Appendices to the Noise Exposure Map Update

Pursuant to Title 14 of the Code of Federal Regulations Part 150

Dane County Regional Airport

HMMH Report No. 312360

November 2022

Prepared for:

Dane County Regional Airport
4000 International Lane
Madison, WI 53704

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Appendix A Noise Metrics

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A.1 Aircraft Noise Terminology

Noise is a complex physical quantity. The properties, measurement, and presentation of noise involve specialized terminology that can be difficult to understand. To provide a basic reference on these technical issues, this section introduces fundamentals of noise terminology, the effects of noise on human activity, and noise propagation.

A.1.1 Introduction to Noise Terminology

Analyses of potential impacts from changes in aircraft noise levels rely largely on a measure of cumulative noise exposure over an entire calendar year, expressed in terms of a metric called the Day-Night Average Sound Level (DNL). However, DNL does not provide an adequate description of noise for many purposes. A variety of measures, which are further described in subsequent sub-sections, are available to address essentially any issue of concern, including:

- Sound Pressure Level, SPL, and the Decibel, dB
- A-Weighted Decibel, dBA
- Maximum A-Weighted Sound Level, L_{max}
- Time Above, TA
- Sound Exposure Level, SEL
- Equivalent A-Weighted Sound Level, L_{eq}
- Day-Night Average Sound Level, DNL

A.1.2 Sound Pressure Level, SPL, and the Decibel, dB

All sounds come from a sound source – a musical instrument, a voice speaking, an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source travels through the air in sound waves – tiny, quick oscillations of pressure just above and just below atmospheric pressure. The ear senses these pressure variations and – with much processing in our brain – translates them into "sound."

Our ears are sensitive to a wide range of sound pressures. The loudest sounds that we can hear without pain contain about one million times more energy than the quietest sounds we can detect. To allow us to perceive sound over this very wide range, our ear/brain "auditory system" compresses our response in a complex manner, represented by a term called sound pressure level (SPL), which we express in units called decibels (dB).

Mathematically, SPL is a logarithmic quantity based on the ratio of two sound pressures, the numerator being the pressure of the sound source of interest (P_{source}), and the denominator being a reference pressure ($P_{reference}$) [1]

$$Sound\ Pressure\ Level\ (SPL) = 20 * Log\left(\frac{P_{source}}{P_{reference}}\right) dB$$

The logarithmic conversion of sound pressure to SPL means that the quietest sound that we can hear (the reference pressure) has a sound pressure level of about 0 dB, while the loudest sounds that we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels from about 40 to 100 dB[2].

Because decibels are logarithmic quantities, we cannot use common arithmetic to combine them. For example, if two sound sources each produce 100 dB operating individually, when they operate simultaneously, they produce 103 dB -- not the 200 dB we might expect. Increasing to four equal sources operating simultaneously will add another three decibels of noise, resulting in a total SPL of 106 dB. For every doubling of the number of equal sources, the SPL goes up another three decibels.

If one noise source is much louder than another is, the louder source "masks" the quieter one and the two sources together produce virtually the same SPL as the louder source alone. For example, a 100 dB and 80 dB sources produce approximately 100 dB of noise when operating together.

Two useful “rules of thumb” related to SPL are worth noting: (1) humans generally perceive a six to 10 dB increase in SPL to be about a doubling of loudness,[3] and (2) changes in SPL of less than about three decibels for an particular sound are not readily detectable outside of a laboratory environment.

A.1.3 A-Weighted Decibel

An important characteristic of sound is its frequency, or "pitch.” This is the per-second oscillation rate of the sound pressure variation at our ear, expressed in units known as Hertz (Hz).

When analyzing the total noise of any source, acousticians often break the noise into frequency components (or bands) to consider the “low,” “medium,” and “high” frequency components. This breakdown is important for two reasons:

- Our ear is better equipped to hear mid and high frequencies and is least sensitive to lower frequencies. Thus, we find mid- and high-frequency noise more annoying.

[1] The reference pressure is approximately the quietest sound that a healthy young adult can hear.

[2] The logarithmic ratio used in its calculation means that SPL changes relatively quickly at low sound pressures and more slowly at high pressures. This relationship matches human detection of changes in pressure. We are much more sensitive to changes in level when the SPL is low (for example, hearing a baby crying in a distant bedroom), than we are to changes in level when the SPL is high (for example, when listening to highly amplified music).

[3] A “10 dB per doubling” rule of thumb is the most often used approximation.

- Engineering solutions to noise problems differ with frequency content. Low-frequency noise is generally harder to control.

The normal frequency range of hearing for most people extends from a low of about 20 Hz to a high of about 10,000 to 15,000 Hz. Most people respond to sound most readily when the predominant frequency is in the range of normal conversation – typically around 1,000 to 2,000 Hz. The acoustical community has defined several “filters,” which approximate this sensitivity of our ear and thus, help us to judge the relative loudness of various sounds made up of many different frequencies.

The so-called "A" filter (“A weighting”) generally does the best job of matching human response to most environmental noise sources, including natural sounds and sound from common transportation sources. “A-weighted decibels” are abbreviated “dBA.” Because of the correlation with our hearing, the U. S. Environmental Protection Agency (EPA) and nearly every other federal and state agency have adopted A-weighted decibels as the metric for use in describing environmental and transportation noise. **Figure 1** depicts A-weighting adjustments to sound from approximately 20 Hz to 10,000 Hz.

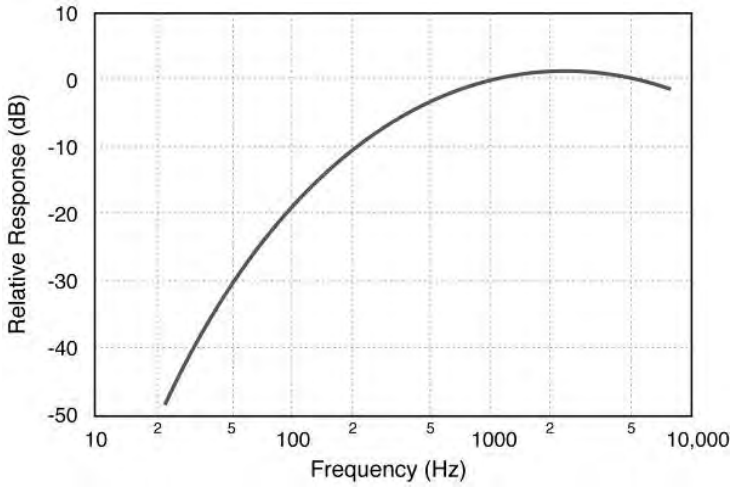

Figure 1. A-Weighting Frequency Response
Source: Extract from Harris, Cyril M., Editor, “Handbook of Acoustical Measurements and Control,” McGraw-Hill, Inc., 1991, pg. 5.13; HMMH

As the figure shows, A-weighting significantly de-emphasizes noise content at lower and higher frequencies where we do not hear as well, and has little effect, or is nearly "flat,” in for mid-range frequencies between 1,000 and 5,000 Hz. All sound pressure levels presented in this document are A-weighted unless otherwise specified.

Figure 2 depicts representative A-weighted sound levels for a variety of common sounds.

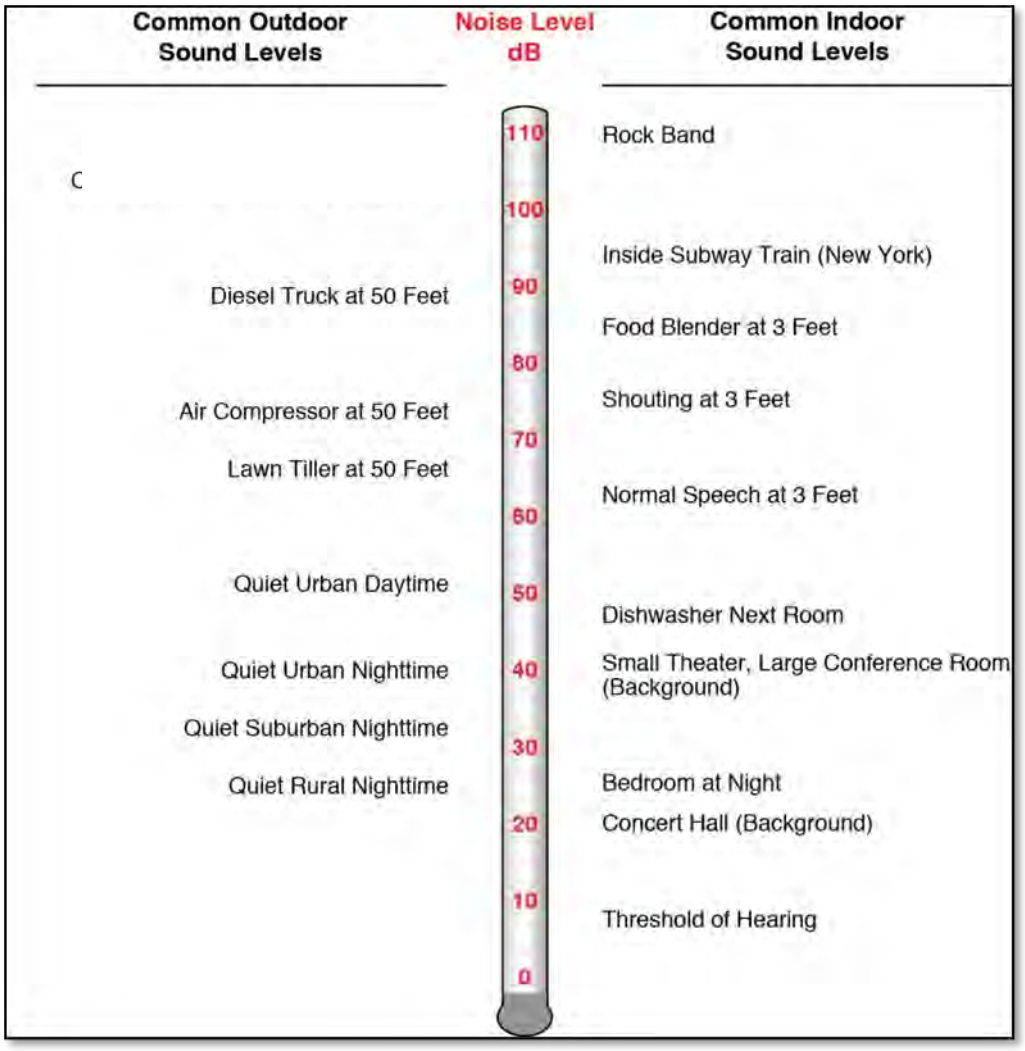

Figure 2. A-Weighted Sound Levels for Common Sounds
Source: HMMH

A.1.4 Maximum A-Weighted Sound Level, L_{max}

An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as a car or aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance. The background or “ambient” level continues to vary in the absence of a distinctive source, for example due to birds chirping, insects buzzing, leaves rustling, etc. It is often convenient to describe a particular noise "event" (such as a vehicle passing by, a dog barking, etc.) by its maximum sound level, abbreviated as L_{max}.

Figure 3 depicts this general concept, for a hypothetical noise event with an L_{max} of approximately 102 dB.

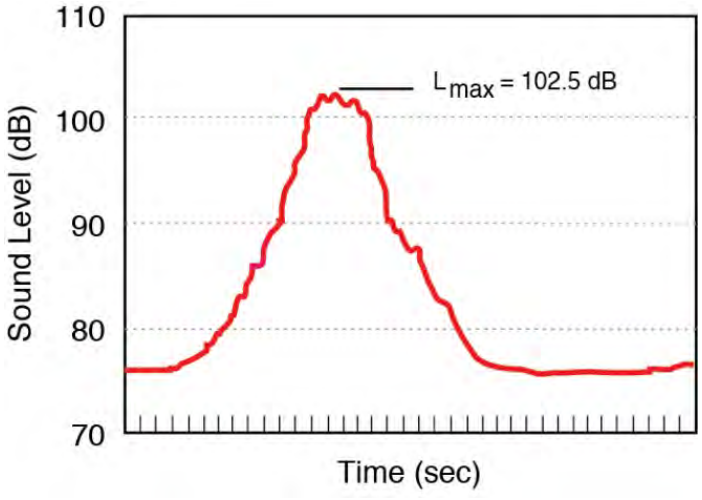

Figure 3. Variation in A-Weighted Sound Level over Time and Maximum Noise Level

Source: HMMH

While the maximum level is easy to understand, it suffers from a serious drawback when used to describe the relative "noisiness" of an event such as an aircraft flyover; i.e., it describes only one dimension of the event and provides no information on the event's overall, or cumulative, noise exposure. In fact, two events with identical maximum levels may produce very different total exposures. One may be of very short duration, while the other may continue for an extended period and be judged much more annoying. The next section introduces a measure that accounts for this concept of a noise "dose," or the cumulative exposure associated with an individual "noise event" such as an aircraft flyover.

A.1.5 Sound Exposure Level, SEL

The most commonly used measure of cumulative noise exposure for an individual noise event, such as an aircraft flyover, is the Sound Exposure Level, or SEL. SEL is a summation of the A-weighted sound energy over the entire duration of a noise event. SEL expresses the accumulated energy in terms of the one-second-long steady-state sound level that would contain the same amount of energy as the actual time-varying level.

SEL provides a basis for comparing noise events that generally match our impression of their overall "noisiness," including the effects of both duration and level. The higher the SEL, the more annoying a noise event is likely to be. In simple terms, SEL "compresses" the energy for the noise event into a single second. **Figure 4** depicts this compression, for the same hypothetical event shown in **Figure 3**. Note that the SEL is higher than the L_{max}.

