FLYING CLOUD AIRPORT

LONG-TERM PLAN 2040

CHAPTER 6

ENVIRONMENTAL CONSIDERATIONS

SEPTEMBER 2025

List of Figures

List of Tables

6.0 Environmental Considerations

This chapter presents an overview of the environmental considerations for development of the 2040 FCM Long-Term Comprehensive Plan LTP. The analysis for noise conditions was developed using the Aviation Environmental Design Tool (AEDT) and is based on the 2021 Base Year and 2040 LTP forecast aircraft operations. The remaining environmental considerations align with federal NEPA and Minnesota Environmental Policy Act (MEPA) requirements to identify the environmental footprint of proposed improvements.

6.1 Aircraft Noise

6.1.1 Quantifying Aircraft Noise

Sound is energy transferred through the air that ears detect as small changes in air pressure. A sound source vibrates or otherwise disturbs the air immediately surrounding the source, causing variations in pressure above and below the static (at-rest) value of atmospheric pressure. These disturbances force air to compress and expand setting up a wavelike movement of air particles that move away from the source. Sound waves, or fluctuations in pressure, vibrate the eardrum creating audible sound.

Noise has both a measurable, physical component as well as a subjective component that takes account of an individual's reaction to a sound. For example, the same sound can be pleasant for one person and annoying to another. Even sounds that are pleasant at one volume can become annoying as they get louder.

Sound levels are measured in decibels (dB), which is a logarithmic scale of energy referenced to human hearing. The dB scale accounts for the range of hearing with values from 0 dB to around 200 dB. Most human hearing of sound experience falls into the 30 dB to 120 dB range.

Decibels are logarithmic and thus cannot be added directly. Two identical noise sources each producing 70 dB do not add to a total of 140 dB, but to 73 dB. Each time the number of sources is doubled, the sound pressure level increases 3 by dB.

- 2 sources: 70 dB + 70 dB = 73 dB
- 4 sources: 70 dB + 70 dB + 70 dB + 70 dB = 76 dB
- 8 sources: 70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB + 70 dB = 79 dB

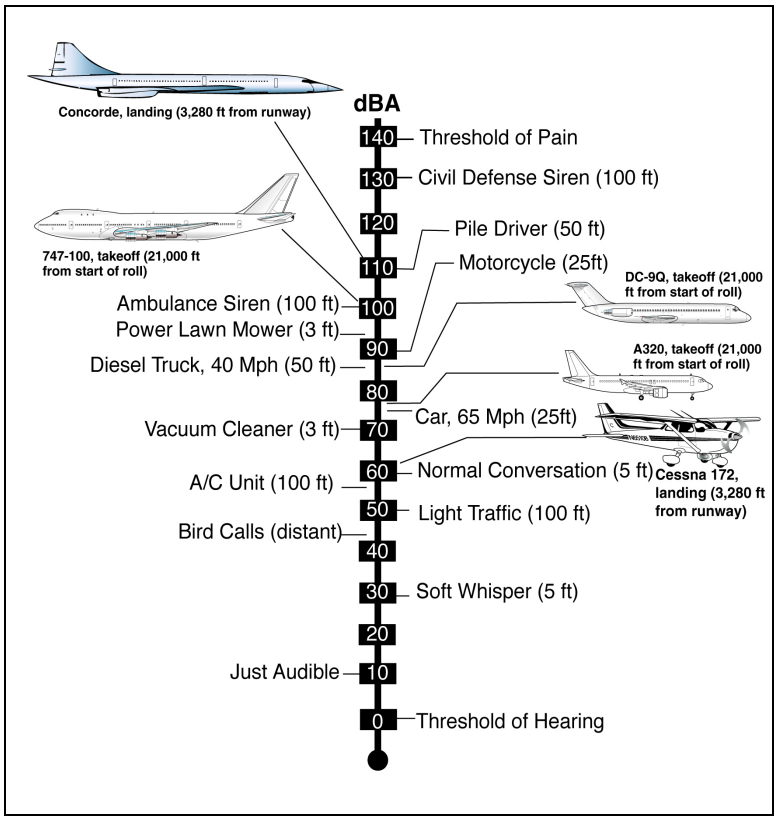
The perceivable change in loudness for normal hearing adults is approximately 3 dB (i.e., changes in sound level of 3 dB or less are difficult to notice). A doubling of loudness for the average listener of A-weighted sound is about 10 dB1 [1]. Measured, A-weighted sound levels changing by 10 dBA result in a subjective perception of being "twice as loud."[2]

Figure 6.1 provides the noise levels for various common sources.

