22	0.04	0.53
Bombardier CRJ-900-ER	CRJ9-ER	0.08	1.23	1.21	0.11	2.62
Large Passenger Jet Subtotal		0.33	2.13	2.24	0.21	4.91
Regional / Air Taxi Jets						
Bombardier Challenger 600	CL600	4.95	2.20	5.55	1.60	14.30
Cessna 525 CitationJet	CNA525C	0.04	0.03	0.06	0.01	0.14
Cessna 550 Citation Bravo	CNA55B	0.15	0.06	0.14	0.06	0.40
Cessna 560 Citation Excel	CNA560XL	0.11	0.03	0.11	0.02	0.27
Cessna 680 Citation Sovereign	CNA680	0.08	0.01	0.07	0.02	0.18
Cessna 750 Citation X	CNA750	0.06	0.03	0.07	0.02	0.19
Gulfstream IV	GIV	0.05	0.02	0.04	0.03	0.15
Learjet 35	LEAR35	0.06	0.03	0.07	0.02	0.17
Regional/Air Taxi Jet Subtotal		5.50	2.40	6.10	1.80	15.80
Commuter / Air Taxi Props						
Beech 58 Baron	BEC58P	0.37	0.10	0.34	0.13	0.94
Cessna 208 Caravan	CNA208	0.29	0.18	0.32	0.15	0.94
DeHavilland Dash 6 Twin Otter	DHC6	0.90	0.05	0.04	0.91	1.89
DeHavilland Dash 8 Twin Otter	DHC8	0.85	0.02	0.03	0.84	1.75
Commuter/Air Taxi Prop Subtotal		2.42	0.34	0.72	2.03	5.52
General Aviation Jets						
Bombardier Global Express	BD-700-1A10	0.50	0.13	0.49	0.14	1.25
Bombardier Challenger 600	CL600	0.21	0.09	0.23	0.07	0.59
Cessna 525C CitationJet	CNA525C	1.05	0.65	1.37	0.33	3.40
Cessna 550 Citation Bravo	CNA55B	1.47	0.56	1.44	0.59	4.06
Cessna 560 Citation Excel	CNA560XL	0.22	0.05	0.23	0.05	0.56
Cessna 680 Citation Sovereign	CNA680	0.29	0.04	0.25	0.08	0.66
Cessna 750 Citation X	CNA750	0.23	0.14	0.27	0.09	0.73
Eclipse Aerospace EA500	ECLIPSE500	11.53	1.90	12.58	0.85	26.87
Falcon 900	FAL900EX	0.24	0.03	0.22	0.04	0.54
Gulfstream IV	GIV	0.38	0.16	0.31	0.23	1.08



Aircraft Type	AEDT ANP ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Learjet 35	LEAR35	1.35	0.60	1.73	0.23	3.92
Mitsubishi MU-300 Diamond	MU3001	0.35	0.13	0.38	0.11	0.98
General Aviation Jet Subtotal		17.82	4.49	19.50	2.81	44.63
General Aviation Props						
Beech 58 Baron	BEC58P	3.82	0.98	3.46	1.34	9.59
Cessna 172 Skyhawk	CNA172	1.18	0.80	1.11	0.87	3.95
Cessna 182 Skylane	CNA182	0.30	0.14	0.31	0.13	0.89
Cessna 206	CNA206	0.34	0.25	0.42	0.17	1.18
Cessna 208 Caravan	CNA208	1.11	0.68	1.21	0.58	3.59
Cessna 441 Conquest II	CNA441	0.91	0.29	1.03	0.17	2.40
Cirrus SR-22 Single-Engine Prop	COMSEP	17.40	5.71	21.23	1.88	46.21
DeHavilland Dash 6 Twin Otter	DHC6	0.45	0.02	0.09	0.38	0.94
General Aviation Single Engine Prop	GASEPF	0.37	0.06	0.41	0.01	0.85
General Aviation Single Engine Prop	GASEPV	1.65	0.59	1.64	0.60	4.48
Piper PA28 Cherokee	PA28	0.82	0.51	0.68	0.66	2.66
Piper PA31 Comanche	PA31	0.24	--	0.16	0.08	0.47
Piper PA42 Cheyenne	PA42	0.35	0.09	0.39	0.04	0.87
General Aviation Prop Subtotal		29.13	10.49	32.33	7.29	79.25
General Aviation Helicopters						
Agusta A-109	A109	0.15	0.19	0.21	0.13	0.67
Robinson R44 Raven	R44	0.10	0.20	0.16	0.15	0.61
General Aviation Helicopter Subtotal		0.25	0.39	0.37	0.27	1.28
Civil Aircraft Total		55.45	20.24	61.27	14.42	151.38
Military Aircraft						
Lockheed F-16 Fighting Falcon	F16PW0	11.96	0.40	12.35	--	24.70
Lockheed 130 Hercules	C130	0.34	--	0.34	--	0.68
Military Aircraft Total		12.30	0.40	12.69	--	25.38
Grand Total		67.75	20.64	73.96	14.42	176.76

Notes: Totals may not equal sum total due to rounding.
 Daytime = 7:00am – 9:59pm, Nighttime = 10:00pm – 6:59am.
 Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: Federal Aviation Administration (FAA) Operations Network (OpsNet) data, Traffic Flow Management System (TFMS) data, National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



In addition to standard arrival and departure operations touch-and-go operations and F-16 low approach operations were calculated. **Table 3** presents the total annual daily operations for general aviation and military aircraft performing these types of operations. These operations are included in **Table 2** and are presented here for clarity.

Table 3 Existing (2020) NEM Average-Annual Day Touch-and-Go and Low Approach Operations

Aircraft Type	AEDT ANP ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
General Aviation						
Eclipse Aerospace EA500	ECLIPSE500	0.62	--	0.62	--	1.25
Cirrus SR-22 Single-Engine Prop	COMSEP	0.70	--	0.70	--	1.41
General Aviation Sub Total		1.33	--	1.33	--	2.65
Military Aircraft						
Lockheed F-16 Fighting Falcon (Low Approach)	F16PW0	2.47	--	--	--	2.47
Lockheed 130 Hercules (Touch-and-Go)	C130	0.24	--	0.24	--	0.48
Military Aircraft Subtotal		2.71	--	0.24	--	2.95
Grand Total		4.04	--	1.57	--	5.60

Notes: Totals may not equal sum total due to rounding.
 Touch-andGo and Low Approach operations are included in Table 2
 Daytime = 7:00am – 9:59pm, Nighttime = 10:00pm – 6:59am.
 Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: Federal Aviation Administration (FAA) Operations Network (OpsNet) data, Traffic Flow Management System (TFMS) data, National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.

Runway End Utilization: Average-annual runway end utilization was derived from analysis of NOP data from September 2018 through August 2019. Runway use was derived for aircraft types and summarized by aircraft category. Runway use for military aircraft was developed through coordination with the MnANG 148th FW. **Table 4** summarizes the percentage of use by each aircraft category on each of the runways at DLH during the daytime (7:00 a.m. – 9:59 p.m.) and nighttime (10:00 p.m. – 6:59 a.m.) periods.



Table 4 Existing (2020) NEM Runway End Utilization

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%
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	--	--	--	--	--	--

Notes: Daytime = 7:00 a.m. – 9:59 p.m., Nighttime = 10:00 p.m. – 6:59 a.m.
 Total may not equal sum total due to rounding.

Source: Federal Aviation Administration (FAA) Operations Network (OpsNet) data, Traffic Flow Management System (TFMS) data, National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Flight Tracks: A flight track is the path over the ground as an aircraft flies to or from the airport. Flight track locations and percent distributions for the Existing (2020) NEM condition were derived primarily from analysis of eight weeks of radar data collected at DLH from September 2018 through August 2019. This data was analyzed to verify the location, density, and width of existing flight corridors. Consolidated flight tracks were developed from this radar data and used in the AEDT to model the flight corridors present around the Airport and are shown on **Exhibit 2** through **Exhibit 14**. Military flight tracks were developed with coordination from the MnANG 148th FW.

Exhibit 2 through **Exhibit 9** depict the arrival and departure flight tracks for civil aircraft. **Exhibit 10** and **Exhibit 11** depict flight tracks for military arrival and departure flight tracks. **Exhibit 12** depicts flight tracks representative of touch-and-go operations that touch down and take off again as one continuous event. This activity is typically conducted by small aircraft for training purposes. **Exhibit 13** depicts flight tracks representative of military low approach operations. **Exhibit 14** depicts the general aviation helicopter flight tracks.

The tracks are composed of both backbone and sub-tracks that account for the dispersion of operations across a corridor of flight, rather than along a single constrained path. These types of tracks are useful at DLH where aircraft fly within wide departure flight corridors. The use of sub-tracks for the definition of baseline noise patterns allows a more definitive description of overall operating characteristics. **Table 5**, **Table 6**, and **Table 7** provide the proportion of operations assigned to each of the flight tracks indicated on the exhibits for the Existing (2020) NEM condition.