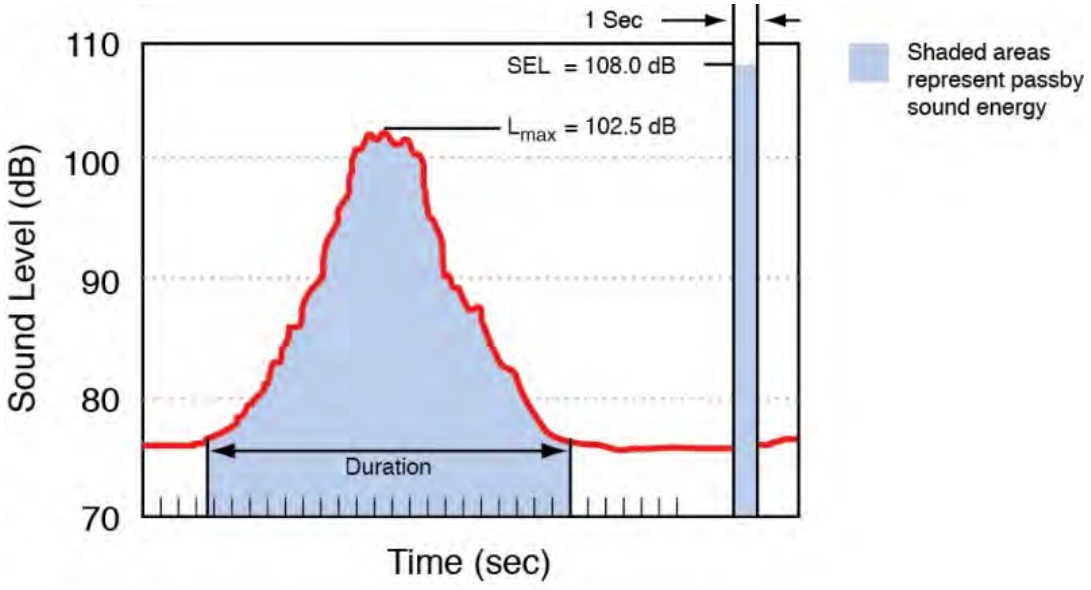

Figure 4. Graphical Depiction of Sound Exposure Level

Source: HMMH

The "compression" of energy into one second means that a given noise event's SEL will almost always will be a higher value than its L_{max}. For most aircraft flyovers, SEL is roughly five to 12 dB higher than L_{max}. Adjustment for duration means that relatively slow and quiet propeller aircraft can have the same or higher SEL than faster, louder jets, which produce shorter duration events.

A.1.6 Equivalent A-Weighted Sound Level, L_{eq}

The Equivalent Sound Level, abbreviated L_{eq}, is a measure of the exposure resulting from the accumulation of sound levels over a particular period of interest; e.g., one hour, an eight-hour school day, nighttime, or a full 24-hour day. L_{eq} plots for consecutive hours can help illustrate how the noise dose rises and falls over a day or how a few loud aircraft significantly affect some hours.

L_{eq} may be thought of as the constant sound level over the period of interest that would contain as much sound energy as the actual varying level. It is a way of assigning a single number to a time-varying sound level. **Figure 5** illustrates this concept for the same hypothetical event shown in **Figure 3** and **Figure 4**. Note that the L_{eq} is lower than either the L_{max} or SEL.

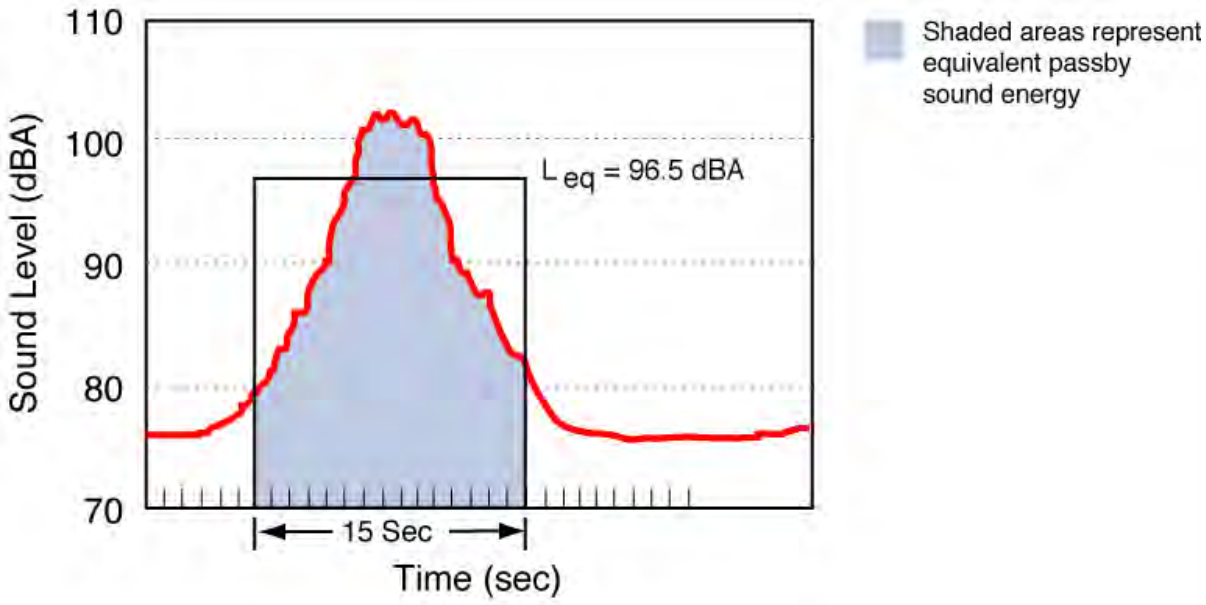

Figure 5. Example of a 15-Second Equivalent Sound Level

Source: HMMH

A.1.7 Day-Night Average Sound Level, DNL or L_{dn}

The FAA requires that airports use a measure of noise exposure that is slightly more complicated than L_{eq} to describe cumulative noise exposure – the Day-Night Average Sound Level, DNL.

The U.S. EPA identified DNL as the most appropriate means of evaluating airport noise based on the following considerations.[4]

- The measure should be applicable to the evaluation of pervasive long-term noise in various defined areas and under various conditions over long periods.
- The measure should correlate well with known effects of the noise environment and on individuals and the public.
- The measure should be simple, practical, and accurate. In principal, it should be useful for planning as well as for enforcement or monitoring purposes.
- The required measurement equipment, with standard characteristics, should be commercially available.
- The measure should be closely related to existing methods currently in use.
- The single measure of noise at a given location should be predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.

[4] "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U. S. EPA Report No. 550/9-74-004, March 1974.

- The measure should lend itself to small, simple monitors, which can be left unattended in public areas for long periods.

Most federal agencies dealing with noise have formally adopted DNL. The Federal Interagency Committee on Noise (FICON) reaffirmed the appropriateness of DNL in 1992. The FICON summary report stated: "There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric."

In 2015, the FAA began a multi-year effort to update the scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports.[5] This was the most comprehensive study using a single noise survey ever undertaken in the United States, polling communities surrounding 20 airports nationwide. The FAA Reauthorization Act of 2018 under Section 188 and 173, required FAA to complete the evaluation of alternative metrics to the DNL standard within one year. The Section 188 and 173 Report to Congress was delivered on April 14, 2020[6] and concluded that while no single noise metric can cover all situations, DNL provides the most comprehensive way to consider the range of factors influencing exposure to aircraft noise. In addition, use of supplemental metrics is both encouraged and supported to further disclose and aid in the public understanding of community noise impacts. The full study supporting these reports was released in January 2021. If changes are warranted in the use of DNL, which DNL level to assess or the use of supplemental metrics, FAA will propose revised policy and related guidance and regulations, subject to interagency coordination, as well as public review and comment.

In simple terms, DNL is the 24-hour L_{eq} with one adjustment; all noises occurring at night (defined as 10 p.m. through 7 a.m.) are increased by 10 dB, to reflect the added intrusiveness of nighttime noise events when background noise levels decrease. In calculating aircraft exposure, this 10 dB increase is mathematically identical to counting each nighttime aircraft noise event ten times.

DNL can be measured or estimated. Measurements are practical only for obtaining DNL values for limited numbers of points, and, in the absence of a permanently installed monitoring system, only for relatively short periods. Most airport noise studies use computer-generated DNL estimates depicted as equal-exposure noise contours (much as topographic maps have contours of equal elevation).

The annual DNL is mathematically identical to the DNL for the average annual day; i.e., a day on which the number of operations is equal to the annual total divided by 365 (366 in a leap year). **Figure 6** graphically depicts the manner in which the nighttime adjustment applies in calculating DNL. **Figure 7** presents representative outdoor DNL values measured at various U.S. locations.

[5] Federal Aviation Administration. Press Release – FAA To Re-Evaluate Method for Measuring Effects of Aircraft Noise. https://www.faa.gov/news/press_releases/news_story.cfm?newsId=18774

[6] Federal Aviation Administration. Report to Congress on an evaluation of alternative noise metrics. https://www.faa.gov/about/plans_reports/congress/media/Day-Night_Average_Sound_Levels_COMPLETED_report_w_letters.pdf

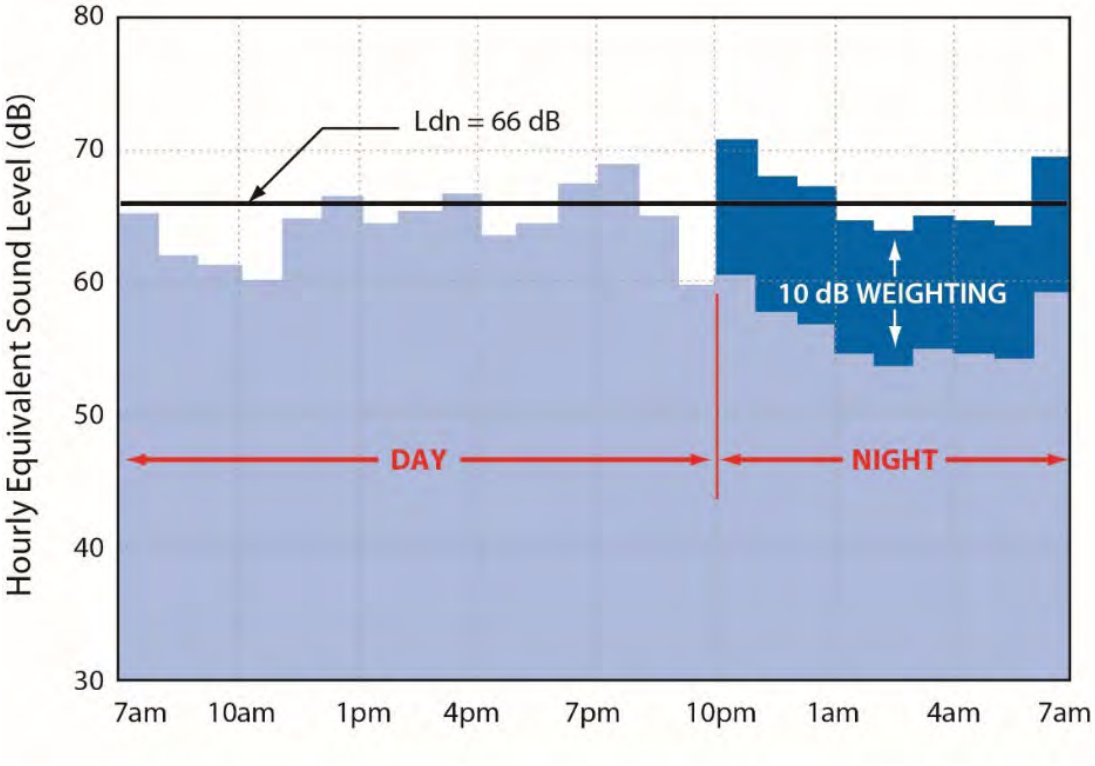

Figure 6. Example of a Day-Night Average Sound Level Calculation

Source: HMMH

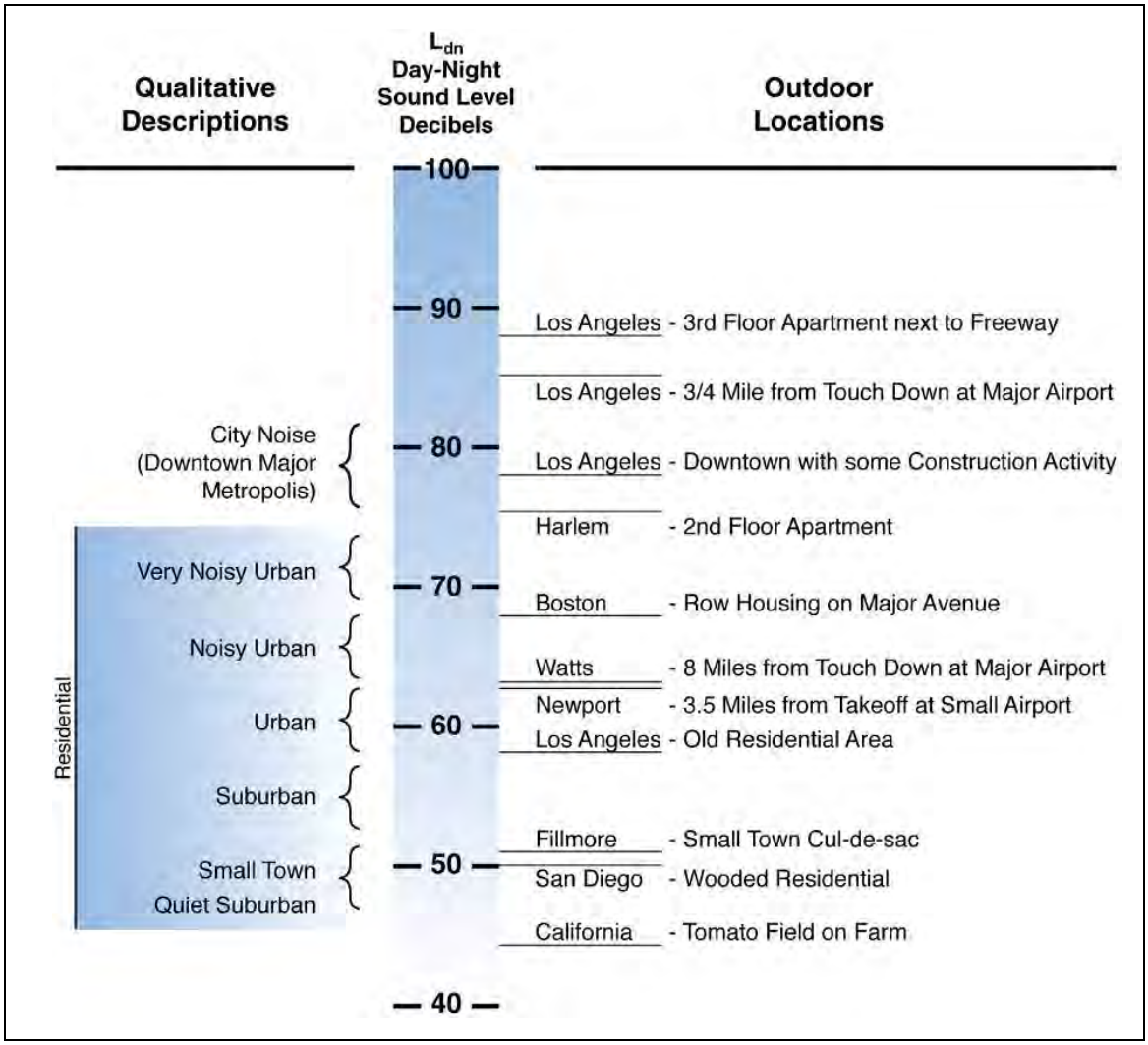

Figure 7. Examples of Measured Day-Night Average Sound Levels, DNL

Source: U.S. Environmental Protection Agency, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," March 1974, p.14.