[1] A-weighted decibels represent noise levels that are adjusted relative to the frequencies that are most audible to the human ear.

[2] Peppin and Rodman, Community Noise, p. 47-48; additionally, Harris, Handbook, Beranek and Vér, Noise and Vibration Control Engineering, among others.

Figure 6-1: Sound Levels of Typical Noise Sources (dBA)



6.1.2 Day-Night Average Sound Level (DNL)

Through the Aviation Safety and Noise Abatement Act (ANSA) of 1979, Congress directed the FAA to establish a single metric for assessing land use compatibility with respect to noise from aircraft operations and to establish standards and methods for assessing the noise environment associated with ongoing aircraft operations near airports. In 1981, the FAA implemented the ANSA provisions. These are published in 14 Code of Federal Regulations (CFR), Part 150 (“Part 150”)

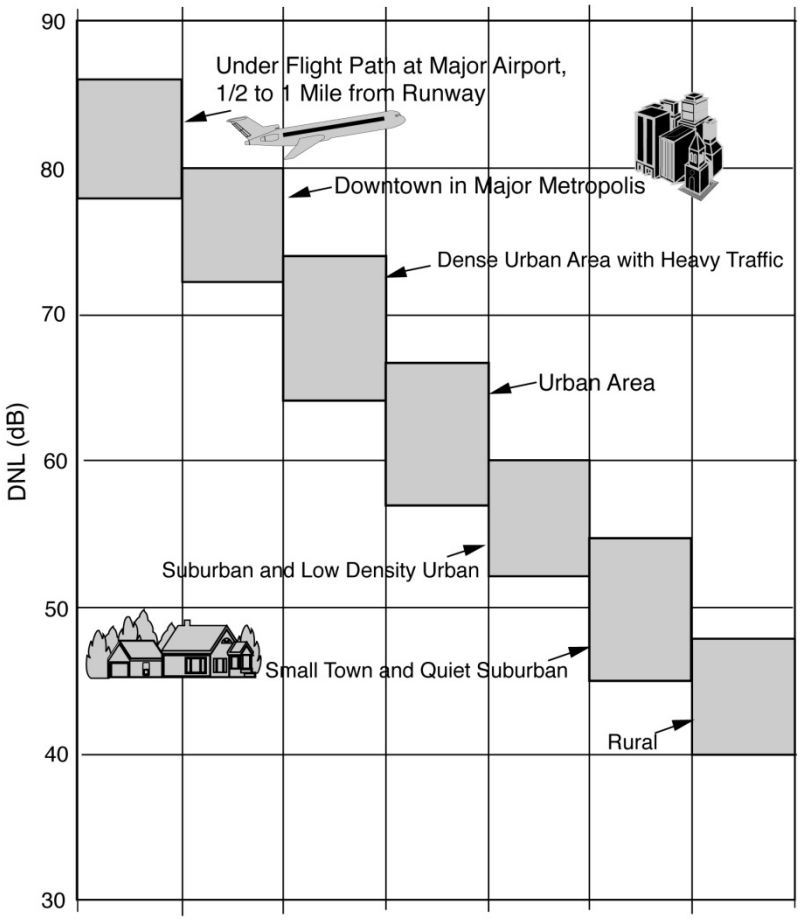
This regulation adopted the Day-Night Average Sound Level (DNL) metric. The DNL metric reflects a person’s cumulative exposure to sound over a 24-hour period. The metric uses aircraft operations over the course of the year to calculate noise exposure for an average annual day. To account for a higher sensitivity to noise exposure at night (10:00 PM to 7:00 AM), DNL calculations add 10x weighting for each nighttime flight, which equates to each nighttime flight being measured as if 10 daytime flights had occurred. Due to the logarithmic scale of decibels, this is equivalent to adding 10 decibels to nighttime flights.