EXHIBIT 4 RUNWAY 09 JET FLIGHT TRACKS

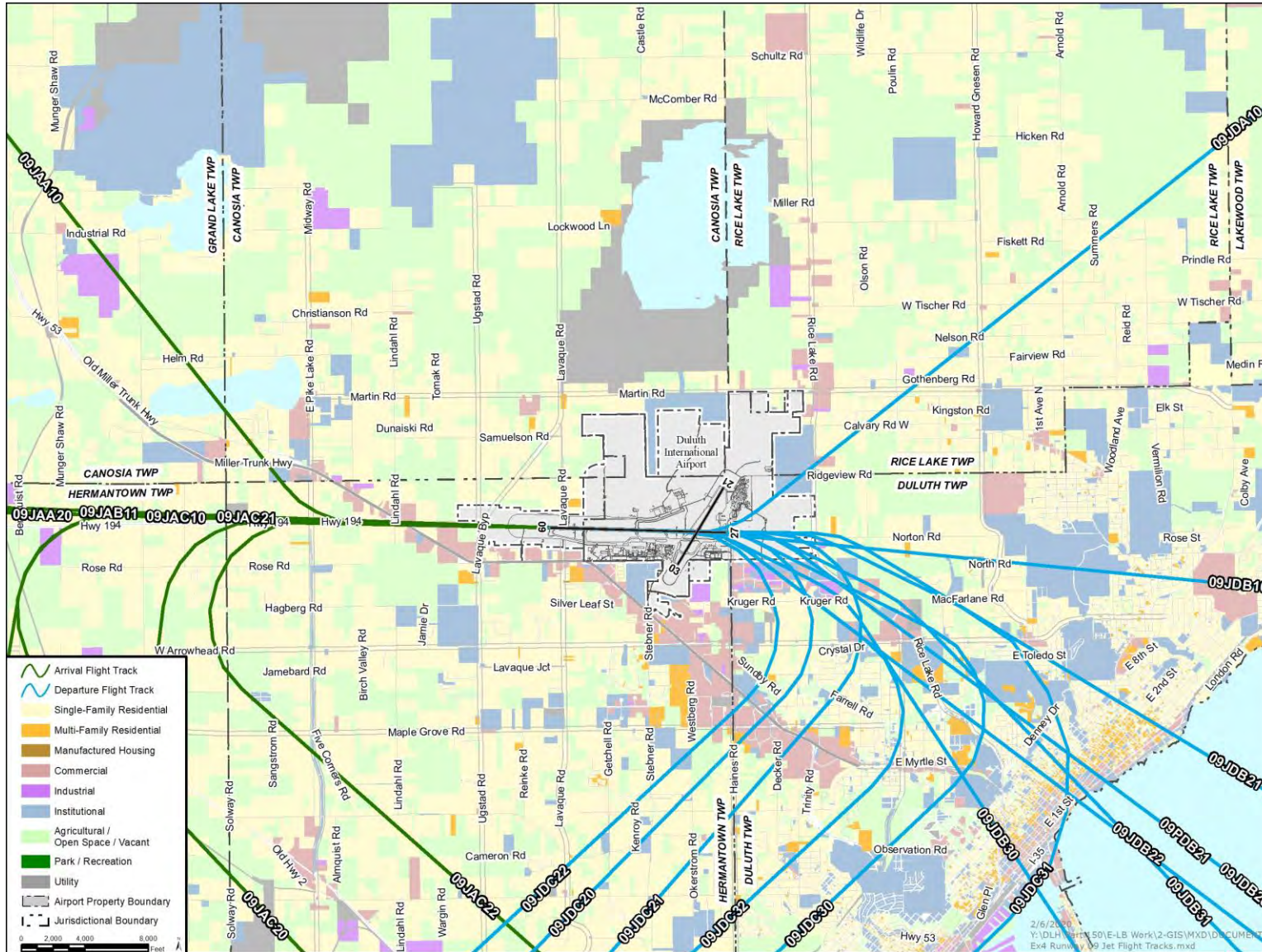




EXHIBIT 5 RUNWAY 09 PROP FLIGHT TACKS

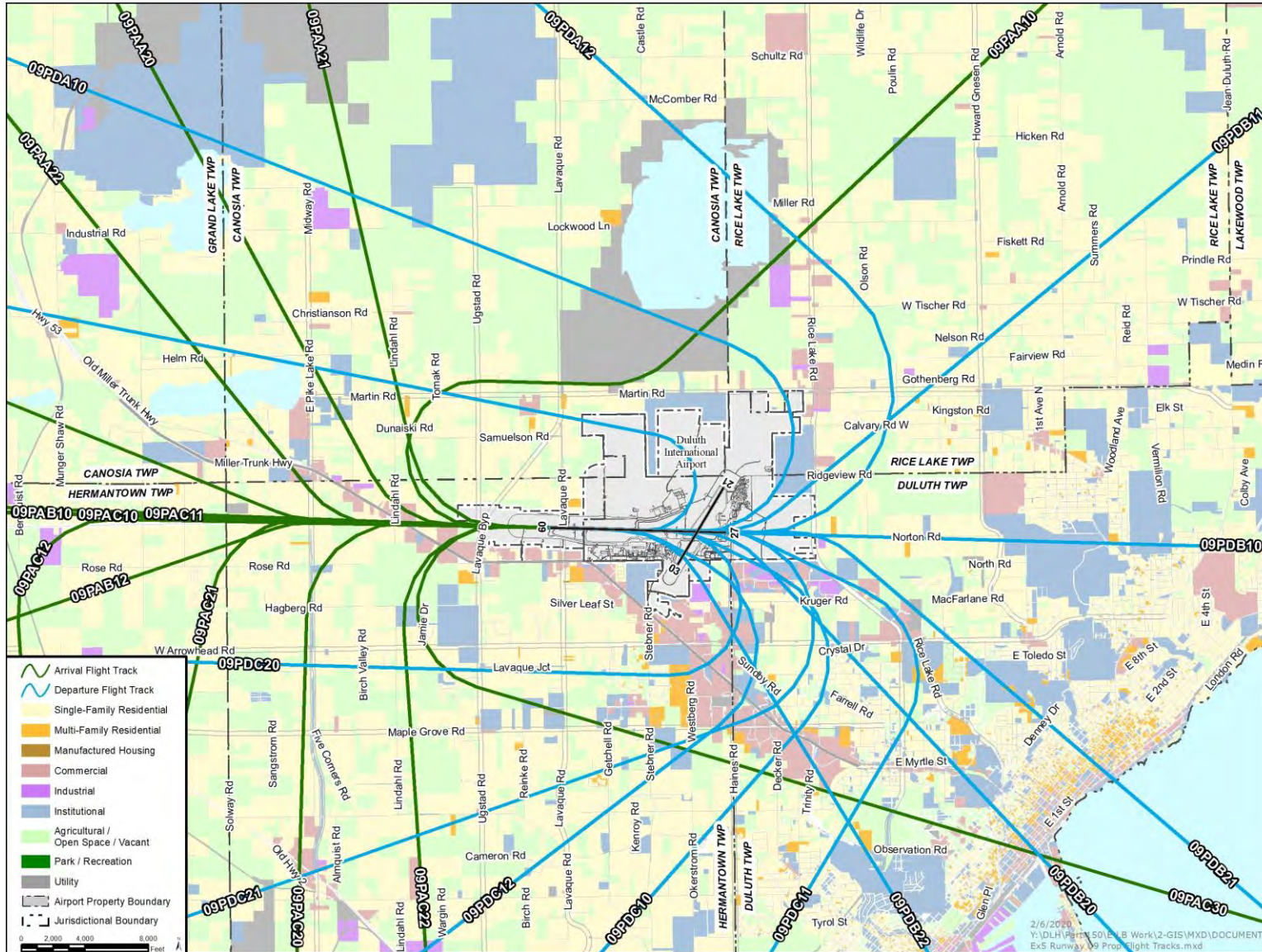