Appendix B Existing Noise Compatibility Program

This appendix includes:

- 1993 FAA Record of Approval of Noise Compatibility Program
- Noise Compatibility Program (NCP) Review Memorandum
- MSN Air Traffic Control Tower Order 8400.9I

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U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: **ACTION:** Transmittal of the Approved Part 150 Program for the Dane County Regional Airport (Truax Field) Madison, Wisconsin

Date: JUN 26 92

Reply to Attn. of:

From: Manager, Community and Environmental Needs Division, APP-600

To: Manager, Great Lakes Region, AGL-600

Attached is the approval package for the subject Noise Compatibility Program. Please send us a copy of your signed letter to the sponsor for our records.

Lynne Sparks Pickard
Lynne S. Pickard

Attachment

cc: AEE-300(info)

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: **ACTION:** FAR Part 150 Noise Compatibility Program for Dane County Regional Airport (Truax Field) Madison, Wisconsin

Date: [illegible] 25 [illegible]

From: Director, Office of Airport Planning and Programming, APP-1

Reply to Attn. of:

To: Assistant Administrator for Airports, ARP-1

Attached for your action is the Noise Compatibility Program (NCP) for the Dane County Regional Airport (Truax Field) Madison, Wisconsin (MSN) under FAR Part 150. The Great Lakes Region, in conjunction with Federal Aviation Administration (FAA) Headquarters has evaluated the program and recommends action as set forth below.

On July 26, 1992, the FAA determined that the Noise Exposure Maps (NEM's) for MSN are in compliance with the requirements of Section 103(a) of the Aviation Safety and Noise Abatement Act of 1979 (ANSA) and Title 14, CFR Part 150. At the same time, the FAA made notification in the Federal Register of the formal 180 day review period for MSN's proposed program under the provisions of section 104(a) of ANSA and FAR Part 150. The 180-day formal review period ends January 25, 1993. If the program is not acted on by the FAA by that date, it will automatically be approved by law, with the exception of flight procedures.

The MSN program describes the current and future noncompatible land uses. The NCP proposes several measures to remedy existing noise problems and prevent noncompatible land uses. Each measure is described in the attached Record of Approval.

The Assistant Administrator for Policy, Planning, and International Aviation and the Chief Counsel have concurred with the recommendations of the Great Lakes Region. If you agree with the recommended FAA determinations, you should sign the "approve" line on the attached signature page. I recommend your approval.

Paul L. Galis

Paul L. Galis

Attachments

RECORD OF APPROVAL

FAR PART 150 NOISE COMPATIBILITY PROGRAM

DANE COUNTY REGIONAL AIRPORT

MADISON, WISCONSIN

		CONCUR	NONCONCUR
Dale B. McDaniel Assistant Administrator for Policy, Planning and International Aviation, API-1	1-19-93 Date	✓	
for Chief Counsel, AGC-1	1/25/93 Date	✓	
Assistant Administrator for Airports, ARP-1	1/25/93 Date	✓ Approved	Disapproved

RECORD OF APPROVAL
DANE COUNTY REGIONAL AIRPORT
NOISE COMPATIBILITY PROGRAM

The Noise Compatibility Program (NCP) for Dane County Regional Airport in Madison, Wisconsin, describes the current and future noncompatible land uses based upon the parameters established in FAR Part 150, Airport Noise Compatibility Planning. Dane County recommended twenty-three (23) measures in their NCP to remedy existing noise problems and prevent future non-compatible land uses. These measures are grouped into three categories: Noise Abatement (Measures NA-1 to NA-9), Land Use Management (Measures LU-1 to LU-11) and Continuing Program (Measures CP-1 to CP-3).

Each measure of the recommended Noise Compatibility Program includes a summary of the airport operator's recommendations and a cross reference to page numbers in the NCP where each measure can be found. The NCP Study itself contains additional summary information in Tables 5-C and 5-D, on pages 5-20 and 5-25, respectively. The official Noise Exposure Maps (NEM) are located on pages I-11 and I-12 in the separate NEM Study.

The summary of each measure follows as closely as possible the airport operator's recommendations in the NCP Study. The statements contained within the summarized recommendations and before the indicated FAA approval, disapproval, or other determination do not represent the opinions or decisions of the FAA.

The approvals listed herein include approvals of measures that the airport recommends be taken by the FAA. **It should be noted that these approvals indicate only that the measures would, if implemented, be consistent with the purposes of Part 150. These approvals do not constitute decisions to implement the measures. Later decisions concerning possible implementation of the measures may be subject to applicable environmental or other procedures or requirements.**

NOISE ABATEMENT MEASURES

NA-1. Continue the existing informal runway use program. (Pages 4-5, 5-2, Appendix D-2, Comments 10 and 12 of Responses to FAA Review Comments)

Dane County proposes to continue using a previously established informal Runway Use Program (RUP). It calls for the use of Runways 31 and 36 for takeoff and Runways 18 or 13 for landing by all aircraft over 12,500 pounds. It applies with tailwinds of 5 knots or less, crosswinds of 15 knots or less, and with clear and dry runways. It is

intended to conform to the informal system established under the criteria set forth in FAA Order 8400.9.

Aircraft arrive from the north on Runway 18 and depart to the north on Runway 36. The resultant operation is a head-to-head configuration, wind, weather and air traffic permitting. Air traffic controllers are requested to honor pilot requests for downwind departures on Runway 36 and downwind arrivals on Runway 18. This informal program is set forth in Tower Order 7220.2A, dated Jan 1, 1990.

The effect of this pattern of air traffic control is clearly seen in the Noise Exposure Map contours. The benefit of this method of operation is that the bulk of the noise generated by air carrier jet aircraft in and out of Madison is directed over largely undeveloped park land north of the airport.

APPROVED AS A VOLUNTARY MEASURE, IN PART. This noise abatement measure has worked well for Dane County Regional Airport over the years and does mitigate the level of noise experienced by noise sensitive areas south of the airport. While FAA approves the continuation of the voluntary program presently in place, it does not approve using the model Letter of Agreement (LOA) in Appendix D for implementation. Since a tower order addressing the RUP procedures already exists, implementing the LOA would be redundant.

NA-2. Maintain internal tower directive requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet AGL) before turning left. (Pages 4-6, 5-2, 5-3, Appendix D-2, Comment 12 of Responses to FAA Review Comments)

Dane County recommends the Air Traffic Control Tower maintain the existing Runway 31 departure procedure as a beneficial noise abatement measure.

The internal operating procedure requires aircraft departing Runway 31 to pass through 2,500 MSL before turning south of 310 degrees. An early left turn from Runway 31 would place departing aircraft over the Cherokee subdivision west of the airport. By limiting such turns until reaching a specified altitude, population impacted by noise is reduced. This procedure is set forth in Tower Order 7220.2A, dated Jan 1, 1990.

APPROVED IN PART. This noise abatement measure has worked well for Dane County Regional Airport over the years and does mitigate the level of noise experienced by noise sensitive areas west of the airport. While FAA approves continuation of the procedure presently in place, it does not approve using the model Letter of Agreement (LOA) in

Appendix D for implementation. Since a tower order addressing the RUP procedures already exists, implementing the LOA would be redundant.

NA-3. Establish visual approach and departure corridors for helicopters. (Pages 4-6, 4-7, 4-8A, 5-3, Appendix D-4, Comment 13 of Responses to FAA Review Comments)

Since there are significant helicopter operations at the airport from the Wisconsin Army National Guard, Dane County should implement this noise abatement measure by entering into a Letter of Agreement with the Air Traffic Control Tower and the National Guard helicopter unit establishing the noise-compatible helicopter corridors shown in **Exhibit 4B** (page 4-8A of the NCP).

The airport staff have developed a draft procedure designating checkpoints, flight corridors, and air traffic control procedures for helicopter approaches and departures. Three checkpoints should be adopted: **Checkpoint Interstate** at the interchange of Interstates 90/94 and State Highway 30; **Checkpoint River** on the Yahara River northwest of the airport; and **Checkpoint Park** (identified on Exhibit 4B as "New Checkpoint") at the interchange of U.S. Highway 51 (a.k.a. Stoughton Road) and Interstate 90/94 adjacent to Token Creek Park. Helicopters departing to and arriving from the south would fly between the airport and Checkpoint Interstate via State Highway 30. Helicopters departing to and arriving from the north and northwest would fly directly between the airport and Checkpoint River. Helicopters departing to and arriving from the north and northeast would fly directly between the airport and Checkpoint Park. Each of these procedures is dependent on weather and operating conditions and would be subject to the discretion of the pilot-in-command and/or air traffic being able to maintain a safe operation.

The County should encourage the National Guard to prominently display maps of the corridors and to inform its pilots of the procedures. The County should also ensure that the Air Traffic Manager has the information needed to properly brief controllers and to fully implement the procedures. Adoption of a tower order, while not strictly necessary, would assist in the implementation of the procedures. (A model Letter of Agreement is included in **Appendix D.**)

The concern expressed during this study about low-flying helicopters is not so severe as to influence the noise contours, but it is the cause of potentially annoying single events and should be dealt with to the extent feasible. Helicopters often fly lower than fixed-wing aircraft and have a distinctive sound which can prove irritating even at

low sound intensity levels. As it is a good policy to route the helicopters over available noise-compatible corridors, these visual approach procedures should be adopted.

APPROVED IN PART. This measure was reviewed and approved in two parts. Concerning the first part, FAA agrees with and approves the concept of establishing VFR helicopter approach and departure corridors. However, the proposed **Checkpoint Park**, northeast of the airport, will create traffic conflicts with Runway 36 departures. The other two checkpoints will not conflict with traffic flows. Therefore, FAA approves only the remaining two checkpoints, Interstate and River, and their associated corridors.

Concerning the second part, implementation of an effective procedure does not require the formality suggested in Appendix D. A simple Letter of Agreement between the aircraft operator, i.e. the military and the Air Traffic Control Tower, in coordination with Airport Management, will suffice. Therefore, FAA approves the two checkpoints, Interstate and River, and the proposed routings, but disapproves the method of implementing the procedures suggested in Appendix D.

NA-4. Encourage use of noise abatement departure procedures by operators of jet aircraft.
(Pages 4-12 thru 4-14, 5-3)

While it is inappropriate for Dane County Regional Airport to enforce an airport-specific noise abatement departure procedure, Dane County should encourage the airlines, business jet operators and the military to make full use of their own internal noise abatement departure procedures.

Airlines fly a variation of the FAA AC 91-53 noise abatement departure profile. Operators of business jet aircraft can fly the NBAA standard departure procedure. In addition, some manufacturers describe noise abatement departure procedures suitable for their aircraft in the operator's manual. Military jet operators have already indicated an interest in quiet flying techniques when within the airport environs. Even as the military is contemplating the conversion of the relatively quiet A-10s to the louder A-16s, military officials have made inquiries as to the best way to fly the new aircraft in relation to airport neighbors.

Such noise mitigation departure procedures have been shown to be beneficial for noise abatement.

APPROVED AS A VOLUNTARY MEASURE. Noise abatement departure measures are incorporated in the INM departure profiles and

do have a degree of effectiveness.

NA-5. Encourage Air National Guard to follow through with its plans to construct a hush house for A-16 engine maintenance runups prior to converting its fleet.
(Pages 4-17, 5-4)

Dane County should encourage the Guard to follow through with its plans to construct a noise suppression structure, commonly called a "hush house", in anticipation of the increased noise levels from maintenance operations on the new aircraft.

The Air National Guard anticipates an aircraft change in the next few years with the A-10 aircraft being replaced with the A-16 aircraft. Engine maintenance for the A-10 is not unlike engine maintenance for business jet aircraft. Noise from test runups would likely be contained on airport property. The A-16 engine maintenance would be a different story. The noise contours from engine test runups for this aircraft would likely extend well beyond airport property.

Hush houses are extremely effective at attenuating noise. Construction of a hush house for A-16 runups will contain the potentially disturbing noise from these events.

APPROVED AS A VOLUNTARY MEASURE. The effectiveness of hush houses at attenuating noise levels is well documented.

NA-6. Construct new 6,500 foot Runway 3-21.
(Pages 4-15 thru 4-16, 4-19 thru 4-20, 4-23 thru 4-24, 4-27 thru 4-28, 5- 4, Comments 9 and 11 of Responses to FAA Review Comments)

Dane County proposes to construct a new air carrier runway, oriented 3-21, at a length of 6,500 feet. Construction of Runway 3-21 was discussed and evaluated as Alternatives Three and Six (**Exhibits 4E and 4F-3** of the NCP) and as Alternative 10 of the Master Plan study (page 5-6 and **Exhibit 5F**).

Part of the justification for a new Runway 3-21 versus lengthening the existing Runway 4-22 is the fact that lengthening Runway 4-22 will require additional relocation of U.S. Highway 51 (a.k.a. Stoughton Road). A road relocation project was recently completed on U.S. 51 adjacent to the area where further road relocation would be required. It would be very difficult to achieve another relocation of U.S. 51 in the near future. Alternatively, there is sufficient space for a new Runway 3-21 to be built without relocating U.S. 51. Also because of the condition of Runway 4-22, a lengthening project would essentially

involve full reconstruction. Because of this, construction of a completely new runway, oriented 3-21, is essentially equivalent in terms of cost.

The question of the best length for the proposed Runway 3-21 was the subject of discussion and analysis in the Airport Master Plan. While it would be desirable to have greater length, thus enabling use of the runway by the military, the proposed length of 6,500 feet will be sufficient for almost all civilian users. This alone will provide a significant noise benefit. The cost and complexity of building a longer runway was also a consideration. Any additional runway length would require the relocation of U.S. 51. As previously stated, another relocation of U.S. 51 is not considered practical. The highway was just relocated within the last two years to provide clearance off the approach end of Runway 31. That project was approved only after a controversial EIS which raised concerns among residents of neighborhoods immediately to the east. The sponsor's analysis indicated that a runway length of 6,500 feet would be sufficient for most commercial users at the airport, and would thus provide important noise benefits. It was considered unwise and not cost-effective to seek even greater runway length, thus reopening the controversial highway relocation issue.