The FAA also established land use compatibility guidelines for aircraft noise, determining 65 A-weighted dB DNL is the threshold of significant noise exposure, and thus would be incompatible with residential and other noise-sensitive land uses.

Figure 6.2 provides examples of typical DNL levels in various environments.

Currently, the FAA requires the DNL metric be used in a variety of policy objectives, including assessment, identification, and mitigation of incompatible land uses in the vicinity of civil airports, and evaluation of environmental consequences that would occur if changes to aircraft operations or airfield infrastructure near an airport were implemented. DNL has also been formally adopted by most federal agencies dealing with noise exposure, such as the U.S. Environmental Protection Agency (EPA), U.S. Department of Defense, U.S. Department of Housing and Urban Development, and Veterans Administration.

Figure 6-2: Typical Range of Outdoor Community Day-Night Average Sound Levels



Source: U.S. Department of Defense. Departments of the Air Force, the Army, and the Navy, 1978. *Planning in the Noise Environment.* AFM 19-10. TM 5-803-2, and NAVFAC P-970. Washington, D.C.: U.S. DoD.

6.1.4 FCM Noise Reduction Efforts

A Noise Abatement Plan for FCM was last revised in January 2017. The plan includes recommended Noise Abatement Procedures (NAP) aimed at keeping more operations over less populated areas, promoting FCM quiet hours from 10 pm to 7 am, and keeping aircraft at or over 1,000 feet as much as possible.[3] NAPs include the following:

- NAP 1: Noise Abatement Takeoff and Approach Procedures
- NAP 2: Traffic Pattern Procedures
- NAP 3: Maintenance Run-Ups
- NAP 4: Helicopter Training
- NAP 5: Nighttime Restrictions

6.2 Noise Contour Development

This section describes the noise contours developed for the 2021 Base Year and the 2040 LTP. Additional details on contour development, including fleet mixes, AEDT aircraft substitutions, weather parameters, terrain, stage length, runway use, and track development is included in **Appendix B***, Noise Technical Memo.*

6.2.1 Aviation Environmental Design Tool

The noise contours presented in this document were developed using the FAA's AEDT. The AEDT model produces DNL noise contours depicting an annualized average day of aircraft noise impacts. The model uses operational information such as runway use, flight track use, aircraft type, aircraft performance and thrust settings and operation time of day as inputs. The model also considers environmental variables, such as topography and atmospheric conditions. Quantifying aircraft-specific noise characteristics in AEDT is accomplished using a comprehensive noise database that has been developed under 14 CFR Part 36. As part of the airworthiness certification process, aircraft manufacturers are required to subject aircraft to a battery of noise tests. Using federally adopted and endorsed methodology, this aircraft-specific noise information is used in the generation of DNL contours. Justification for this approach is rooted in national standardization of noise quantification at airports.

6.2.2 Aircraft Activity Levels and Fleet Mixes

The 2021 Base Year and the 2040 LTP fleet mixes were developed based on MAC Noise & Operations Monitoring System (MACNOMS) operations data between July 2021 and June 2022, and the FAA approved forecast. This period was selected because MACNOMS was enhanced in July 2021 to accurately capture touch-and-go (TGO) operations, which are significant at FCM.

Aircraft that account for approximately 99% of the total MACNOMS operations were retained in the fleet mix. After arrivals and departures were balanced, a proprietary General Aviation (GA) operation forecast model were applied to project operations by each individual aircraft for 2040. In the end, projected operations were scaled to match the 2040 LTP forecast operations by Aircraft Approach Category (AAC), Airplane Design Group (ADG), and aircraft types (piston, turboprop, jet, military, and helicopter). The fleet

[3] MAC, Noise Abatement Plan Flying Cloud Airport (FCM), https://metroairports.org/sites/default/files/2021-09/fcm_na-plan-2017.pdf

mix input was based on the 2040 AAD fleet mix as documented in **Appendix B.** Following the development of the 2040 LTP fleet mix, the FAA AEDT, version 3e, was used to create the 2040 LTP noise contours.