EXHIBIT 7 RUNWAY 21 PROP FLIGHT TRACKS

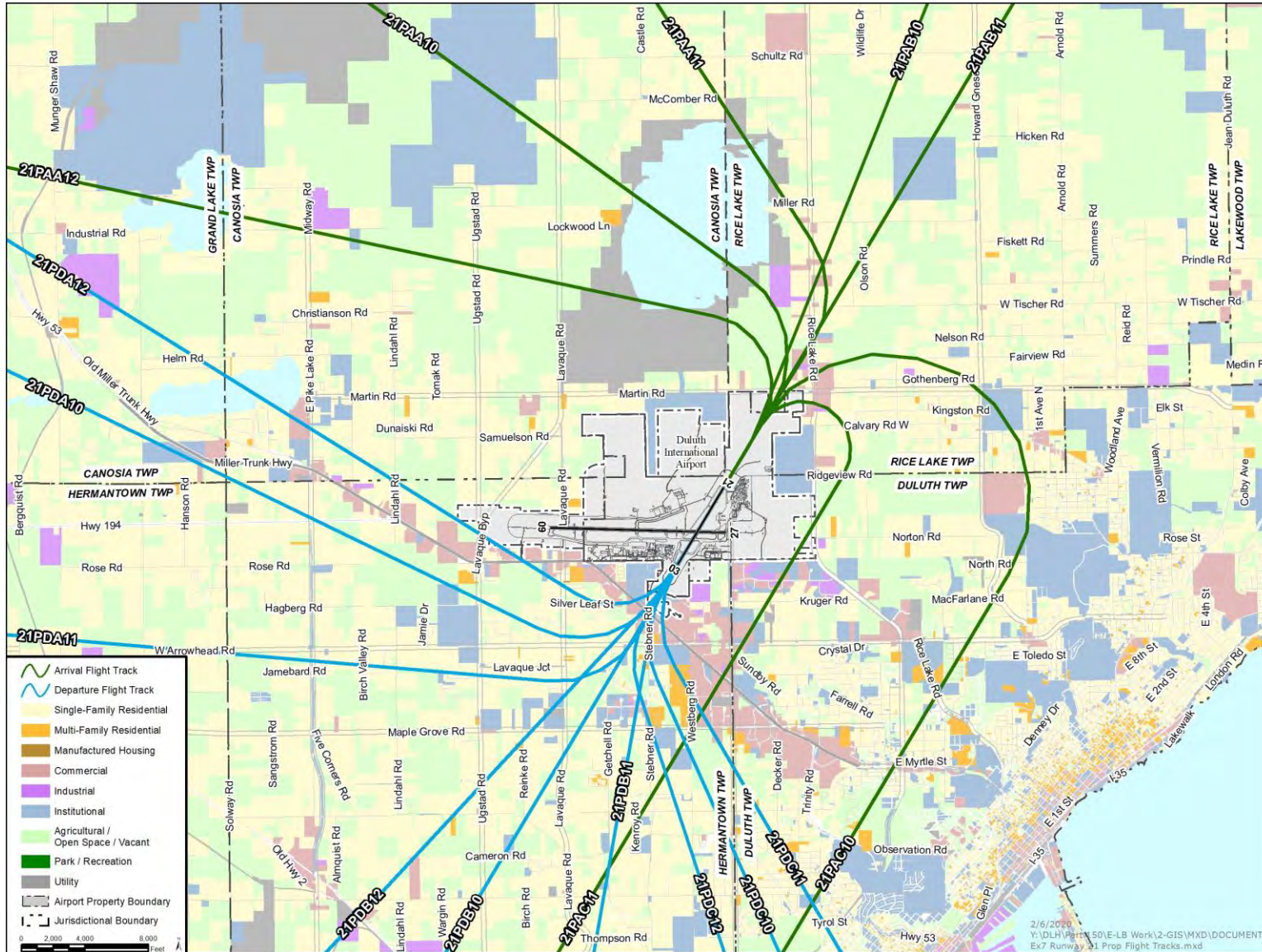




EXHIBIT 9 RUNWAY 27 PROP FLIGHT TRACKS

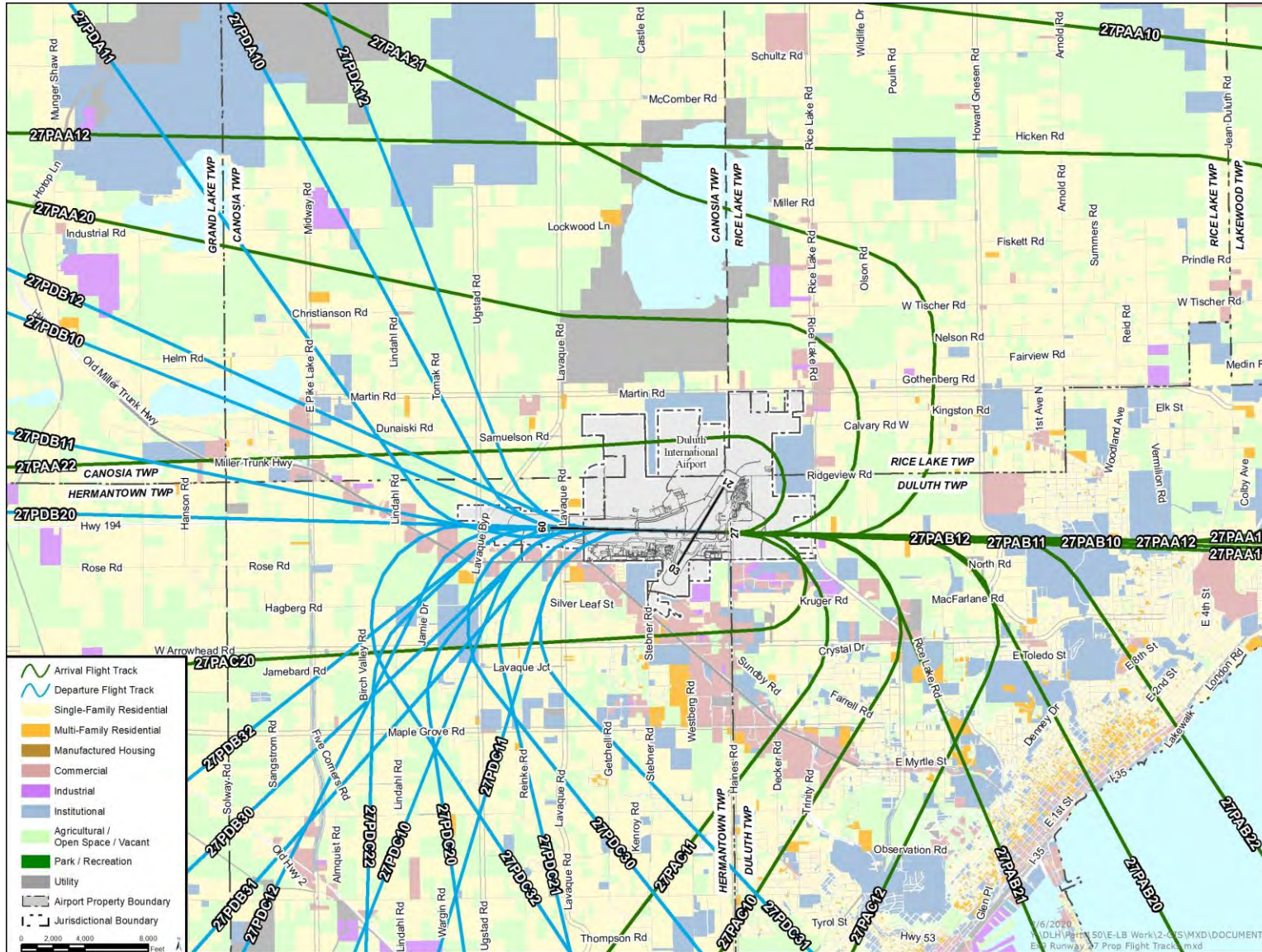




EXHIBIT 11 RUNWAY 27 MILITARY FLIGHT TRACKS