Construction of a secondary air carrier runway allows the airport to operate for a longer period of time with its present contra-flow method of noise abatement. As has been pointed out, with increasing operations levels the airport will not be able to continue the present procedure of arrivals from the north and departures to the north. This procedure is of particular noise benefit and should be maintained as long as possible. Construction of an alternate runway will enable this.

Using the level-weighted population (LWP) analysis in the Study, an investment of $13.5 million for the new runway will relieve approximately 602 LWP (610 inside DNL 65 dB + 252 inside DNL 70 dB = 862 actual people) out of a total of 3,771 LWP (4,865 inside DNL 65 dB + 835 inside DNL 70 dB = 5,700 actual people) from significant noise impacts. This equates to a reduction of 16 percent. However, when viewed from the perspective of the cost to insulate the 372 homes occupied by the 862 actual people residing inside the DNL 65 dB, a different picture results. Assuming an average cost of $25,000 to $30,000 per house, the total insulation cost would be $9.3 to $11.2 million. Considering the additional time, effort and money to complete an insulation project of this magnitude, the final costs will be comparable to the $13.5 million cost for a new Runway 3-21. Furthermore, when combined with the fact that insulation is only effective when people remain inside their homes, justification for the new runway is even more compelling.

APPROVED.

NA-7. Adopt an informal preferential runway use system which encourages departures on Runways 3, 31, and 36 while preferring arrivals on Runways 13, 18, and 21.
(Pages 4-19 thru 4-20, 4-23 thru 4-24, 5-4 thru 5-5, Appendix D-6, Comments 10 and 12 of Responses to FAA Review Comments)

After Runway 3-21 is constructed, Dane County proposes to modify the existing informal Runway Use Program (RUP) to account for use of the new runway. Departures and arrivals on the new runway would be encouraged to and from the northeast. As with the existing RUP, it applies to all aircraft over 12,500 pounds, when tailwinds are 5 knots or less, crosswinds are 15 knots or less, and the runways are clear and dry. It is intended to conform to the informal system established under the criteria set forth in FAA Order 8400.9.

With Runway 3-21 in place, simultaneous operations are possible. Arrivals on Runway 21 and departures on Runway 36 or arrivals on Runway 18 and departures on Runway 3 are variations of the present contra-flow procedure to and from the north. Wind conditions would allow either of these simultaneous operating configurations about 25 percent of the time. Overall, departures could occur to the north on Runway 3 about 38 percent of the time and departures on Runway 36 could occur about 19 percent for a 57 percent total north departure potential. The winds and runway configuration would allow arrivals from the north about 65 percent of the time, 52 percent for Runway 21 and 13 percent for Runway 18. For 1995 baseline conditions, it was estimated only a 50 percent head-to-head north operating configuration would be possible.

Amendment of the current informal Runway Use Program which favors departures to the north and arrivals from the north would continue to provide noise abatement benefits to the heavily populated areas south of the airport.

APPROVED AS A VOLUNTARY MEASURE, IN PART. As with the existing RUP, this voluntary noise abatement measure will work well for Dane County Regional Airport in mitigating the level of noise experienced by noise sensitive areas south of the airport. While FAA approves the continuation of the voluntary program presently in place, it does not approve using the model Letter of Agreement (LOA) in Appendix D for implementation. Instead, as is done with the existing RUP, the procedures should be set forth in a tower order.

It is also important to note that the proposed operations planned for Runway 3-21 would not be simultaneous operations as defined by FAA. The FAA definition of such operations means that operations occur at the same time on two, different runways. The sponsor's proposed operational scheme would, in reality, be a sequential operation, that is, two operations would occur within the same general time frame on two different runways. To ensure that aircraft separations required by FAA Order 7110.65G are maintained, ATCT will develop procedures for the proposed runway use program.

NA-8. Adopt procedures requiring east and southbound aircraft exceeding 12,500 pounds and departing Runway 3 to climb on runway heading through 2,500 feet MSL before turning right. (Pages 4-20, 5-5, Appendix D-6, Comment 12 of Responses to FAA Review Comments)

The County proposes to encourage the Tower to establish this procedure to avoid departure turns at low altitude over populated areas northeast of the new Runway 3-21. The typical air carrier aircraft would begin the departure turn approximately three nautical miles from the start of the takeoff roll.

The procedure is very similar to the existing requirement for departures from Runway 31 and it would serve a similar purpose in avoiding low overflights of a residential area. Early right turns from Runway 3 could place departing aircraft at low altitudes over populated areas. With the procedure, aircraft would be at 1,600 feet above the ground before initiating right turns.

APPROVED IN PART. As with the existing voluntary noise abatement procedure for departures from Runway 31, here too the procedure could be effectively implemented by an Air Traffic Tower Order. Once coordinated with Airport Management, the procedure could be set forth in Tower Order 7220.2 for internal standardization. Therefore, FAA approves the concept of the proposed measure, but disapproves the Letter of Agreement process suggested in Appendix D.

NA-9. Adopt procedures requiring all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable. (Pages 4-23 thru 4-24, 5-5, Appendix D-6, Comment 12 of Responses to FAA Review Comments)

Dane County recommends the Air Traffic Control Tower require aircraft exceeding 12,500 pounds and departing from Runway 21 to turn left 10 degrees and climb through 3,000 feet MSL

before turning to course headings.

The County should encourage the Air Traffic Manager to adopt a Tower Order setting forth the procedure. The proposed turn from Runway 21 is not difficult and could be implemented at Tower direction. It is also in line with present airport procedure. Currently, business jets departing on Runway 22 are directed to execute a quick left turn and fly south out of the airport environs.

Straight-out departures and right turns from Runway 21 would cause overflights of residential areas which do not presently experience aircraft overflights. While cumulative noise exposure levels would be quite low, this would likely create new noise complaints from people disturbed by loud single events. The benefits of the new runway would be eroded by introduction of new impacts. Therefore, as part of the operating configuration of the new runway layout, limitations on departures off Runway 21 are appropriate. A 10-degree left turn would place departing aircraft over the noise-compatible corridor extending south-southwest from the airport down toward the isthmus.

APPROVED IN PART. As with the existing voluntary noise abatement procedure for departures from Runway 22, here too the procedure could be effectively implemented through an Air Traffic Tower Order. Once coordinated with Airport Management, the procedure could be set forth in Tower Order 7220.2 for internal standardization. Therefore, FAA approves the concept of the proposed measure, but disapproves the Letter of Agreement process suggested in Appendix D.

LAND USE MANAGEMENT MEASURES

LU-1 City of Madison, Dane County - Maintain Existing Compatible Zoning in the Airport Vicinity

(Pages 4-33, 5-11)

A significant amount of land in the airport vicinity is already zoned for commercial and industrial use. This is shown in Exhibit 4G (following page 4-38 of the NCP). As Exhibit 1H (following page 1-27 of the NEM) shows, there is also a significant amount of open space and recreation zoning in the airport vicinity. Both of these zoning categories are considered compatible with aircraft noise.

Dane County officials recommend they and the City of Madison maintain compatible zoning in the "airport affected area". **Exhibit 5D** (following page 5-12 of the NCP) shows the airport affected area. It is defined by the DNL 60 dB contour, the approach areas southeast of Runway 13-31 and

south of the planned Runway 18L-36R, and the training pattern area for Runway 18L-36R.

Although much of this area is outside the DNL 65 dB contour, it will be subject to moderate levels of aircraft noise and frequent aircraft overflights which some residents could find annoying. The exhibit also shows areas currently zoned for commercial and industrial use, as well as for open space and recreation areas, within the boundaries of the airport affected area. It is important to preserve the existing compatible use zoning in this area.

This proposal is not intended to necessarily lock into place all compatible zoning categories in the area. The two jurisdictions should reserve the flexibility to make zoning changes in these areas as needed, provided that the changes do not create the potential for the development of non-compatible land uses. For example, zoning changes from one commercial district to another or from commercial to industrial would still be acceptable.

An advantage of this measure is that neither Dane County nor Madison have cumulative zoning ordinances, although some residential and noise- sensitive institutional uses are permitted in certain commercial districts in each jurisdiction. The disadvantage to zoning is that the ordinances are subject to amendment.

APPROVED.

LU-2 Dane County, City of Madison, Town of Burke -- Define "Airport Affected Area" for Purposes of Implementing Wisconsin Act 136 (Page 5-11)

Dane County recommends entering into an intergovernmental agreement with Madison and the Town of Burke defining the "airport affected area". The full three mile area specified in the Wisconsin Act 136 statute would cover a very large area, much more than would be significantly affected by aircraft operations at an airport of this size. By defining a somewhat smaller area, it should make compliance with the requirements of the Act more manageable for the airport staff as well as the County, Town, and City planning staffs.

In 1985, the Wisconsin legislature adopted Wisconsin Act 136, Wis. Stat. 66.31, to promote the public interests in aviation. The law has three key provisions. First, each municipality with a development plan must show the location of any publicly owned airport and "airport affected areas". These are defined as areas within three miles of the airport, although smaller areas can be defined through intergovernmental agreements. Second, the municipality with zoning authority must notify the airport owner of proposed

zoning changes within the "airport affected area". Third, if the airport owner objects to the proposed zoning change, a two-thirds vote of the municipal governing body is required to approve the change.

For purposes of implementing and administering Act 136 in the Madison area, it would be acceptable to define the "airport affected area" as shown in **Exhibit 5D.** The area is based on a composite of the DNL 60 dB contour for 1995 baseline conditions and for noise abatement plan conditions. It also includes an approximation of the training pattern area for the proposed parallel runway (18L-36R). The training pattern area extends 8,000 feet off each end and 10,000 feet east of the proposed runway.

APPROVED.

LU-3 Dane County, City of Madison -- Adopt Airport Noise Overlay Zoning
(Pages 4-35, 5-11 thru 5-12, Appendix D-8)

Dane County officials propose they and the City of Madison consider the adoption of airport noise overlay zoning. One overlay district should be established with the boundaries corresponding to a composite of the DNL 65 dB noise contours for the 1995 baseline conditions and the 1995 noise abatement plan conditions. That is, the boundary should be the outermost line defined by overlaying the DNL 65 dB contours for 1995 conditions with and without the noise abatement plan. (Suggested language for noise overlay zoning is in **Appendix D.**)

Airport noise overlay zoning establishes special standards within a noise- impacted area to help mitigate the problems caused by noise. These provisions supplement the standards of the underlying zoning classifications and would apply only to new development.

Proposed overlay zone boundaries are shown in **Exhibit 5E** (following page 5-12 of the NCP). It is recognized that the local jurisdictions may wish to make adjustments to these boundaries to relate better to local land use planning needs. For example, they may wish to adjust the boundaries to follow streets, railroads, section lines, quarter-section, and quarter-quarter-section lines in order to facilitate agreement as to the precise location of the boundaries and to simplify administration of the regulations.

Within the noise overlay zoning district, it is proposed that the development of new noise-sensitive land uses would be prohibited. This would include residential uses, churches, schools, nursing homes, day care centers, and

hospitals and clinics. Exceptions would be made for existing lots of record. Noise-sensitive uses could be permitted on existing lots of record provided that the structures are sound-insulated to achieve an outdoor to indoor noise level reduction of 25 decibels.

The intent of the lot of record provision is to avoid creating severe hardships for the owners of undeveloped and platted lots. It is also intended to permit the owners of structures which may be destroyed to rebuild them.

Considerable developed land in Madison, south of the airport, is within the boundaries of the airport noise overlay zone. In order to prevent the regulations from causing problems for existing homes, which would be considered legal non-conforming uses under the terms of the proposed noise overlay zoning ordinance, language should be adopted to exempt existing homes from the effect of the regulations. It is not intended that the regulations should be interpreted to require sound insulation, for example, for existing homes undergoing expansion or remodeling.

The airport noise overlay zoning provisions also should include a requirement to notify the airport management of any land use development proposals within the overlay zone which require discretionary review or approval by the zoning boards of appeals, the planning commissions, the county board, or the city council. This is intended to give the airport management an opportunity to review and comment on applications for variance, conditional use, rezoning, and subdivision plat approval. This special notification requirement is not intended to apply to simple applications for building and zoning permits and occupancy certificates.

APPROVED.

LU-4 Dane County, City of Madison -- Amend Subdivision Regulations to Require Dedication of Noise and Avigation Easements or Plat Notes on Final Plat (Pages 4-37 thru 4-38, 5-12 thru 5-13, Appendix D-13)

Dane County proposes they, along with the City of Madison, consider amending their subdivision regulations to require the dedication of noise and avigation easements for any new subdivisions within an airport compatibility overlay zone. While the noise overlay zoning regulations should restrict the opportunities for land subdivision, this measure is recommended to provide some back-up protection in the event of unforseen events. (Suggested language for the subdivision regulation amendment is in **Appendix D.**)

The purpose of the noise and avigation easements is to put owners of property on notice that their land is subject to

frequent aircraft overflight and potentially disturbing levels of aircraft noise. The easement also would protect the airport proprietor, i.e. Dane County, from lawsuits claiming damages for noise or other airport activities. (This protection from suit would benefit only the airport proprietor, not private individuals or corporations.)

While this easement dedication requirement is considered fair and justified, both in terms of protecting the airport and in terms of providing a means of disclosing important information about a property, it may be sensitive from a legal standpoint. The consultant is unaware of any specific litigation, in any state, on the legality of dedicated noise and avigation easements. Based on a broad interpretation of the general welfare criterion, and based on longstanding legal traditions in land use control, the dedication of noise and avigation easements is clearly defensible. On the other hand, recent decisions of the U.S. Supreme Court indicate that the court is beginning to scrutinize land use controls and development exactions with a view toward vigorous protection of private property rights. (See, for example, **Nollan v. California Coastal Commission**, 107 S. Ct. 3141, 1987.) **It is important that the City and County attorneys carefully review this easement dedication proposal before it is adopted.**

If the County and City should determine that the required dedication of noise and avigation easements is not legally acceptable, they should consider a back-up measure requiring notices of potentially high noise levels to be placed on the final plat of subdivisions within the noise overlay zone. This would serve as a limited means of providing fair disclosure of the potential for disturbance caused by aircraft noise.

APPROVED.