6.2.3 DNL and Day/Night Split

In DNL, a 10 dB penalty is added to those noise events occurring at nighttime (between 10 p.m. and 7 a.m.) to reflect the added intrusiveness of nighttime noise events when background noise levels are low and people are at rest. To account for this penalty, the fleet mixes were categorized into daytime (between 7 a.m. to 10 p.m.) operations and nighttime (between 10 p.m. and 7 a.m.) operations (day/night split).

Table 6.1 compares the day/night split in the 2021 Base Year and the 2040 LTP noise contours. The percentage of nighttime operations is expected to increase slightly from 4.2% in 2021 to 4.6% in 2040 because of higher projected growth rates of turboprops and jets which operate more frequently at nighttime than pistons. The total AAD operations would increase by 9.6%.

Table 6.1: 2021 and 2040 AAD Day/Night Split Comparison

DAY/NIGHT SPLIT	2021	2040	PERCENT CHANGE
Day	95.8%	95.4%	-0.4%
Night	4.2%	4.6%	0.4%
Total	100.0%	100.0%	

Totals may not sum up due to rounding.

Sources: MAC and HNTB analysis, 2023.

6.2.4 Runway Use

Runway use represents how aircraft utilize the runway(s) and helipad(s) at an airport and is a primary factor in the determination of noise exposure. Runway uses in 2040 by airline and aircraft were assumed to be consistent with the 2021 runway uses. Since growth rates for individual aircraft types are different, the overall runway uses may change as a result.

Table 6.2 compares the runway uses in 2021 and 2040. In general, the projected 2040 LTP runway uses are consistent with the 2021 Base Year runway uses with minor variances because of fleet mix changes. Compared with the 2021 Base Year runway uses, the 2040 LTP departures from Runway 28R and 10L would decrease by approximately 4.5% and 2.1% whereas departures from Runway 10R and 28L would increase by approximately 2.6% and 4.2%. The 2040 LTP arrivals to Runway 10R and 28L would increase by approximately 1.6% and 1.1% whereas arrivals to Runway 10L and 28R would decrease by 1.1% and 1.5%. Changes on other runways are less than 1%.

Table 6.2: 2021 and 2040 Runway Uses Comparison

OPERATION TYPE	RUNWAY[1]	2021		2040		COMPARISON	
		AAD	PERCENTAGE	AAD	PERCENTAGE	AAD	PERCENTAGE
Arrival	18	6.7	4.6%	7.2	4.5%	0.5	-0.1%
Arrival	36	2.3	1.6%	2.3	1.5%	0.1	-0.1%
Arrival	10L	13.3	9.1%	12.9	8.0%	-0.4	-1.1%
Arrival	28R	23.9	16.3%	23.9	14.9%	0.0	-1.5%
Arrival	10R	38.5	26.3%	44.7	27.9%	6.2	1.6%
Arrival	28L	61.4	42.1%	69.2	43.2%	7.8	1.1%
Arrival Total		**146.0**	**100.0%**	**160.2**	**100.0%**	**14.1**	**0.0%**
Departure	18	5.9	4.1%	6.4	4.0%	0.5	0.0%
Departure	36	1.8	1.3%	1.9	1.2%	0.1	-0.1%
Departure	10L	32.9	22.5%	32.7	20.4%	-0.2	-2.1%
Departure	28R	59.1	40.5%	57.6	36.0%	-1.5	-4.5%
Departure	10R	17.2	11.8%	22.9	14.3%	5.8	2.6%
Departure	28L	29.1	19.9%	38.5	24.1%	9.5	4.2%
Departure Total		**146.0**	**100.0%**	**160.2**	**100.0%**	**14.1**	**0.0%**
Touch and Go	18	2.4	7.6%	2.5	7.3%	0.2	-0.2%
Touch and Go	36	0.6	1.9%	0.6	1.8%	0.1	0.0%
Touch and Go	10L	8.5	27.2%	9.3	26.9%	0.9	-0.2%
Touch and Go	28R	13.2	42.5%	14.5	42.1%	1.3	-0.4%
Touch and Go	10R	2.5	8.0%	2.8	8.1%	0.3	0.1%
Touch and Go	28L	4.0	12.9%	4.7	13.6%	0.7	0.7%
Touch and Go Total		**31.1**	**100.0%**	**34.5**	**100.0%**	**3.4**	**0.0%**

[1]: Excluding helipads.
Totals may not sum up due to rounding.
Sources: MAC Data and HNTB Analysis, 2023.