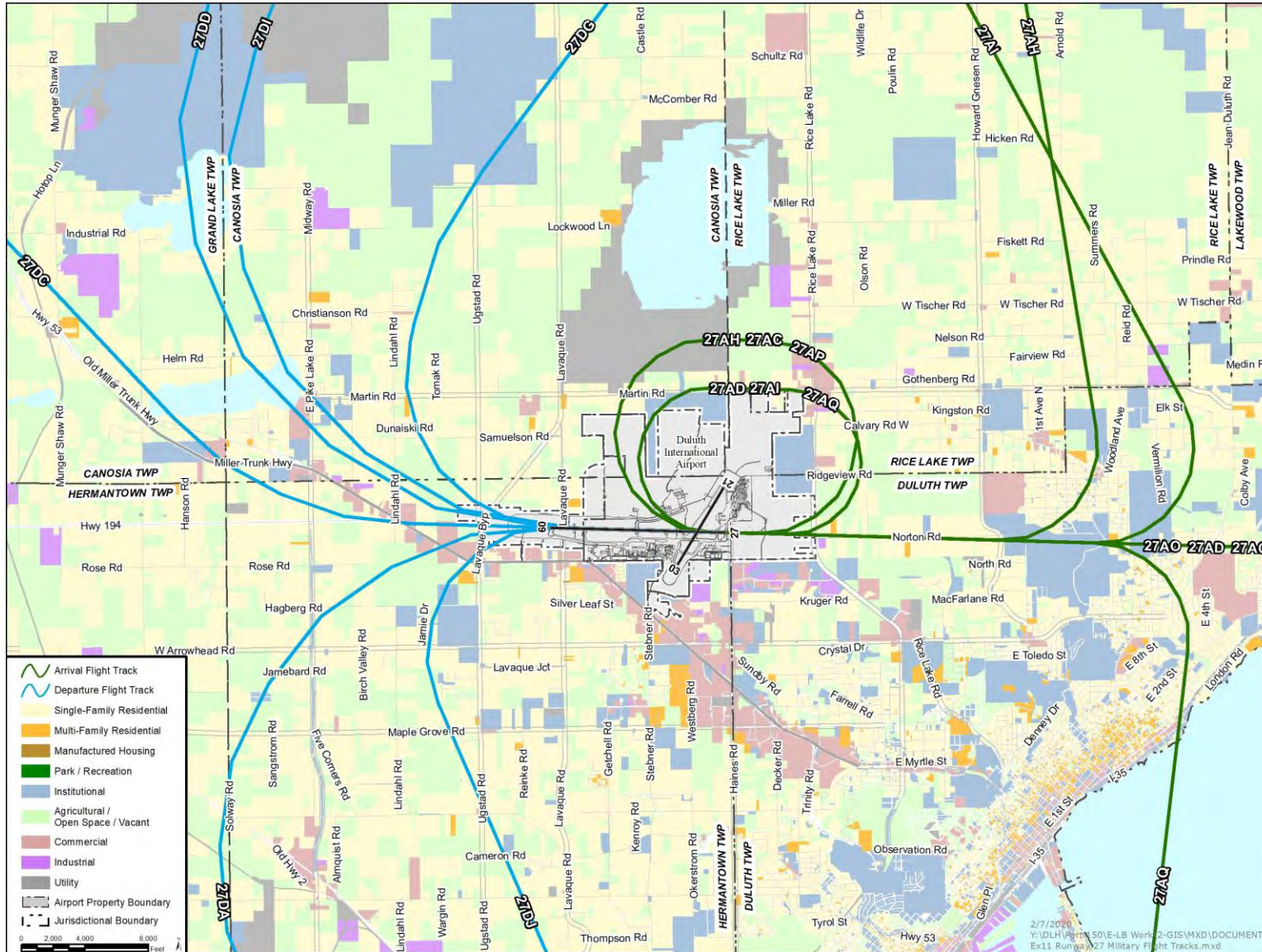




EXHIBIT 13 MILITARY LOW APPROACH FLIGHT TRACKS

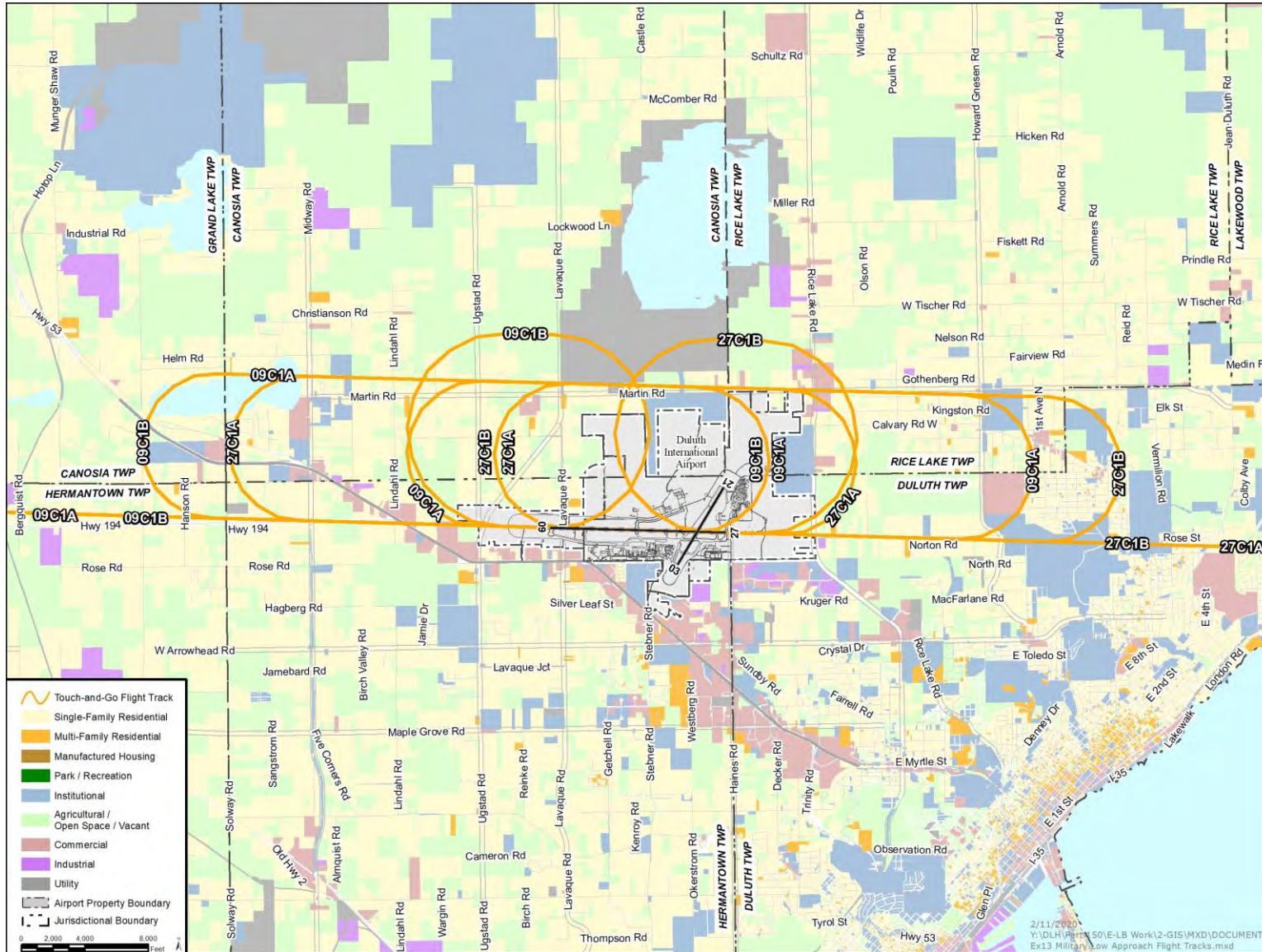
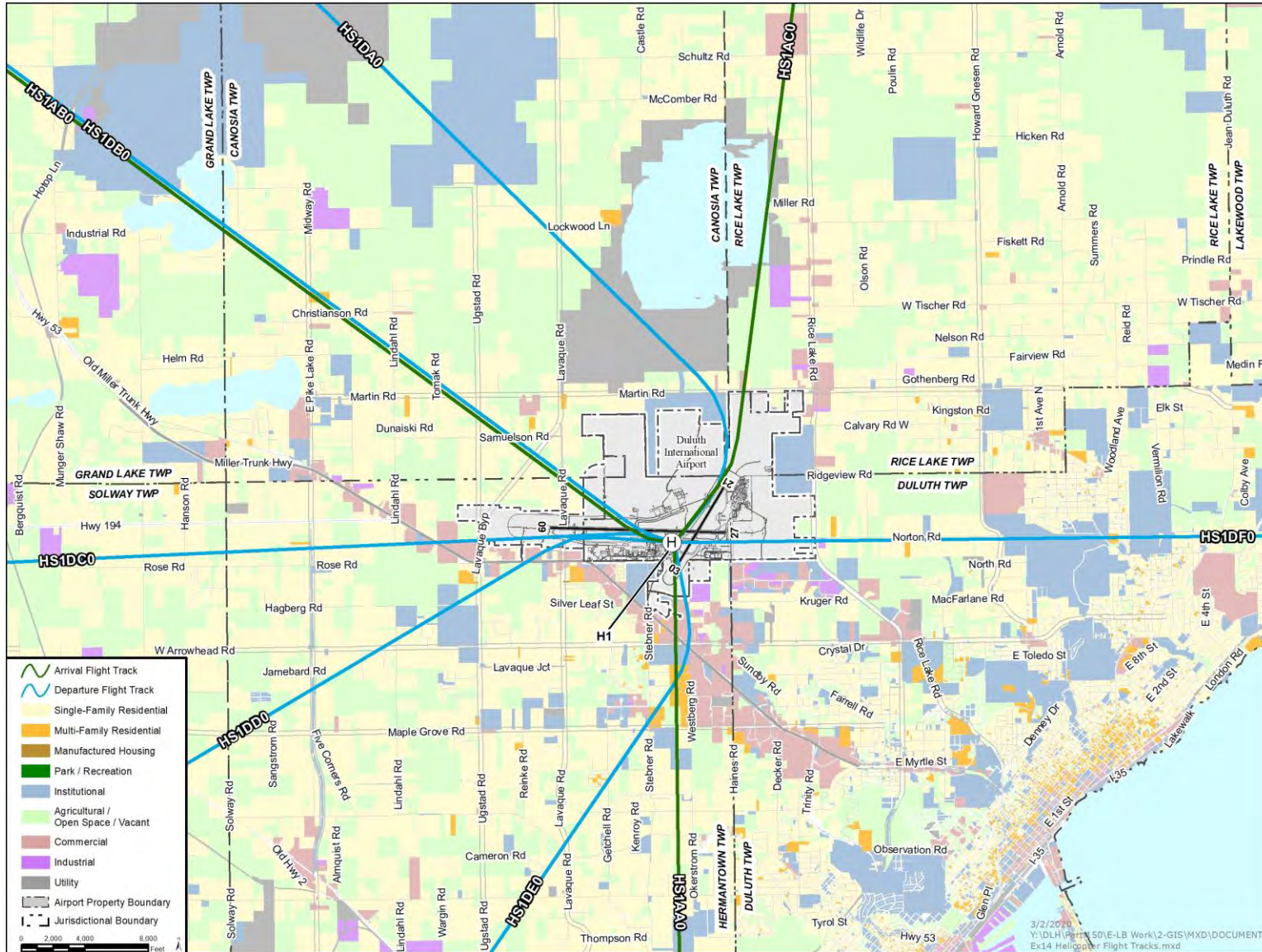