LU-5 Dane County -- Consider Amending Subdivision Regulations to Prevent Subdivision of Land Zoned A-1 Agriculture (Pages 4-37 thru 4-38, 5-13)

Dane County proposes amending its subdivision regulations to prevent the subdivision of land zoned A-1, agriculture. This is envisioned as a means of protecting prime farmland and for urban growth management. To the extent this measure would apply to areas within the noise overlay zone and outlying areas subject to frequent aircraft overflights, it would also promote airport land use compatibility.

APPROVED.

LU-6 Dane County, City of Madison -- Amend Building Codes to

Provide Soundproofing Standards for Noise-Sensitive Development in Airport Noise Overlay Zones (Pages 4-39 thru 4-40, 5-13, Appendix D-16)

Dane County officials recommend they and the City of Madison consider adopting local amendments to the building code to provide soundproofing standards to apply within the airport noise overlay zone. This would implement the sound insulation standards contained in the overlay zoning ordinance. Since non-compatible development would be permitted only on existing lots of record, it is anticipated that these standards would receive only limited use. (Suggested language for the building code amendment is in **Appendix D.**)

It will be important for the City and County to adequately train their inspections staffs to be able to perform satisfactory inspections of sound insulation improvements. This may require special training. It may also require extra administration and extra inspections as construction occurs. The City and County should pass on any additional costs to the builder/developer through the inspections fees.

APPROVED.

LU-7 Dane County, City of Madison, Town of Burke -- Amend Local Land Use Plans to Reflect Noise Compatibility Plan Recommendations and Establish Airport Compatibility Criteria for Project Review (Pages 4-41 thru 4-42, 5-13 thru 5-14)

Dane County officials recommend they, the City of Madison and the Town of Burke amend their land use plans to reflect the recommendations of the Noise Compatibility Plan. The Noise Compatibility Plan sets forth a plan for the airport area which has been coordinated with all of the jurisdictions as well as with the airport staff. It can continue to be important in ensuring land use planning coordination in the airport area. It is important for all jurisdictions in the airport study area to officially acknowledge their separate and mutual interests in order to facilitate coordination in this important area.

While the proposed ordinance amendments will go far to ensure land use compatibility in the area, the land development process is not static. Over time, situations will arise requiring local planning staffs, planning commissions, and governing boards to make decisions on land use changes in the area. The adoption of project review criteria as part of the local land use plans, requiring the consideration of airport noise and land use compatibility, would help ensure that this important concern is not neglected during future land use deliberations.

The following guidelines will be considered. They should apply within all areas subject to noise above DNL 60 dB.

A. Determine the sensitivity of the subject land use to aircraft noise exposure levels. The F.A.R. Part 150 land use compatibility table can be used for this purpose.

B. Advise the airport management of development proposals involving noise-sensitive land uses within the DNL 60 dB noise contour.

C. Locate noise-sensitive public facilities outside the DNL 65 dB contour, if possible. Otherwise, encourage building construction to attenuate interior noise levels to DNL 45 dB.

D. Discourage the approval of urban service area amendments, rezonings, exceptions, variances, and conditional uses which introduce noise-sensitive development into areas impacted by noise exceeding DNL 65 dB. Consider similar limitations in areas impacted by noise above DNL 60 dB.

E. Where development within the DNL 60 dB contour must be permitted. encourage developers to incorporate the following measures into their site designs.

(1) Where noise-sensitive uses will be incorporated into a larger, mixed use building, locate noise-sensitive activities on the side of the building opposite the airport or, if the building is beneath a flight track, opposite the prevailing direction of aircraft flight.

(2) Where noise-sensitive uses are part of a larger mixed use development, use the height and orientation of compatible uses, and the height and orientation of landscape features such as natural hills, ravines and manmade berms, to shield noise-sensitive uses from ground noise generated at the airport.

APPROVED.

LU-8 Dane County -- Follow through with Planned Land Acquisition in Cherokee Marsh and Token Creek Park Areas
(Pages 4-45 thru 4-46, 5-14 thru 5-15, Comment 20 of Responses to FAA Review Comments)

Dane County proposes the purchase of the three unlabeled parcels (pink with green border, north and northwest of the

airport) shown on **Exhibit 5F** (following page 5-14 of the NCP). The three areas, which total approximately 178 acres, are eligible for FAA funding assistance through the noise set-aside of the Airport Improvement Program since they lie within the DNL 65 dB contour and are presently zoned single family residential according to **Exhibit 1H** (following page 1-27 of the NEM).

Exhibit 5F also shows existing park and open space land on the north side of the airport. Most of this is in the Cherokee Marsh Open Space Area. The Cherokee Marsh Revised Long-Range Open Space Plan (September 1981) proposes the acquisition of all of the shaded area as indicated on the exhibit. The Noise Abatement Plan calls for the use of the north side of the airport in order to reduce to the degree possible noise over developed areas to the south. By following through with the Cherokee Marsh Open Space program, the County will be helping to promote airport land use compatibility while also achieving the direct objective of the Open Space Plan.

APPROVED. However, a caveat is added concerning the potential non-compatibility of some "parks/open space" with aeronautical activities. Park uses sensitive to noise such as the congregation of people for educational, entertainment or camping activities or uses increasing bird activity such as wetland enhancement may not be compatible land uses.

LU-9 Dane County -- Consider Expanding Land Acquisition Boundaries in Cherokee Marsh and Token Creek Areas (Pages 4-45 thru 4-46, 5-15 Comment 20 of Responses to FAA Review Comments)

Dane County proposes to purchase the three parcels, B, C, and D, depicted on **Exhibit 5F** for parks and open space expansion. Parcel B is approximately 30 acres in size, Parcel C approximately 190 acres, and Parcel D approximately 50 acres. All are within the DNL 65 dB contour of the 1995 Noise Abatement Plan and presently zoned single family residential. Thus, acquisition costs would be eligible for FAA funding assistance through the noise set-aside of the Airport Improvement Program.

APPROVED. However, a caveat is added concerning the potential noncompatibility of some "parks/open space" with aeronautical activities. Park uses sensitive to noise such as the congregation of people for educational, entertainment or camping activities or uses increasing bird activity such as wetland enhancement may not be compatible land uses.

LU-10 Dane County -- Establish Sales Assistance or Purchase Assurance Program for Homes Impacted by Noise Above

DNL 70 dB (Pages 4-48 thru 4-51, 5-15)

Dane County recommends establishing a sales assistance or purchase assurance program which would apply to single-family homes within the DNL 70 dB contour, generally based on a combination of the 1995 baseline and noise abatement plan contours. **Exhibit 5G** shows the areas which would be affected. The boundaries have been squared off to follow lot lines and streets. South of the airport, the qualifying area is bounded by Aberg Avenue on the north, Washington Avenue on the east and south, and Pawling and North Lawn Avenue on the west. To the north, a few scattered homes on County Road CV and Hoepker Road are included. An estimated 216 homes are within the entire area, including 210 on the south side and 6 on the north side.

The intent of these programs would be to provide homeowners who are severely disturbed by noise the assurance that they could leave the neighborhood without risking financial penalty. With a purchase assurance program, the County would be the buyer of last resort. If, after a given period of time on the market, the homeowner was unable to sell the home for fair market value, as determined through professional appraisals, the County would buy the home. Program guidelines protecting the interests of the County and making the program fair and reasonable in scope would be adopted. The County would then retain a noise and avigation easement and sell the home, accepting a loss if necessary to put the home back on the tax rolls. While the property were under public ownership, it could be soundproofed or otherwise rehabilitated, if housing rehab were an objective.

A drawback of this program is the need for potentially significant administrative support. The program also raises the risk that the airport will have to be involved in property ownership and management with the various problems that entails, such as security and maintenance.

The net costs of a purchase assurance program are impossible to estimate. However, for planning purposes a total cost estimate of $17.9 million has been made. This assumes the net cost to the airport would be 10 percent of the appraised value of the homes. The cost is based on a 100 percent participation rate, so it should describe an extreme, and ultimately unrealistically high situation, although it is an estimate of the County's potential financial involvement.

A sales assistance program would operate in a similar fashion, but the County would never take title to the property. The County would make up the difference between fair market value and the best purchase offer made on the home. The County would secure a noise and avigation easement from homeowners in return for their participation in the program.

In order to prevent collusion between buyer and seller, to the detriment of the County, the airport would approve the listing price for a home and any downward adjustments of that price. This program would achieve generally the same objectives as the purchase assurance program and would probably be easier to administer. It would, however, lack the potential to facilitate housing rehabilitation and soundproofing as easily. Total costs are estimated to be equivalent to the purchase assurance program.

Purchase assurance and sales assistance programs are limited measures which are intended to provide a means of responding to the most heavily impacted people without demolishing neighborhoods and permanently disrupting the tax base. The programs are unlikely to be used by everyone who potentially may qualify which has the added advantage of keeping the cash flow requirements manageable.

It is intended that any given home would only be eligible for this program once. After the County has secured a noise and avigation easement from a home, it would no longer be eligible for the program.

APPROVED.

LU-11 Dane County -- Install Sound Insulation for Schools Impacted by Noise Above DNL 65 dB (Pages 4-51 thru 4-53, 5-16)

Dane County proposes sound insulation for two schools impacted by noise above DNL 65 dB, based on 1995 baseline conditions. These are Holy Cross Lutheran School on Milwaukee Avenue and Lowell School, just north of Lake Monona. It is proposed that sound insulation be installed in both schools.

For planning purposes, soundproofing costs have been estimated at $500,000 for Lowell School and $300,000 for Holy Cross School. While these should be good enough for planning purposes, reliable estimates can only be developed after a detailed inspection of the buildings by a qualified acoustical engineer.

It is recommended Dane County cooperate with the owners, the school district and the church, to arrange for these projects. It is important for both school operators to understand that effective sound insulation depends on the schools keeping their windows closed. This could result in higher heating and cooling costs. While the capital costs of the sound insulation project are eligible for 90% FAA funding assistance, all operating costs must be borne by the school operators. These important cost implications should

be given serious attention before the school operators commit to sound insulation.

APPROVED.

CONTINUING PROGRAM

CP-1 Program Monitoring And Contour Updating (Pages 5-16 thru 5-17)

Dane County recommends that airport management maintain communications with the Madison city planning department and the Dane County Regional Planning Commission to follow their progress in implementing the land use management plan.

The airport management also must take steps to monitor compliance with the noise abatement plan. This includes checking periodically with the air traffic control tower regarding compliance with the air traffic control procedures. The airport management should also check with air carriers, business users, and military users. This can serve as a friendly reminder as to the importance which the airport management places on the program while providing an opportunity to find out about any difficulties with the application of the noise abatement measures.

Noise contour maps should be updated approximately every five years, or more often if equivalent operations levels change significantly in comparison with existing or forecast conditions. As a rule of thumb, the trigger for determining the need for contour updating is a 17% change in equivalent operations by jet aircraft, based on the FAA's Area Equivalency Method (AEM) for estimation of noise contour areas. To calculate "equivalent operations", all nighttime operations, (between 10:00 p.m. and 7:00 a.m.) must be multiplied by ten and added to daytime operations. Noise contours should be mapped and compared to previously calculated noise contours to identify significant changes, namely changes exceeding DNL 1.5 dB.

APPROVED.

CP-2 Evaluation and Update of the Plan (Page 5-17)

Dane County proposes to periodically review the Noise Compatibility Plan and consider revisions and refinements as necessary. It is important that any proposed changes be reviewed by the FAA and all affected aircraft operators and local agencies. Proposed changes should be submitted to FAA for approval after local consultation and a public hearing

in order to comply with F.A.R. Part 150.

It is anticipated that a complete plan update will be needed periodically to respond to changing conditions in the local area and in the aviation industry. A plan update can be anticipated every six to eight years. An update may be needed sooner, however, if major changes occur and later if conditions at the airport and in the surrounding area remain stable.

APPROVED.

CP-3 Complaint Response (Page 5-17)

Dane County recommends that airport management acknowledge and respond to noise complaints, even if it is not possible to take remedial action. It should be recognized that complaints are only an imperfect indicator of noise problems. The tendency of an individual to file a complaint depends on many personal variables including socioeconomic status, feelings about the aviation industry, expectations about overall neighborhood livability, housing tenure, and sensitivity to noise. Recognizing that complaints are limited in their ability to clearly elucidate the existence of noise problems, the staff should nevertheless periodically analyze the complaint records. If the geographic pattern of complaints, or the causes of complaints, indicate that consistent problems exist, the airport management should investigate and, if possible, seek corrective action.

The airport has a well-organized system of recording and responding to noise complaints. The staff has recently computerized the noise complaint records, enabling analysis of complaint trends to be handled relatively easily. The airport should maintain and enhance this system as necessary. The airport management should also be sure to get copies of any noise complaints received by the air traffic control tower.

APPROVED.

HMMH
700 District Avenue, Suite 800
Burlington, MA 01803
781.229.0707

TECHNICAL MEMORANDUM

To:	Michael Kirchner, Engineering Director
From:	Eugene Reindel, Principal in Charge
	Timothy Middleton, C.M., Principal Consultant
Date:	October 13, 2022
Subject:	Dane County Regional Airport – Truax Field (MSN) Part 150 Update Noise Compatibility Program (NCP) Review
Reference:	HMMH Project Number 312360

Harris Miller Miller & Hanson Inc. (HMMH), in association with Jones Payne Group (JPG) and Mead & Hunt (M&H) (the Study team), is assisting Dane County in completing a Noise Compatibility Planning Study (the Study) in accordance with Title 14 of the Code of Federal Regulations Part 150 (14 CFR Part 150 or simply "Part 150"). The Study includes two major elements: (1) Noise Exposure Map (NEM) and (2) Noise Compatibility Program (NCP).

Dane County completed its first Part 150 Study for MSN and submitted the documentation to the FAA in 1991. In 1993, the Federal Aviation Administration (FAA) provided a Record of Approval (ROA) which approved, in whole or in part, all twenty Dane County-recommended NCP measures, the ROA is attached as an appendix to this memo for reference. This memorandum presents the results of the Study team's review of the existing NCP including the implementation status and current compliance for each of the approved 1991 NCP measures.

The 1991 Part 150 documentation includes a detailed description of the development of the NCP and analyses of the benefits of each measure considered. The MSN NCP measures focus on the following three strategies to reduce or prevent noncompatible land use:

1. Noise Abatement (NA)
2. Land Use (LU), including noise mitigation
3. Program Management (PM)

Table 1 lists a brief description of the 1991 study's Dane County-recommended and FAA-approved NCP measures. As a part of this (2022) Part 150 Study, Dane County will determine, for each measure recommended in the 1991 MSN NCP, whether to:

- Continue with the measure as written
- Continue with the measure with minor modifications
- Eliminate the measure

In the event Dane County determines to continue with NCP measures with minor modifications and/or eliminate measures, the 2022 Part 150 Update will include a proposed "amendment" to the MSN NCP.