6.2.5 Flight Tracks

To determine projected noise levels on the ground, it is necessary to determine not only the frequency of aircraft operations, but also the altitude and location in which they fly. Flight routes to and from an airport are generally a function of the geometry of the airport's runways and the surrounding airspace structure near the airfield. The 2040 LTP flight track uses were assumed to be same as the 2021 Base Year flight track uses for the same airline and aircraft. Detailed track use is included in **Appendix B.**

6.2.6 Noise Contours

Figure 6.3 shows a comparison between the 2021 Base Year and the 2040 LTP noise contours in 5dB increments from 55dB-70dB DNL.

Table 6.3 shows the 60dB + and 65dB + DNL area of the 2021 Base Year and the 2040 LTP noise contours. The 60dB + and 65dB + DNL areas are projected to increase by 24.3% and 21.2% respectively from 2021 to 2040. The increases are primarily driven by increases in total operations (9.6%) and nighttime operations (0.4%). Since there is a 10-dB penalty for nighttime operations in DNL, a 0.4% increase in nighttime operations is equivalent to 4% increase in operations. In the 2040 LTP fleet mix forecast, operations by piston aircraft are projected to decrease slightly and operations by turboprops and jets are projected to increase by 68.5% and 26.1% respectively.

Table 6.3: Noise Contour Area (acre)

AREAS	2021	2040	% CHANGE
60dB +	611.2	759.9	24.3%
65dB +	252.4	305.9	21.2%
70dB+	126.9	140.6	10.8%

Sources: MAC Data and HNTB Analysis, 2023.

6.2.6 Residential Noise Impacts

Within the 2021 Base Year noise contours, there are 252 acres within the 65 DNL contour, which is entirely contained on Airport property. Within the 2040 LTP noise contours, there are 306 acres within the 65 DNL contour, which is entirely contained on airport property.

Table 6.4 contains the count of residential units in the 2021 Base Year and 2040 LTP noise contours. The analysis is based on parcels intersect methodology where all parcels that are within or touched by the noise contour are counted. The FAA considers residential structures incompatible within the 65 DNL noise contour, and the 60 DNL noise contour counts are provided for reference only. The noise contours and residential properties are all within the City of Eden Prairie.

Table 6.4: 2021 and 2040 Baseline Noise Impact Summary

NOISE CONTOUR	RESIDENTIAL TYPE	60-64	65-69	70-74	75+	TOTAL
2021 Base Year	Single-Family Detached	1	0	0	0	**1**
	Single Family Attached	10	0	0	0	**10**
2040 LTP	Single-Family Detached	47	0	0	0	**47**
	Single Family Attached	47	0	0	0	**47**

Source: Hennepin County Parcel data and HNTB Analysis, 2024.

DRAWING LEGEND

2021 BASE YEAR NOISE CONTOUR	
2040 LTP NOISE CONTOUR	
AIRPORT PROPERTY LINE	

60 DNL
65 DNL
70 DNL
75 DNL

Staring Lake
Staring Lake Park
Hennepin Technical College
Flying Cloud Airport
Pioneer Trail
Eden Prairie Road
Mitchell Road
East Staring Lane
Staring Lake Parkway
Braxton Drive
Gateway Lane
Hilltop Road
913 ft
Shetland Road
Valley Road
Bryant Road
Riley Creek
Sky Lane
Cirrus Way
Prospect Road
Spring Road
Beverly Drive
Reeder Ridge
Liatris Lane
Charlson Road
Flying Cloud Drive
Riverview Road
Creek Knoll Road
Woodridge Drive
Surrey Street
Sunnybrook Road
Jasper Lane
Kiersten Place
Silverwood Drive
Mooer Lane
Travois Road
912 ft
918 ft
909 ft
901 ft
903 ft

NOTE

Sources: MACNOMS and HNTB Analysis 2023
60 DNL noise contour is shown for informational purposes only.