EXHIBIT 14 HELICOPTER FLIGHT TRACKS



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Table 5 Existing (2020) NEM Arrival Flight Track Utilization

Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
03	03JAA10	5.6%	5.6%	--	5.6%	--	--	--
	03JAB10	16.7%	16.7%	--	16.7%	--	--	--
	03JAB11	27.8%	27.8%	--	27.8%	--	--	--
	03JAC10	23.6%	23.6%	--	23.6%	--	--	--
	03JAC20	15.3%	15.3%	--	15.3%	--	--	--
	03JAC21	2.8%	2.8%	--	2.8%	--	--	--
	03JAC22	8.3%	8.3%	--	8.3%	--	--	--
	03PAA10	--	--	4.7%	--	4.7%	--	--
	03PAA11	--	--	1.6%	--	1.6%	--	--
	03PAA12	--	--	3.9%	--	3.9%	--	--
	03PAA20	--	--	4.7%	--	4.7%	--	--
	03PAA21	--	--	7.0%	--	7.0%	--	--
	03PAA22	--	--	3.1%	--	3.1%	--	--
	03PAB10	--	--	20.2%	--	20.2%	--	--
	03PAB11	--	--	9.3%	--	9.3%	--	--
	03PAB12	--	--	21.7%	--	21.7%	--	--
	03PAB20	--	--	7.0%	--	7.0%	--	--
03PAC10	--	--	17.1%	--	17.1%	--	--	
09	09AB	--	--	--	--	--	3.7%	--
	09AC	--	--	--	--	--	1.2%	--
	09AD	--	--	--	--	--	11.1%	--
	09AH	--	--	--	--	--	2.5%	--
	09AI	--	--	--	--	--	22.3%	--
	09AL	--	--	--	--	--	0.7%	--
	09AP	--	--	--	--	--	0.5%	--
	09AQ	--	--	--	--	--	4.5%	--
	09AE	--	--	--	--	--	46.8%	--
	09JAA10	3.1%	3.1%	0.0%	3.1%	0.0%	--	--
	09JAA20	3.1%	3.1%	0.0%	3.1%	0.0%	--	--

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Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	09JAB10	35.7%	35.7%	--	35.7%	--	--	--
	09JAB11	10.7%	10.7%	--	10.7%	--	--	--
	09JAB12	7.7%	7.7%	--	7.7%	--	--	--
	09JAC10	9.7%	9.7%	--	9.7%	--	--	--
	09JAC20	10.2%	10.2%	--	10.2%	--	--	--
	09JAC21	15.3%	15.3%	--	15.3%	--	--	--
	09JAC22	4.6%	4.6%	--	4.6%	--	--	--
	09PAA10	--	--	5.7%	--	5.7%	--	--
	09PAA20	--	--	10.3%	--	10.3%	--	--
	09PAA21	--	--	1.5%	--	1.5%	--	--
	09PAA22	--	--	1.5%	--	1.5%	--	--
	09PAB10	--	--	7.7%	--	7.7%	--	--
	09PAB11	--	--	8.8%	--	8.8%	--	--
	09PAB12	--	--	4.1%	--	4.1%	--	--
	09PAC10	--	--	8.2%	--	8.2%	--	--
	09PAC11	--	--	9.3%	--	9.3%	--	--
	09PAC12	--	--	6.2%	--	6.2%	--	--
	09PAC20	--	--	7.2%	--	7.2%	--	--
	09PAC21	--	--	3.6%	--	3.6%	--	--
	09PAC22	--	--	14.9%	--	14.9%	--	--
09PAC30	--	--	10.8%	--	10.8%	--	--	
21	21JAA10	29.4%	29.4%	--	29.4%	--	--	--
	21JAB10	8.8%	8.8%	--	8.8%	--	--	--
	21JAB11	5.9%	5.9%	--	5.9%	--	--	--
	21JAB12	23.5%	23.5%	--	23.5%	--	--	--
	21JAC10	8.8%	8.8%	--	8.8%	--	--	--
	21JAC11	23.5%	23.5%	--	23.5%	--	--	--
	21PAA10	--	--	15.2%	--	15.2%	--	--
	21PAA11	--	--	13.9%	--	13.9%	--	--
	21PAA12	--	--	6.3%	--	6.3%	--	--

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Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	21PAB10	--	--	15.2%	--	15.2%	--	--
	21PAB11	--	--	21.5%	--	21.5%	--	--
	21PAC10	--	--	13.9%	--	13.9%	--	--
	21PAC11	--	--	13.9%	--	13.9%	--	--
27	27AC	--	--	--	--	--	1.2%	--
	27AD	--	--	--	--	--	11.1%	--
	27AH	--	--	--	--	--	3.2%	--
	27AI	--	--	--	--	--	29.0%	--
	27AO	--	--	--	--	--	50.5%	--
	27AP	--	--	--	--	--	0.5%	--
	27AQ	--	--	--	--	--	4.5%	--
	27JAA10	6.7%	6.7%	0.0%	6.7%	--	--	--
	27JAB10	16.5%	16.5%	0.0%	16.5%	--	--	--
	27JAB11	2.8%	2.8%	0.0%	2.8%	--	--	--
	27JAB12	21.3%	21.3%	0.0%	21.3%	--	--	--
	27JAC10	23.6%	23.6%	0.0%	23.6%	--	--	--
	27JAC11	3.5%	3.5%	0.0%	3.5%	--	--	--
	27JAC12	18.9%	18.9%	0.0%	18.9%	--	--	--
	27JAD10	6.7%	6.7%	0.0%	6.7%	--	--	--
	27PAA10	--	--	9.7%	--	9.7%	--	--
	27PAA11	--	--	5.7%	--	5.7%	--	--
	27PAA12	--	--	4.8%	--	4.8%	--	--
	27PAA20	--	--	5.7%	--	5.7%	--	--
	27PAA21	--	--	3.5%	--	3.5%	--	--
	27PAA22	--	--	4.4%	--	4.4%	--	--
	27PAB10	--	--	8.4%	--	8.4%	--	--
	27PAB11	--	--	4.4%	--	4.4%	--	--
27PAB12	--	--	6.2%	--	6.2%	--	--	
27PAB20	--	--	4.4%	--	4.4%	--	--	
27PAB21	--	--	4.0%	--	4.0%	--	--	

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Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	27PAB22	--	--	3.5%	--	3.5%	--	--
	27PAC10	--	--	11.0%	--	11.0%	--	--
	27PAC11	--	--	7.0%	--	7.0%	--	--
	27PAC12	--	--	7.0%	--	7.0%	--	--
	27PAC20	--	--	10.1%	--	10.1%	--	--
H1	HS1AA0	--	--	--	--	--	--	42.1%
	HS1AB0	--	--	--	--	--	--	31.6%
	HS1AC0	--	--	--	--	--	--	26.3%

Source: Federal Aviation Administration (FAA) National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Table 6 Existing (2020) NEM Departure Flight Track Utilization

Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
03	03JDA10	10.1%	10.1%	--	10.1%	--	--	--
	03JDA11	2.9%	2.9%	--	2.9%	--	--	--
	03JDA12	1.4%	1.4%	--	1.4%	--	--	--
	03JDB10	18.8%	18.8%	--	18.8%	--	--	--
	03JDB11	8.7%	8.7%	--	8.7%	--	--	--
	03JDB12	8.7%	8.7%	--	8.7%	--	--	--
	03JDC10	10.1%	10.1%	--	10.1%	--	--	--
	03JDC11	2.9%	2.9%	--	2.9%	--	--	--
	03JDC12	10.1%	10.1%	--	10.1%	--	--	--
	03JDD10	14.5%	14.5%	--	14.5%	--	--	--
	03JDD11	8.7%	8.7%	--	8.7%	--	--	--
	03JDD12	2.9%	2.9%	--	2.9%	--	--	--
	03PDA10	--	--	3.7%	--	3.7%	--	--
	03PDA11	--	--	1.9%	--	1.9%	--	--
	03PDA12	--	--	0.9%	--	0.9%	--	--
	03PDA20	--	--	8.4%	--	8.4%	--	--
	03PDA21	--	--	6.5%	--	6.5%	--	--
	03PDA22	--	--	3.7%	--	3.7%	--	--
	03PDB10	--	--	9.3%	--	9.3%	--	--
	03PDB11	--	--	8.4%	--	8.4%	--	--
	03PDB12	--	--	7.5%	--	7.5%	--	--
	03PDB20	--	--	7.5%	--	7.5%	--	--
	03PDC10	--	--	19.6%	--	19.6%	--	--
	03PDC11	--	--	8.4%	--	8.4%	--	--
03PDC12	--	--	4.7%	--	4.7%	--	--	
03PDD10	--	--	9.3%	--	9.3%	--	--	
09	09DA	--	--	--	--	--	13.5%	--
	09DB	--	--	--	--	--	40.9%	--
	09DC	--	--	--	--	--	10.7%	--
	09DF	--	--	--	--	--	24.8%	--
	09DH	--	--	--	--	--	10.0%	--
	09JDA10	2.9%	2.9%	--	2.9%	--	--	--



Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	09JDB10	6.9%	6.9%	--	6.9%	--	--	--
	09JDB20	17.7%	17.7%	--	17.7%	--	--	--
	09JDB21	6.3%	6.3%	--	6.3%	--	--	--
	09JDB22	4.6%	4.6%	--	4.6%	--	--	--
	09JDB30	7.4%	7.4%	--	7.4%	--	--	--
	09JDB31	3.4%	3.4%	--	3.4%	--	--	--
	09JDC20	7.4%	7.4%	--	7.4%	--	--	--
	09JDC21	7.4%	7.4%	--	7.4%	--	--	--
	09JDC22	2.9%	2.9%	--	2.9%	--	--	--
	09JDC30	14.3%	14.3%	--	14.3%	--	--	--
	09JDC31	12.0%	12.0%	--	12.0%	--	--	--
	09JDC32	6.9%	6.9%	--	6.9%	--	--	--
	09PDA10	--	--	7.9%	--	7.9%	--	--
	09PDA11	--	--	6.1%	--	6.1%	--	--
	09PDA12	--	--	7.5%	--	7.5%	--	--
	09PDB10	--	--	4.7%	--	4.7%	--	--
	09PDB11	--	--	7.0%	--	7.0%	--	--
	09PDB20	--	--	14.0%	--	14.0%	--	--
	09PDB21	--	--	9.3%	--	9.3%	--	--
	09PDB22	--	--	3.7%	--	3.7%	--	--
	09PDC10	--	--	12.1%	--	12.1%	--	--
	09PDC11	--	--	15.0%	--	15.0%	--	--
	09PDC12	--	--	3.3%	--	3.3%	--	--
	09PDC20	--	--	4.7%	--	4.7%	--	--
	09PDC21	--	--	4.7%	--	4.7%	--	--
21	21JDA10	25.6%	25.6%	--	25.6%	--	--	--
	21JDA11	12.8%	12.8%	--	12.8%	--	--	--
	21JDA12	12.8%	12.8%	--	12.8%	--	--	--
	21JDB10	25.6%	25.6%	--	25.6%	--	--	--
	21JDB11	12.8%	12.8%	--	12.8%	--	--	--
	21JDB12	10.3%	10.3%	--	10.3%	--	--	--
	21PDA10	--	--	13.2%	--	13.2%	--	--
	21PDA11	--	--	7.4%	--	7.4%	--	--

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Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	21PDA12	--	--	11.8%	--	11.8%	--	--
	21PDB10	--	--	25.0%	--	25.0%	--	--
	21PDB11	--	--	7.4%	--	7.4%	--	--
	21PDB12	--	--	11.8%	--	11.8%	--	--
	21PDC10	--	--	8.8%	--	8.8%	--	--
	21PDC11	--	--	2.9%	--	2.9%	--	--
	21PDC12	--	--	11.8%	--	11.8%	--	--
27	27DA	--	--	--	--	--	13.2%	--
	27DC	--	--	--	--	--	14.9%	--
	27DD	--	--	--	--	--	24.8%	--
	27DG	--	--	--	--	--	24.8%	--
	27DI	--	--	--	--	--	12.4%	--
	27DJ	--	--	--	--	--	9.9%	--
	27JDA10	5.0%	5.0%	--	5.0%	--	--	--
	27JDA11	2.1%	2.1%	--	2.1%	--	--	--
	27JDA12	2.8%	2.8%	--	2.8%	--	--	--
	27JDB10	22.7%	22.7%	--	22.7%	--	--	--
	27JDB11	18.1%	18.1%	--	18.1%	--	--	--
	27JDB12	6.7%	6.7%	--	6.7%	--	--	--
	27JDC10	14.2%	14.2%	--	14.2%	--	--	--
	27JDC11	14.2%	14.2%	--	14.2%	--	--	--
	27JDC12	6.7%	6.7%	--	6.7%	--	--	--
	27JDC13	5.0%	5.0%	--	5.0%	--	--	--
	27JDC14	2.5%	2.5%	--	2.5%	--	--	--
	27PDA10	--	--	4.8%	--	4.8%	--	--
	27PDA11	--	--	3.3%	--	3.3%	--	--
	27PDA12	--	--	3.0%	--	3.0%	--	--
27PDB10	--	--	4.8%	--	4.8%	--	--	
27PDB11	--	--	4.1%	--	4.1%	--	--	
27PDB12	--	--	2.6%	--	2.6%	--	--	
27PDB20	--	--	8.1%	--	8.1%	--	--	
27PDB30	--	--	15.2%	--	15.2%	--	--	
27PDB31	--	--	6.7%	--	6.7%	--	--	

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Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
	27PDB32	--	--	4.8%	--	4.8%	--	--
	27PDC10	--	--	7.0%	--	7.0%	--	--
	27PDC11	--	--	5.9%	--	5.9%	--	--
	27PDC12	--	--	2.6%	--	2.6%	--	--
	27PDC20	--	--	3.3%	--	3.3%	--	--
	27PDC21	--	--	3.3%	--	3.3%	--	--
	27PDC22	--	--	0.7%	--	0.7%	--	--
	27PDC30	--	--	9.3%	--	9.3%	--	--
	27PDC31	--	--	7.8%	--	7.8%	--	--
	27PDC32	--	--	2.6%	--	2.6%	--	--
H1	HS1DA0	--	--	--	--	--	--	14.8%
	HS1DB0	--	--	--	--	--	--	18.5%
	HS1DC0	--	--	--	--	--	--	14.8%
	HS1DD0	--	--	--	--	--	--	22.2%
	HS1DE0	--	--	--	--	--	--	11.1%
	HS1DF0	--	--	--	--	--	--	18.5%

Source: Federal Aviation Administration (FAA) National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Table 7 Existing (2020) NEM Touch-and-Go and Low Approach Flight Track Utilization

Runway End	Track ID	Aircraft Category						
		Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	Military Aircraft	Helicopter
03	03PTA1				--	32.4%	--	
	03PTB1				--	26.5%	--	
	03PTC1				--	20.6%	--	
	03PTD1				--	20.6%	--	
09	09PTA1				45.5%	12.9%	8.3%	
	09PTB1				--	60.0%	--	
	09PTC1				--	14.1%	8.3%	
	09PTD1				--	12.9%	--	
	09C1A		n/a		--	--	4.7%	
	09C1B		n/a		--	--	78.8%	n/a
21	21PTA1				--	59.4%	--	
	21PTB1				--	40.6%	--	
27	27PTA1				53.0%	17.6%	8.3%	
	27PTA2				--	23.5%	--	
	27PTB1				--	29.4%	8.3%	
	27PTB2				--	29.4%	--	
	27C1A				--	--	4.7%	
	27C1B				--	--	78.8%	

Source: Federal Aviation Administration (FAA) National Offload Program (NOP) data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Aircraft Weight and Trip Length: Aircraft weight upon departure is a factor in the dispersion of noise because it impacts the rate at which an aircraft is able to climb. Generally, heavier aircraft have a slower rate of climb and a wider dispersion of noise along the flight route. Where specific aircraft weights are unknown, the AEDT uses the distance flown to the first stop as a surrogate for the weight, by assuming that the weight has a direct relationship with the fuel load necessary to reach the first destination. The AEDT groups trip lengths into nine stage categories and assigns standard aircraft weights to each stage category. These categories are:

<u>Stage Category</u>	<u>Stage Length</u>	<u>Sample Destinations</u>
1	0-500 nautical miles	MSP, ORD, STL
2	501-1000 nautical miles	DEN, DAL
3	1001-1500 nautical miles	LAS, HOU, SLC
4	1501-2500 nautical miles	--
5	2501-3500 nautical miles	--
6	3501-4500 nautical miles	--
7	4501-5500 nautical miles	--
8	5501-6500 nautical miles	--
9	6500+ nautical miles	--

The stage lengths modeled for the Existing (2020) NEM condition are based upon a review of existing schedules and typical destinations for current conditions at DLH. **Table 8** indicates the proportion of the operations that were modeled within each of the nine stage length categories for Existing (2020) NEM condition.