Table 1. NCP Measures Included the Original Part 150 Study, submitted in 1991

Noise Abatement Measures	Land Use Measures	Programmatic Measures
1. Continue the existing runway use program **/***	1. Maintain existing compatible zoning in the airport vicinity *	1. Program monitoring and noise contour updating *
2. Continue requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet above ground level) before turning left **	2. Define "airport affected area" for purposes of implementing Wisconsin Act 136 *	2. Evaluation and update of the plan *
3. Establish visual approach and departure corridors for helicopters **	3. Adopt airport noise overlay zoning *	3. Noise complaint response *
4. Encourage use of noise abatement departure procedures by operators of jet aircraft ***	4. Amend subdivision regulations to require dedication of noise and avigation easements of plat notes on final plat *	
5. Encourage Air National Guard to construct a hush house for a A-16 engine maintenance runups prior to converting its fleet ***	5. Consider amending County subdivision regulations to prevent subdivision of land zoned A-1 Agriculture *	
6. Build new 6,500 foot Runway 3-21 *	6. Amend building codes to provide soundproofing standards for noise-sensitive development in airport noise overlay zones *	
7. Adopt runway use system preferring departures on Runways 3, 31, and 36 and arrivals on Runways 13, 18, and 21 ***	7. Amend local land use plans to reflect noise compatibility plan recommendations and establish airport compatibility criteria for project review *	
8. Require east and southbound aircraft exceeding 12,500 pounds and departing on Runway 3 to climb on runway heading through 2,500 feet MSL before turning right **	8. Follow through with planned land acquisition in Cherokee Marsh and Token Creek Park areas *	
9. Require all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable **	9. Consider expanding land acquisition boundaries in Cherokee Marsh and Token Creek areas *	
	10. Establish sales assistance or purchase assurance program for homes impacted by noise above 70 Ldn *	
	11. Install sound insulation for schools impacted by noise above 65 Ldn *	

** - Approved*
***- Approved in part*
****- Approved as a voluntary measure*

1 Review of Noise Abatement Measures

Noise abatement measures are those that control noise at the source; such measures, as shown in the table above, include airport layout modifications, noise barriers, flight path changes, preferential runway use, and arrival and departure procedures. The intention of noise abatement measures in the NCP is to reduce the number of people and noise-sensitive properties exposed to aircraft noise of 65 DNL (Day-Night Average Sound Level[1]) or greater.

Dane County-recommended noise abatement measures contained in the FAA's ROA were reviewed to assess implementation status and compliance with those measures implemented. As part of the Part 150 study, flight track and aircraft identification data for MSN was acquired from Envirosuite[2] for the calendar year 2021. This data provided the primary basis for evaluating the extent to which the approved noise abatement measures from the original 1991 MSN NCP are implemented and in compliance with the intent of measures.

Table 2 lists the nine (9) Dane County-recommended noise abatement measures approved by the FAA and summarizes the status of each measure as described in the 1991 NCP and 1993 ROA.

Table 2. Status of 1991 NCP Noise Abatement Measures

Measure Number	Flight Procedures Addressed	Implementation Status
NA-1	Continue the existing runway use program	Superseded by NA-7
NA-2	Continue requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet above ground level) before turning left	Implemented
NA-3	Establish visual approach and departure corridors for helicopters	Implemented
NA-4	Encourage use of noise abatement departure procedures by operators of jet aircraft	Implemented
NA-5	Encourage Air National Guard to construct a hush house for F-16 engine maintenance runups prior to converting its fleet	Implemented
NA-6	Build new 6,500-foot Runway 3-21	Implemented
NA-7	Adopt runway use system preferring departures on Runways 3, 31, and 36 and arrivals on Runways 13, 18, and 21	Implemented
NA-8	Require east and southbound aircraft exceeding 12,500 pounds and departing on Runway 3 to climb on runway heading through 2,500 feet MSL before turning right	Implemented
NA-9	Require all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable	Implemented

The following subsections provide full descriptions of the noise abatement measures, implementation status, and compliance with each measure implemented as compared to the intention with the measure as provided in the 1991 NCP. For clarity, it is worth noting that Runway 13-31 has been renumbered to 14-32 since the

[1] The Day-Night Average Sound Level represents the noise energy present during a 24-hour period. DNL represents a weighted average of the noise level over a 24-hour period. Weighting is applied to noise events occurring at night (10:00 p.m. to 7:00 a.m.), with 10 dB added to the actual nighttime sound level. This 10 dB weighting accounts for greater sensitivity to nighttime noise, and the fact that events at night are often perceived to be more intrusive than daytime events.

[2] https://envirosuite.com/

1991 NCP and associated ROA was published. When the recommended noise abatement procedures refer to Runway ends 13 or 31, the analysis will show Runway ends 14 or 32, respectively, for consistency with the current runway numbers in effect at MSN.

The airport's ability to implement the existing NCP Noise Abatement Measures was impacted by weather conditions. Per company policy, most air carriers operating cannot conduct tail wind operations when winds are greater than 5 knots. Historically, the wind at DCRA is greater than 5 knots approximately 90 percent of the time based on a recent annual audit. This percentage is confirmed by the National Weather Service (NWS). Wind speed and direction are the most significant factors in the runways used and direction aircraft arrive and depart the airport.

1.1 NA-1: Continue the existing runway use program

Dane County has a runway use program preferring Runways 31 and 36 for takeoff and Runways 18 or 13 for landing by all aircraft over 12,500 pounds, weather and traffic permitting. This directs aircraft to and from the north, away from Madison. While traffic at Madison and congestion at destination airports is making this program more difficult to observe, it should remain in place.

Implementation Status: N/A.
Replaced by NA-7, which includes the new runway 3-21 (NA-6).

Compliance: N/A.
See NA-7, which includes the new runway 3-21, for details.

1.2 NA-2: Continue requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet above ground level) before turning left

This measure is intended to keep low flying aircraft from turning directly over the Cherokee subdivision west of the airport. This procedure is now in place and should be continued.

Implementation Status: Implemented.

Compliance: Low.

The following analysis was used to determine compliance. The development of Tower Order 8400.9H establishes this Noise Abatement procedure has been implemented. Aircraft departures from Runway 32 in 2021 were analyzed using a gate positioned in parallel to Runway 32 (shown as a black diagonal line among the green Runway 32 departure flight tracks in the figure below) to determine the altitude of the flights upon turning left off of the Runway extended centerline. Of all the tracks that turned left, only 54% (1,114 out of the 2,048 jet operations) were at or above 2,500 feet when passing through the analysis gate.

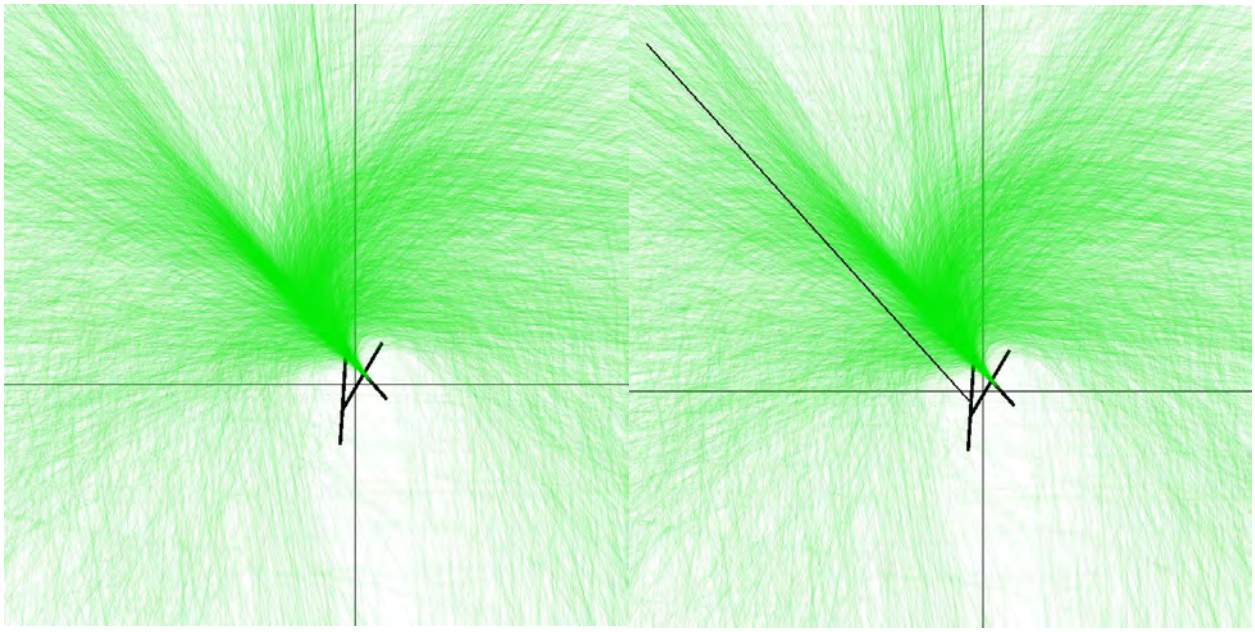


Figure 1: Departure Flight Tracks on Runway 32 with (right) and without (left) the Analysis Gate
Source: HMMH

1.3 NA-3: Establish visual approach and departure corridors for helicopters

Three noise-compatible corridors extending to the northwest and northeast over undeveloped areas and to the south and east over State Highway 30 and commercial areas have been defined. When weather and traffic conditions permit, helicopters should be routed over these corridors. This would remove low-flying helicopters from residential areas under visual flying conditions.

Implementation Status: Implemented.

Compliance: Low.

The following analysis was used to determine compliance. The development of Tower Order 8400.9H establishes this Noise Abatement procedure has been implemented. Figure 2 shows the suggested checkpoints to be used to define three corridors for helicopters to use when arriving or departing from MSN. These corridors and checkpoints were replicated using gates to represent each checkpoint – if helicopters were using these checkpoints, a wide majority of helicopter operations would be contained within the three gates defined.

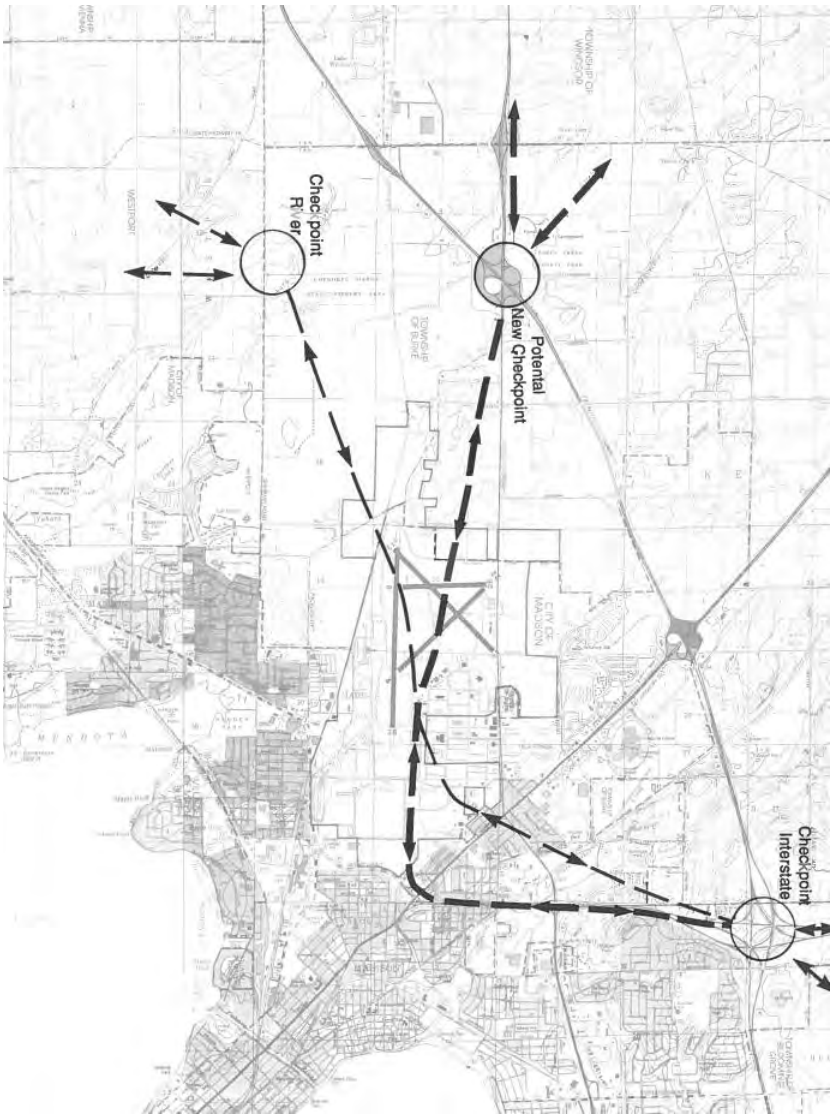


Figure 2: 1991 NA-3 Diagram of Suggested Helicopter Corridors
Source: MSN Part 150 Noise Compatibility Program Summary, February 1991

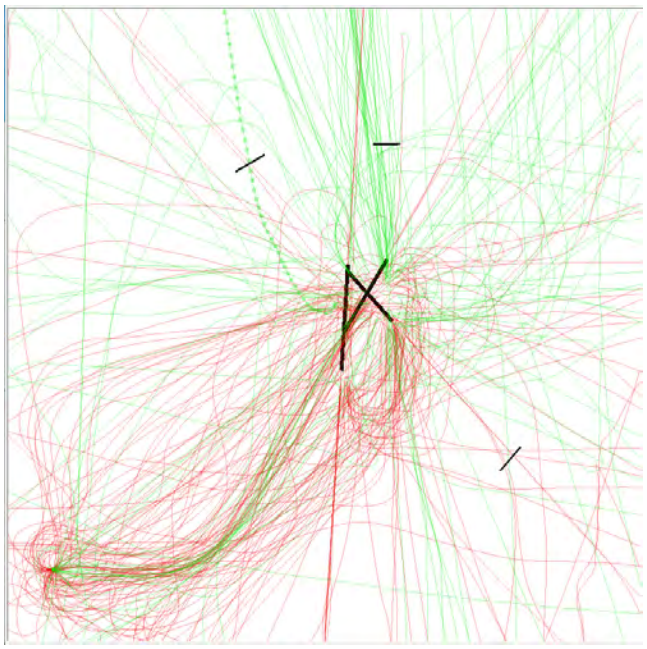


Figure 3: Helicopter Operations, with Gates corresponding to NA-3 Checkpoints
Source: HMMH, 2022

As Figure 3 shows, there is no clear pattern to which the helicopter operations comply to NA-3. Notably, our analysis shows that it appears operations seem to focus traffic to and from Verona Airport to the southwest of MSN. A conversation may be needed with local FAA depending on MSN staffs review and comment on this memo.