FCM

FLYING CLOUD AIRPORT
FCM LTP NOISE CONTOURS

N

0 500 1,000 2,000 Feet

HNTB

FINAL DOCUMENT

FIGURE 6-3

SEPTEMBER 2025

2021 BASE YEAR vs
2040 LTP NOISE CONTOUR

6.3 Other Environmental Considerations

It is anticipated that most of the projects in the preferred development plan will require an environmental review process per federal NEPA and Minnesota Environmental Policy Act (MEPA) requirements to identify the environmental footprint of the improvements more specifically before construction can begin. During that process, alternatives must be reviewed, and any potential impacts must be avoided if possible. If impacts cannot be avoided, they must be minimized to the extent possible and mitigated in full compliance with federal and state requirements.

The following impact categories will be assessed during the environmental review:

- Air quality
- Biological resources (including fish, wildlife, and plants)
- Climate
- Department of Transportation Section 4(f) properties (park and recreational lands, wildlife and waterfowl refuges, and historic sites)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archeological, and cultural resources
- Land use
- Natural resources and energy supply
- Noise and compatible land use
- Socioeconomics, environmental justice, and children's environmental health and safety risks
- Visual effects (including light emissions)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)
- Construction impacts
- Cumulative effects

As part of the NEPA process, federal, state, and local resource agency coordination may be required, including (but not limited to): U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S> Army Corps of Engineers, MN State Historic Preservation Office, MN Pollution Control Agency, MN Environmental Quality Board, and Hennepin County.

As detailed in *Chapter 1, Inventory of Existing Conditions, Section 1.8, Environmental*, and Figures 1-11 and 1-12, the following resource categories should be more closely considered at and around FCM:

- **Air Quality**
  - Hennepin County is in a maintenance area for CO (1971 standard) and SO_2 (1971 standard). The designation signifies those violations of the NAAQS for CO and SO_2 have occurred in the past but that the area is currently in attainment. To qualify as a CATEX, projects must be listed as exempt, presumed to conform, or demonstrate that emissions fall below *de minimis* levels.
- **Biological Resources**
  - According to the USFWS Information, Planning, and Conservation (IPaC) tool, federally listed species include the threatened Northern Long-eared Bat (*Myotis septentrionalis*) and the endangered Rusty Patched Bumble Bee (*Bombus affinis*).
  - Conservation areas and the Minnesota Valley National Wildlife Refuge, along the Minnesota River, are located nearby the Airport, as shown on Figure 1-11. The refuge, with its wetlands

and floodplain forests, provides protected habitat to numerous species, including but not limited to migrating waterfowl, threatened and endangered species, and the bald eagle.[4]

- **Department of Transportation Act, Section 4(f) resources on and adjacent to Airport property**
  - FCM is surrounded by multiple parks, conservation areas and wildlife refuges, as indicated on Figure 1-11. 4(f) properties near the Airport include Staring Lake Park (north of the Airport), Cedar Hills Park (west of the Airport), Prairie Bluff Conservation Area (south of the Airport), Riley Creek Conservation Area (southwest of the Airport), and the Minnesota Valley National Wildlife Refuge (located south of the Airport).[5] Staring Lake Park and the Minnesota Valley National Wildlife Refuge are also considered 6(f) properties.[6]
- **Noise and Land Use Compatibility**
  - For construction which may require extended runway closure periods, consideration must be given to the temporary noise impacts on noise sensitive areas resulting from a change in operations.
- **Water Resources**
  - Wetlands associated with major surface waters are located nearby FCM, including Minnesota River and Grass Lake (south of the Airport), Staring Lake and Purgatory Creek (north of the Airport), and Riley Creek (west of the Airport), as shown on Figure 1-12. There are 100-year floodplains and floodways around the Airport associated with waterways, however no Airport facilities are within the floodplain.
  - FCM is in the City of Eden Prairie which relies on groundwater for municipal water.

[4] USFWS, Minnesota Valley National Wildlife Refuge, https://www.fws.gov/refuge/minnesota-valley/species
[5] Hennepin County GIS, Parks Finder, https://gis.hennepin.us/parks/, accessed 4/4/2022
[6] The Land and Water Conservation Fund, Past Projects, https://lwcf.tplgis.org/mappast/, accessed 4/4/2022