Table 8 Existing (2020) NEM Stage Lengths

Stage Length Category	Large Jet	Regional / Air Taxi Jet	Commuter / Air Taxi Prop	General Aviation Jet	General Aviation Prop	General Aviation Helicopter	Military Aircraft
1	98.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100%
2	0.1%	--	--	--	--	--	--
3	1.1%	--	--	--	--	--	--
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Federal Aviation Administration (FAA) Operations Network (OpsNet) data, Traffic Flow Management System (TFMS) data, National Offload Program (NOP) data, Landrum & Brown analysis, 2020.



Engine Run-ups: Engine run-ups for civilian aircraft are primarily performed on Airbus 319's and 320's for maintenance purposes on the AAR Aircraft Services apron. Military engine run-ups are performed for maintenance purposes and the arming and de-arming of aircraft. These run-ups occur at five (5) locations at DLH described below and shown on **Exhibit 15**. In order to model noise from aircraft engine run-ups, aircraft run-up locations and times were obtained from run-up information received from AAR Aircraft Services and the MnANG 148th FW. **Table 9** shows the number, types, and the duration of engine run-ups that were modeled for the Existing (2020) NEM conditions.

- **AAR Ramp:** Located on the north side of the airfield, northwest of the runway 09/27 and runway 03/21 intersection. Aircraft primarily positioned with the nose pointing west into the wind.
- **Hush House:** Located on the north end of the MnANG 148th FW Base. Aircraft are positioned facing south when located inside the hush house. The noise generated from engine run-ups that occur inside the hush house are attenuated, however with-in the AEDT model there is no standard practice for modeling this noise attenuation.
- **Hangar:** Located on the south side of the MnANG 148th FW apron. Aircraft are primarily positioned facing south when inside the hangar.
- **Flight Line:** The flight line is located on the east side of the MnANG 148th FW apron. Aircraft while on the flight line are positioned facing west.
- **Arm and De-arm Pad:** The arming and de-arming pad is located on the southwest side of the MnANG 148th FW apron. The same location is used for both departure arming, preflight checks and the de-arming of aircraft on arrival.

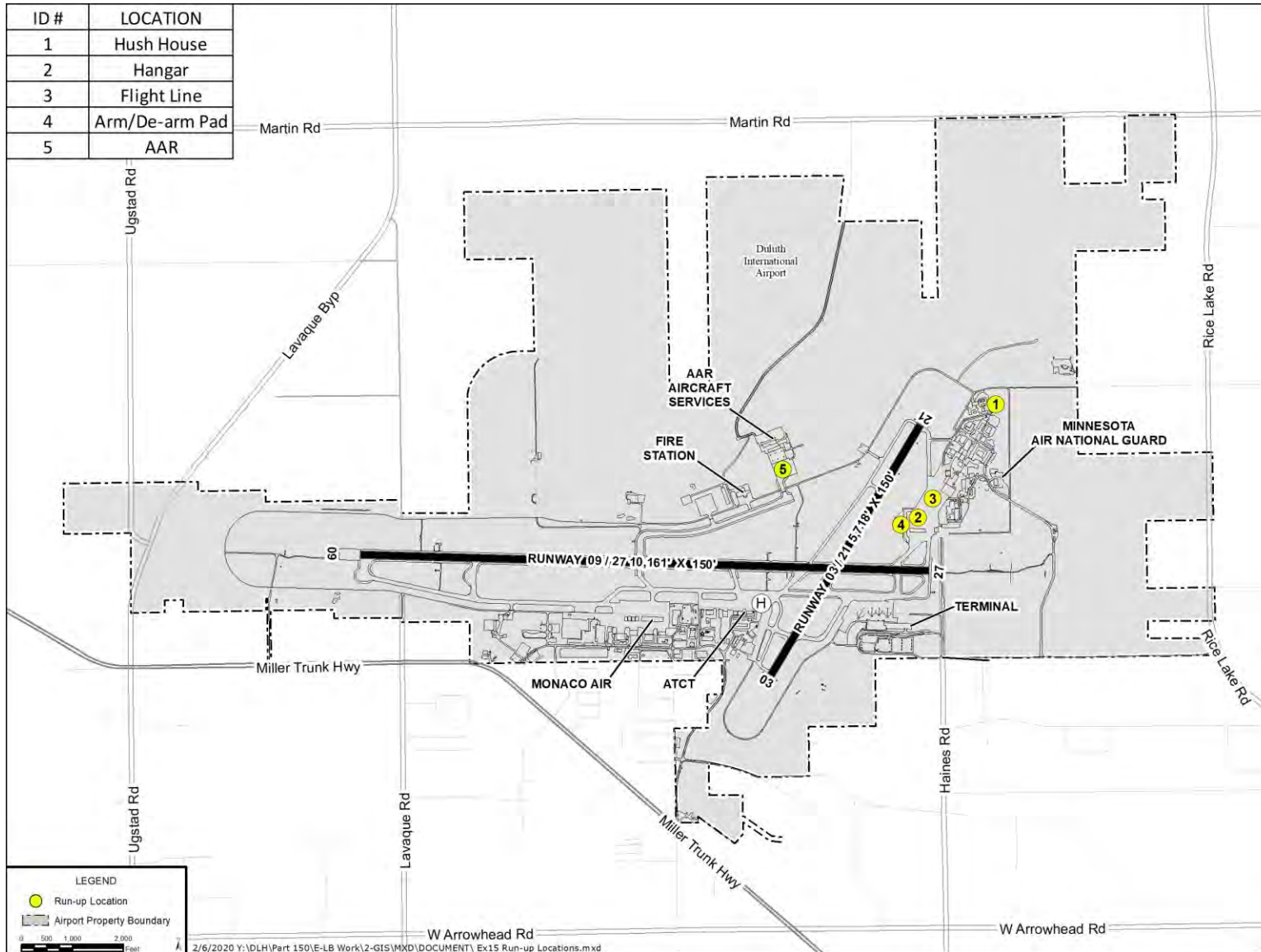
Table 9 Existing (2020) NEM Run-Up Operations

Run-Up Location	Aircraft AEDT ANP ID	Annual Runups			Duration (minutes)	Heading (degrees)	Thrust / Setting
		Daytime	Nighttime	Total			
Hush House	F16	87.4	--	87.4	50.0	211	65%
Hush House	F16	87.4	--	87.4	7.6	211	78%
Hush House	F16	87.4	--	87.4	7.6	211	82%
Hush House	F16	87.4	--	87.4	7.6	211	89%
Hush House	F16	87.4	--	87.4	2.1	211	AB
Hangar	F16	4.6	--	4.6	30.0	180	70%
Flight Line	F16	182.0	--	182.0	10.0	270	70%
Departure Arm Pad	F16	2,458.0	--	2,458.0	30.0	90	67%
Arrival De-Arm Pad	F16	2,379.3	78.7	2,458.0	10.0	90	67%
AAR	A319-131	38.3	--	38.3	30	270	80%
AAR	A320-232	13.7	--	13.7	30	270	80%

Source: Minnesota Air National Guard 148th Fighter Wing data, AAR Aircraft Services data, Landrum & Brown analysis, 2020.



EXHIBIT 15 RUN-UP LOCATIONS





Future (2025) Baseline Noise Contour Input Data

The following describes the input data for the Future (2025) Baseline conditions. The noise exposure contours reflective of the Future (2025) Baseline will be used as a baseline for comparing potential noise abatement alternatives. The result of that analysis may be recommendations for changes in operating procedures. Any recommended changes to operating procedures would be captured in the Future (2025) Noise Exposure Map, which would be produced later in the process.

Runway Definition: There are no anticipated airfield modifications that will occur at DLH in the next five (5) years that would significantly change the noise exposure patterns at DLH.

Number of Operations and Fleet Mix: The number of Future (2025) Baseline annual operations at DLH is based on the DLH Airport Master Plan Aviation Forecast. The fleet mix was adjusted by adding the Boeing 717-200, this aircraft represents anticipated introduction of additional Delta Airlines service. The number of daily operations for each aircraft was scaled based on data in the aviation forecast. Based on the aviation forecast data it is projected there will be 63,860 total civil aircraft operations and 5,650 military aircraft operations at DLH by 2025. Since the forecast documentation is still undergoing modifications this data may need to be modified before a final noise contour is completed. **Table 9** provides a summary of the annual daily operations forecasted in 2025.