1.4 NA-4: Encourage use of noise abatement departure procedures by operators of jet aircraft

All airlines have established noise abatement departure procedures involving a thrust cutback after takeoff. A standard procedure is also available to operators of business jet aircraft – the NBAA standard departure procedure. In addition, some aircraft manufacturers describe noise abatement departure procedures in the operator's manuals. The airport management should encourage operators of jet aircraft to use the appropriate noise abatement departure procedure for their type of aircraft.

Implementation Status: Implemented.

Compliance: High.

Information from MSN staff and those familiar with tower procedures suggests strong compliance with NA-4 via relevant signage up around the airport, runways, and airport facilities to inform pilots of the noise abatement procedures. Additionally, this measure is a priority of both MSN staff and tower operators and is used by the tower whenever possible. The continued usage of noise abatement procedures is a frequent subject during airport meetings. It is currently not possible to determine compliance through data analysis so we must rely on the self-reporting of aircraft operators.

1.5 NA-5: Encourage Air National Guard to construct a hush house for F-16 engine maintenance runups prior to converting its fleet

The Air National Guard anticipates the replacement of the A-10 aircraft with the F-16 within the next several years. The A-10 is a very quiet aircraft, and noise from engine maintenance runups is not severe. Noise from F-16 runups, however, is much louder. The Guard plans to construct a noise suppression structure, commonly called a "hush house" for attenuating the noise from F-16 engine runups. Airport management should encourage the Guard to follow through with those plans.

Implementation Status: Implemented.

Compliance: High.

The Hush House constructed specifically for F-16 runups is set to be phased out as part of the conversion of the fleet to F-35A aircraft. Upon complete conversion of the fleet, this measure will no longer be implemented due to the Hush House's lack of compatibility with the F-35A.

1.6 NA-6: Build new 6,500-foot Runway 3-21

As operations increase, the airport will not be able to continue accepting arrivals from the north and sending departures to the north unless a new runway becomes available. The present contra-flow procedure (described in Measure 1 above) requires long separations between aircraft, which can increase delays. This will become an increasingly serious problem as traffic at Madison and congestion at destination airports increase. Construction of Runway 3-21 would allow the airport to continue operating with an improved version of its present contra-flow runway use program. The modified program is explained in Measure NA-7 below.

Implementation Status: Implemented.

Compliance: N/A.

1.7 NA-7: Adopt runway use system preferring departures on Runways 3, 31, and 36 and arrivals on Runways 13, 18, and 21

After Runway 3-21 is built, the existing runway use program should be changed to account for the use of the new runway. Departures would be encouraged on Runway 3 and arrivals on Runway 21. By continuing to favor departures to the north and arrivals from the north, the revised program would continue providing noise abatement to the heavily populated areas south of the airport.

Implementation Status: Implemented.

Compliance: Moderate.

The following analysis was used to determine compliance. The development of Tower Order 8400.9H establishes this Noise Abatement procedure has been implemented. **Table 3** presents the runway use across all operations in a sample of data from MSN. The table shows that 51% of departures and 51% of arrivals comply with NA-7 Runway Use. Please note that this data does not consider aircraft weight, which is explored further in Table 4. Bolded cells represent those operations compliant with the preferential runway usage favoring departures to the north and arrivals from the north.

To account for aircraft weight, in **Table 4**, the same data is shown for only jet aircraft departing or arriving their respective runways. As a category, jet aircraft have the largest number of models over 12,500 pounds, so this category can be used as a better estimate of compliance as intended by this measure. Included **Table 4** as well is a change in percent column which represents whether runway usage increased or decreased for jets compared to the entire data set. The rows which correspond to the compliant usages have been bolded as in Table 3. As shown compliant jet aircraft operations make up 50% of departures and 50% of arrivals – not as high as expected from a "preferential runway use program".

Table 3. Runway Use

Runway	Number of Departures	Departure Percentage	Number of Arrivals	Arrival Percentage
3	**685**	**3%**	1202	5%
14	263	1%	**1153**	**5%**
18	5707	25%	**6549**	**28%**
21	5193	23%	**4082**	**18%**
32	**5124**	**22%**	2602	11%
36	**6052**	**26%**	7617	33%
Total	23024	100%	23205	100%

Source: HMMH, 2022

Table 4: Runway Use by Jet Aircraft Types

Runway	Number of Departures	Departure Percentage	Change from All Aircraft Types, Departures	Number of Arrivals	Arrival Percentage	Change from All Aircraft Types, Arrivals
3	**363**	**2%**	**-1%**	450	3%	-2 %
14	52	0%	-1%	**346**	**2%**	**-3 %**
18	5570	35%	+10%	**5791**	**37%**	**+2 %**
21	2182	14%	-9%	**1658**	**11%**	**-7 %**
32	**1913**	**12%**	**-10%**	517	3%	-8 %
36	**5738**	**36%**	**+10%**	6897	44%	+11%
Total	15818	100%		15659	100%	

Note: Totals may not match exactly due to rounding

Source: HMMH, 2022

Table 4 shows the tendency for jet aircraft to consistently depart and arrive from runways 18 and 36. These runways are the only runways which have an increase in percentage of operations when looking at jets rather than the entire aircraft operations sample. If there was strict compliance to the preferential runway use, this data would show a higher percentage of operations in the cells that have been highlighted. Instead, there remains departures on runway 18 and arrivals on runway 36 that correspond with opposite aircraft flow which is not the intent of this measure. However, given the fact that 90% of the time winds are 5 knots or greater, more research is required to determine whether northerly operations tend to occur on days when winds are less than 5 knots.

1.8 NA-8: Require east and southbound aircraft exceeding 12,500 pounds and departing on Runway 3 to climb on runway heading through 2,500 feet MSL before turning right

This is intended to avoid departure turns at low altitude over populated areas northeast of the new Runway 3-21. This procedure would require aircraft to climb to 1,600 feet above the ground before beginning right turns.

Implementation Status: Implemented.

Compliance: High.

To evaluate compliance for NA-8, the aircraft types which operate at MSN were researched to determine their weight. Once weight was determined, those that were above 12,500 lbs. were selected from the departures on Runway 3. Tracks which were not turning right were filtered out of the data set, after which all tracks entering the gate displayed in **Figure 4** were evaluated for their altitude upon crossing. Of the 235 operations which crossed through the gate, 207 of them were at or above 2,500 ft. MSL at the time of their crossing, signifying a relatively high compliance rate of approximately 88%.

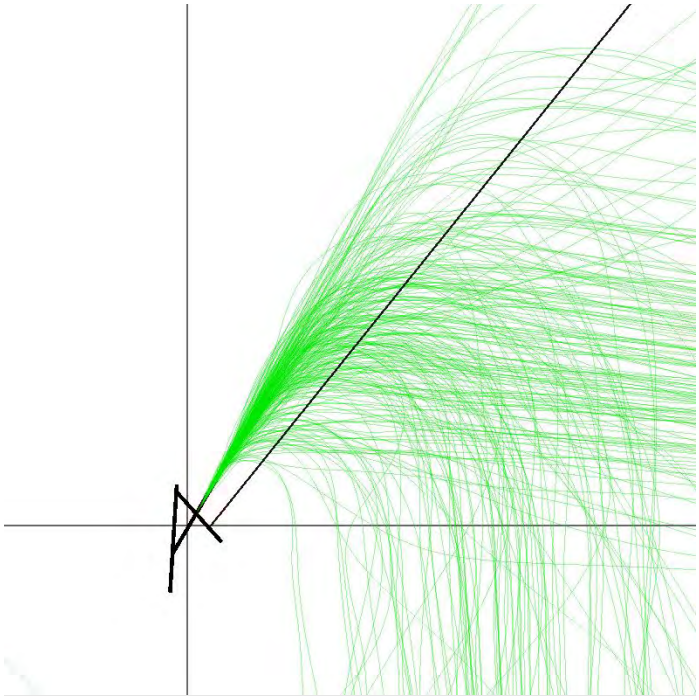


Figure 4: Departures above 12,500 lbs. turning right on Runway 3
Source: HMMH

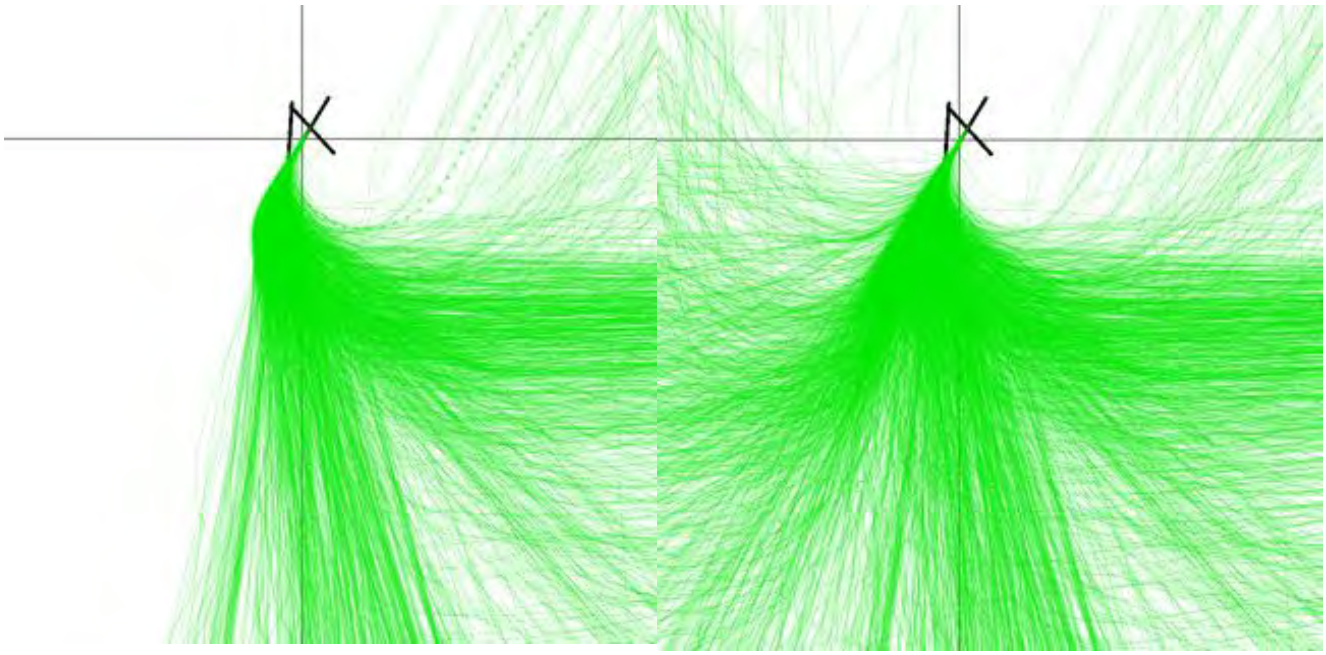
1.9 NA-9: Require all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable

Straight-out departures and right turns from Runway 21 would cause overflights of residential areas southwest of the airport which have not previously been exposed to low aircraft overflights. While cumulative noise exposure would be quiet low, this 10-degree left turn would put aircraft over the noise compatible corridor extending south-southwest from the airport toward the isthmus.

Implementation Status: Implemented.

Compliance: Low.

The following analysis was used to determine compliance. The development of Tower Order 8400.9H establishes this Noise Abatement procedure has been implemented. To determine compliance with NA-9, the aircraft types which operate at MSN were researched for their weight. Once weight was determined, those that were above 12,500 lbs. and turned left were selected from the departures on Runway 21. Refer to **Figure 5** for the original departures above 12,500 lbs. on runway 21 (at right in the figure), and only those departures that turned left (at left in the figure). Neither of the figures indicate an immediate 10-degree left turn.



Left: Compliant aircraft which completed the 10-degree turn. Right: All departures above 12,500 lbs.

Figure 5: Departures above 12,500 lbs. on Runway 21

Source: HMMH

2 Review of Land Use Measures including Noise Mitigation

The original 1991 Part 150 documentation recommended ten Land Use measures for inclusion in the NCP, all of which were approved. This section lists each of these measures and the status of implementation. Based on the results of the NEM update, Dane County will determine whether the existing land use measures are required to continue to minimize noncompatible land uses within the 65 DNL contour per Part 150 regulations.

Table 5. Status of 1991 NCP Land Use (noise mitigation) Measures

Measure Number	Flight Procedures Addressed	Implementation Status
LU-1	Maintain existing compatible zoning in the airport vicinity	Implemented
LU-2	Define "airport affected area" for purposes of implementing Wisconsin Act 136	Implemented
LU-3	Adopt airport noise overlay zoning	Not Implemented
LU-4	Amend subdivision regulations to require dedication of noise and avigation easements of plat notes on final plat	Implemented
LU-5	Consider amending County subdivision regulations to prevent subdivision of land zoned A-1 Agriculture	Not Implemented
LU-6	Amend building codes to provide soundproofing standards for noise-sensitive development in airport noise overlay zones	Not Implemented
LU-7	Amend local land use plans to reflect noise compatibility plan recommendations and establish airport compatibility criteria for project review	Implemented
LU-8	Follow through with planned land acquisition in Cherokee Marsh and Token Creek Park areas	Not Implemented
LU-9	Consider expanding land acquisition boundaries in Cherokee Marsh and Token Creek areas	Not Implemented
LU-10	Establish sales assistance or purchase assurance program for homes impacted by noise above 70 Ldn	Implemented
LU-11	Install sound insulation for schools impacted by noise above 65 Ldn	Not Implemented

2.1 LU-1: Maintain existing compatible zoning in the airport vicinity

Much land in the airport vicinity is zoned for commercial, industrial open space, and recreation use. All of these zoning categories are compatible with aircraft noise. Dane County and Madison should maintain compatible zoning in the "airport affected area," discussed below and shown on the enclosed map. This would prevent the encroachment of residential development into these areas.