Table 9 Future (2025) Baseline Average-Annual Daily Operations

Aircraft Type	Arrivals		Departures		Total	Percent of Total
	Daytime	Nighttime	Daytime	Nighttime		
Large Jets	0.2	4.0	3.4	0.8	8.5	4.2%
Regional / Air Taxi Jets	5.5	2.4	6.1	1.8	15.7	7.8%
Commuter / Air Taxi Props	2.4	0.3	0.7	2.0	5.5	2.7%
General Aviation Jets	20.6	5.2	22.6	3.3	51.8	25.5%
General Aviation Props	33.7	12.2	37.5	8.5	91.91	45.3%
General Aviation Helicopter	0.3	0.5	0.4	0.3	1.6	0.8%
Civil Aircraft Total	62.8	24.6	70.7	16.8	175.0	--
Military Aircraft	13.6	0.4	14.0	--	28.0	13.8%
Military Aircraft Total	13.6	0.4	14.0	--	28.0	--
Grand Total	76.4	25.0	84.7	16.8	203.0	100%

Notes: Total may not equal sum total due to rounding.
 Daytime = 7:00am – 9:59pm, Nighttime = 10:00pm – 6:59am.
 Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: DLH Master Plan Forecast Summary data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Table 10 Future (2025) Baseline Average-Annual Day Operations by Aircraft Type

Aircraft Type	AEDT ANP ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Large Passenger Jets						
Boeing 717-200	717200	--	0.62	--	0.62	1.24
Airbus 319-131	A319-131	0.03	0.92	0.94	0.02	1.91
Airbus 320-232	A320-232	0.01	0.01	0.01	0.00	0.02
Bombardier CRJ-900-ER	CRJ9-ER	0.16	2.49	2.44	0.21	5.30
Large Passenger Jet Subtotal		0.20	4.04	3.39	0.85	8.47
Regional / Air Taxi Jets						
Bombardier Challenger 600	CL600	4.94	2.19	5.53	1.60	14.25
Cessna 525 CitationJet	CNA525C	0.04	0.03	0.06	0.01	0.14
Cessna 550 Citation Bravo	CNA55B	0.15	0.05	0.14	0.06	0.40
Cessna 560 Citation Excel	CNA560XL	0.11	0.03	0.11	0.02	0.27
Cessna 680 Citation Sovereign	CNA680	0.08	0.01	0.07	0.02	0.18
Cessna 750 Citation X	CNA750	0.06	0.03	0.07	0.02	0.19
Gulfstream IV	GIV	0.05	0.02	0.04	0.03	0.15
Learjet 35	LEAR35	0.06	0.03	0.06	0.02	0.17
Regional/Air Taxi Jet Subtotal		5.48	2.39	6.08	1.79	15.74
Commuter / Air Taxi Props						
Beech 58 Baron	BEC58P	0.37	0.10	0.34	0.13	0.93
Cessna 208 Caravan	CNA208	0.29	0.18	0.32	0.15	0.93
DeHavilland Dash 6 Twin Otter	DHC6	0.89	0.05	0.04	0.91	1.89
DeHavilland Dash 8 Twin Otter	DHC8	0.85	0.02	0.03	0.84	1.74
Commuter/Air Taxi Prop Subtotal		2.41	0.34	0.72	2.03	5.49
General Aviation Jets						
Bombardier Global Express	BD-700-1A10	0.58	0.15	0.56	0.16	1.45
Bombardier Challenger 600	CL600	0.24	0.11	0.27	0.08	0.69
Cessna 525C CitationJet	CNA525C	1.22	0.75	1.59	0.38	3.94
Cessna 550 Citation Bravo	CNA55B	1.71	0.65	1.67	0.69	4.71
Cessna 560 Citation Excel	CNA560XL	0.26	0.06	0.27	0.06	0.65
Cessna 680 Citation Sovereign	CNA680	0.33	0.05	0.29	0.09	0.77
Cessna 750 Citation X	CNA750	0.27	0.16	0.32	0.11	0.85
Eclipse Aerospace EA500	ECLIPSE500	13.34	2.25	14.58	1.00	31.16
Falcon 900	FAL900EX	0.28	0.04	0.26	0.05	0.63
Gulfstream IV	GIV	0.44	0.19	0.35	0.27	1.25
Learjet 35	LEAR35	1.57	0.70	2.01	0.26	4.54



Aircraft Type	AEDT ANP ID	Arrivals		Departures		Total
		Day	Night	Day	Night	
Mitsubishi MU-300 Diamond	MU3001	0.41	0.15	0.44	0.13	1.13
General Aviation Jet Subtotal		20.64	5.25	22.60	3.28	51.76
General Aviation Props						
Beech 58 Baron	BEC58P	4.43	1.14	4.01	1.55	11.13
Cessna 172 Skyhawk	CNA172	1.36	0.93	1.28	1.01	4.58
Cessna 182 Skylane	CNA182	0.35	0.17	0.36	0.15	1.03
Cessna 206	CNA206	0.40	0.29	0.49	0.20	1.37
Cessna 208 Caravan	CNA208	1.29	0.79	1.40	0.68	4.16
Cessna 441 Conquest II	CNA441	1.06	0.33	1.19	0.20	2.79
Cirrus SR-22 Single-Engine Prop	COMSEP	20.13	6.67	24.60	2.20	53.60
DeHavilland Dash 6 Twin Otter	DHC6	0.52	0.03	0.10	0.45	1.09
DeHavilland Dash 8 Twin Otter	DHC8	0.97	0.02	0.04	0.95	1.98
General Aviation Single Engine Prop	GASEPF	0.43	0.07	0.48	0.02	0.99
General Aviation Single Engine Prop	GASEPV	1.92	0.68	1.90	0.70	5.19
Piper PA28 Cherokee	PA28	0.95	0.59	0.78	0.76	3.09
Piper PA31 Comanche	PA31	0.27	--	0.18	0.09	0.55
Piper PA42 Cheyenne	PA42	0.40	0.10	0.45	0.05	1.01
General Aviation Prop Subtotal		33.74	12.22	37.48	8.47	91.91
General Aviation Helicopters						
Agusta A-109	A109	0.19	0.23	0.26	0.16	0.83
Robinson R44 Raven	R44	0.12	0.25	0.19	0.18	0.75
General Aviation Helicopter Subtotal		0.31	0.48	0.45	0.34	1.58
Civil Aircraft Total		62.77	24.71	70.73	16.75	174.96
Military Aircraft						
Lockheed F-16 Fighting Falcon	F16PW0	12.88	0.43	13.31	--	26.62
Lockheed 130 Hercules	C130	0.71	--	0.71	--	1.42
Military Aircraft Total		13.59	0.43	14.02	--	28.04
Grand Total		76.36	25.14	84.75	16.75	203.00

Notes: Total may not equal sum total due to rounding.
Daytime = 7:00am – 9:59pm, Nighttime = 10:00pm – 6:59am.
Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: DLH Master Plan Forecast Summary data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.



Runway End Utilization: There are no anticipated shifts in primary runway use at DLH. Runway utilization calculations from the Existing (2020) NEM condition will be used in the Future (2025) Baseline condition modeling input.

Flight Tracks: There are no anticipated airspace modifications that would affect the existing flight corridors location or utilization when arriving and departing from DLH and the surrounding airspace. The Existing (2020) NEM flight tracks and flight track utilizations will be used in the Future (2025) baseline condition modeling.

Aircraft Weight and Trip Length: The stage length for the Delta Airlines Boeing 717-200 service was the only adjustment to the aircraft weight and trip length settings in the Future (2025) Baseline condition. The Stage Length setting for all Boeing 717-200 departures were set to Stage Length 2.

Engine Run-ups: There are no expected changes to the locations for run-up operations conducted at DLH by 2025. However, additional military arm/de-arm run-ups will occur as the total F-16 arrival and departure operations increase in the Future (2025) Baseline condition. **Table 11** shows the new run-up totals for the arm\de-arm pad.

Table 11 Future (2025) Baseline Arm/De-arm Run-up Operations

Run-Up Location	Aircraft AEDT ANP ID	Annual Runups			Duration (minutes)	Heading (degrees)	Thrust / Setting
		Daytime	Nighttime	Total			
Departure Arm Pad	F16PW0	2,648	--	2,648.0	30.0	90	67%
Arrival De-Arm Pad	F16PW0	2,563.3	84.7	2,648.0	10.0	90	67%

Notes: Total may not equal sum total due to rounding.

Military operations were based on adjusted annual operating days, F16 (199 flying days) C130 (250 flying days)

Source: DLH Master Plan Forecast Summary data, Minnesota Air National Guard 148th Fighter Wing data, Landrum & Brown analysis, 2020.