Implementation Status: Implemented.

Measure LU-1 recognizes the significant amount of compatibly zoned land in the vicinity of the Airport and recommends that zoning be maintained by Dane County and the City of Madison. This land, referred to as the "airport affected area," is defined by the 60 dB DNL contour and shown on Exhibit 5D of the NCP. The NCP notes that while compatible zoning should be maintained, changes from one type of compatibility to another is acceptable.

The measure was implemented through Dane County Ordinance, Chapter 78. The ordinance defines the "airport affected area" via the "Airport Affected Area Map," dated 1996 and on record at the county clerk's office.

Figure 6 on the next page shows the "airport affected area" as defined in the original 1991 NCP Document. No such map was discovered in the County records during review of this measure.

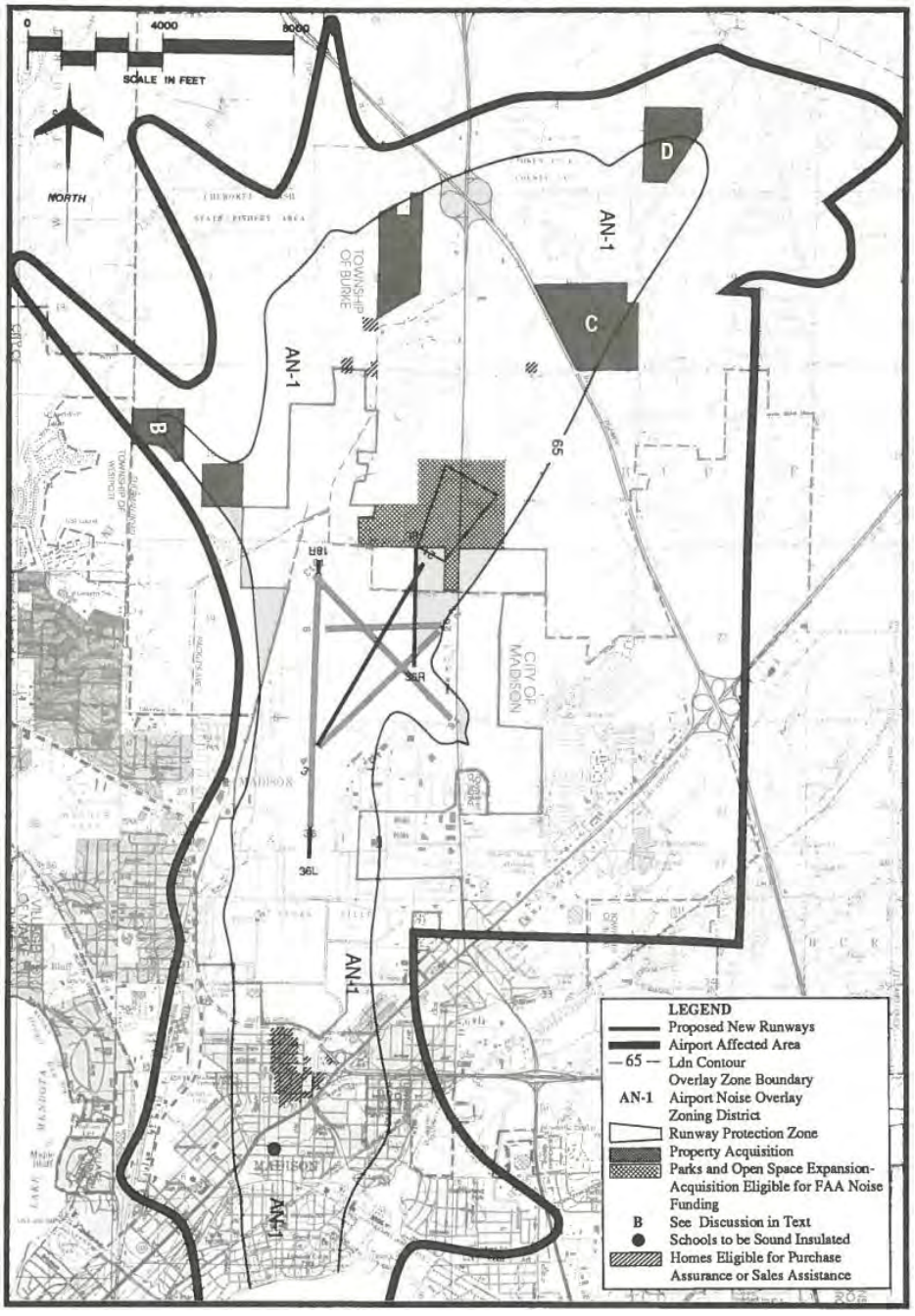


Figure 6: Approximate Airport Affected Area as of 1991
Source: 1991 MSN Part 150 Noise Compatibility Study

2.2 LU-2: Define "airport affected area" for purposes of implementing Wisconsin Act 136

Wisconsin Act 136, Wis. Stat. 66.31, has three key provisions. First, each municipality with a development plan must show the location of any publicly owned airport and "airport affected areas." These are defined as areas within three miles of the airport, although smaller areas can be defined through intergovernmental agreements. Second, the municipality with zoning authority must notify the airport owner of proposed zoning changes within the "airport affected area." Third, if the airport owner objects to the proposed zoning change, a two-thirds vote of the municipal governing body is required to approve of the change.

For purposes of implementing and administering Act 136 in the Madison area, it is recommended to define the "airport affected area" as shown in the attached map. The area is based on a composite of the 60 Ldn contour for 1995 baseline conditions and for noise abatement plan conditions. It also includes an approximation of the training pattern area for the proposed parallel runway (18L-36R).

Implementation Status: Implemented.

Measure LU-2 provides for the definition of an "airport affected area" so that Wisconsin Act 136 may be implemented. Firstly, the Act requires municipalities to show the location of any publicly owned airports and subsequently affected areas. These are defined as areas within three (3) miles of the Airport, unless otherwise agreed upon by the affected municipalities. Secondly, the Act requires a municipality with zoning authority to notify the Airport of any proposed changes within the "airport affected area." Finally, the Act requires that if the Airport objects to the proposed zoning change, a two-thirds vote of the municipal governing body must be reached for the change to be approved. Recognizing that the three-mile requirement in the Act would be a much larger area than what would be significantly impacted by the Airport's operations, the NCP recommends the appropriate municipal bodies agree upon an "airport affected area."

The measure was implemented through Dane County Ordinance Chapter 78, which defines a specific "airport affected area" in place of a three-mile boundary. As stated in LU-1, no "airport affected area" map was discovered in the County records during review of this measure.

The Ordinance also notes the intention of the County to enter into agreements with affected municipalities so that they may adopt the "airport affected area." Conversations with Dane County and MSN will continue during the Part 150 Study process to determine continued implementation moving forward.

2.3 LU-3: Adopt airport noise overlay zoning

Airport noise overlay zoning establishes special standards within a noise-impacted area to help mitigate the problems caused by noise. These provisions supplement those of the underlying zoning classifications and would apply only to new institutions, except on existing lots of record. Where noise-sensitive uses are permitted on lots of record, soundproofing would be required. The overlay district boundaries should correspond to a composite of the 65 Ldn noise contours for 1995 based on both baseline conditions and noise abatement plan conditions

Implementation Status: Not implemented.

Measure LU-3 recommends Dane County and the City of Madison adopt an Airport Noise Overlay Zone. This zone would establish specific standards for new development, with the goal of mitigating noise from Airport operations. The NCP recommended the zone correspond to the 1995 forecast 65 dB DNL noise contour, with the acknowledgement that some adjustment may be necessary to compensate for local land use planning. New noise-sensitive land uses would be prohibited within the overlay zone, with certain exceptions such as existing lots of record. Like LU-2, the NCP recommended a requirement in which the Airport is notified of significant land use development proposals within the overlay zone.

The measure has not been implemented, per currently available documentation. However, while there is no specific reference to a noise overlay zone in the Dane County Ordinance, Chapter 78 requires that any change

in land use be from one compatible land use to another. This in addition to the implementation of LU-1 and LU-2, essentially achieves the same effect as the overlay zone.

2.4 LU-4: Amend subdivision regulations to require dedication of noise and avigation easements of plat notes on final plat

Dane County and Madison should amend their subdivision regulations to require the dedication of noise and avigation easements for new subdivisions within the airport noise overlay zone. While the noise overlay zoning regulations should restrict opportunities for land subdivision, this would provide back-up protection in case of unforeseen events. The noise and avigation easements would help to inform prospective property buyers that the land is subject to frequent aircraft overflight and aircraft noise. It would also protect the airport proprietor (Dane County), from lawsuits claiming damages for noise or other airport activities.

Implementation Status: Implemented.

Measure LU-4 recommends Dane County and City of Madison revise their subdivision regulations so that avigation easements are conveyed for any new subdivisions within a noise overlay zone. This measure would ensure property owners are aware of the frequency and levels of aircraft noise exposure. The measure states that if easements are not deemed acceptable by the City and County, a notice of potential high noise levels should be placed on the final plat of subdivisions within the overlay zone; this would serve as an alternative disclosure for property owners.

The measure was implemented via Dane County Ordinance, Chapter 75. The ordinance states that the below notation must be placed on the plat or certified survey map for any approved subdivision within the airport affected area:

“Lands covered by this [plat] [certified survey map] are located within an area subject to heightened noise levels emanating from the operation of aircraft and equipment from a nearby airport.”

2.5 LU-5: Consider amending County subdivision regulations to prevent subdivision of land zoned A-1 Agriculture

Dane County is considering amending is subdivision regulations to prevent the subdivision of land zoned A-1, agriculture. This is a way to protect prime farmland and guide urban growth. To the extent this measure would apply to areas affected by noise and frequent aircraft overflights, it also would promote airport land use compatibility by discouraging residential development.

Implementation Status: Not implemented.

Measure LU-5 recommends that Dane County consider amending its zoning regulations to prevent the subdivision of land zoned A-1, agriculture. The goal of this amendment would be to protect farmland, manage the growth of urban areas, and ensure land use compatibility where applicable.

This measure was not implemented; there is no such regulation found in the Dane County Ordinances.

2.6 LU-6: Amend building codes to provide soundproofing standards for noise-sensitive development in airport noise overlay zones

The County and City should amend building codes to provide soundproofing standards for use within the airport noise overlay zone. This would implement the sound insulation requirements of the noise overlay zoning ordinance

Implementation Status: Not implemented.

Measure LU-6, assuming the establishment of an airport noise overlay zone, recommends Dane County and the City of Madison amend their building codes to include soundproofing standards for new developments within the overlay zone.

The measure was not implemented as a specific airport noise overlay zone was not established.

2.7 LU-7: Amend local land use plans to reflect noise compatibility plan recommendations and establish airport compatibility criteria for project review

Dane County, the City of Madison, and the Town of Burke should amend their land use plans to reflect the recommendations of the Noise Compatibility Plan. The adoption of project review criteria as part of the local land use plans, requiring the consideration of airport noise and land use compatibility, would help ensure that these important concerns are not neglected during future land use deliberations.

Implementation Status: Implemented.

Measure LU-7 stated that Dane County, the City of Madison, and the Town of Burke amend their local land use plans to reflect recommendations of the NCP. Continued coordination amongst jurisdictions is necessary to maintain land use compatibility. As such, the measure recommended the following guidelines for future land use review:

A. Determine the sensitivity of the subject land use
B. Advise the Airport of development proposals
C. Locate noise-sensitive public facilities outside the 65 dB DNL contour and encourage building construction that brings interior noise levels to 45 dB DNL
D. Discourage approval of urban area amendments that allow for noise-sensitive development
E. Where development within the 60 dB DNL contour must be allowed, encourage developers to adjust their designs to shield noise-sensitive areas of the building

This measure was implemented; ongoing support for the Airport's promotion of compatible land uses is noted in the Dane County Land Use Plan, which notes the participation of local municipalities.

2.8 LU-8: Follow through with planned land acquisition in Cherokee Marsh and Token Creek Park areas

The Cherokee Marsh Revised Long-Range Open Space Plan (September 1981) proposes the acquisition of plan in the marsh and along Token Creek north of the airport. By following through with that program, the County will be helping to promote airport land use compatibility while also achieving the direct objective of the Open Space Plan. The attached map shows three areas proposed for acquisition which would be eligible for FAA funding assistance through the noise set-aside of the airport improvement program since they lie within the 65 Ldn contour.

Implementation Status: Not implemented (further investigation needed).

Measure LU-8 notes the planned acquisition of land to the north side of the Airport, as proposed in the 1981 Cherokee Marsh Revised Long-Range Open Space Plan. This acquisition would support the Noise Abatement Plan which calls for use of the north side of the Airport, with the goal of reducing the noise exposure of the developed areas to the south of the Airport. Exhibit 5F of the NCP highlights the proposed acquisition areas. Three of the proposed areas, totaling 178 acres, were eligible for FAA-funding at the time of NCP publication, as they are within the 65 dB DNL contour.

More investigation is needed to determine the implementation status of this measure. While land acquisition is noted on the Airport website (https://www.msnairport.com/about/ecomentality/noise_faq), detailed acquisition history should be confirmed with the Airport.

2.9 LU-9: Consider expanding land acquisition boundaries in Cherokee Marsh and Token Creek areas

The attached map shows three parcels, B, C, and D, as proposed for parks and open space expansion. All are within the 65 Ldn contour, based on 1995 conditions with the Noise Abatement Plan. Thus, acquisition costs would be eligible for FAA funding assistance through the noise set-aside of the Airport Improvement Program. As an option to outright acquisition by the County, private development for park and recreation uses, such as golf courses, riding clubs, or private wildlife sanctuaries, would also be acceptable.

Implementation Status: Not implemented (further investigated needed).

Measure LU-9 is a continuation of LU-8 and recommends the expansion of the planned land acquisition to the north of the Airport. Three specific parcels are highlighted on Exhibit 5F, and all were eligible for FAA-funding at the time of NCP publication.

More investigation is needed to determine the implementation status of this measure. While land acquisition is noted on the Airport website (https://www.msnairport.com/about/ecomentality/noise_faq), detailed acquisition history should be confirmed with the Airport.

2.10 LU-10: Establish sales assistance or purchase assurance program for homes impacted by noise above 70 Ldn

Dane County should consider a sales Assistance or purchase assurance program for single-family homes within the 70 Ldn contour, based on a combination of the 1995 baseline and noise abatement plan contours. South of the airport, the qualifying area is bounded by Aberg Avenue on the north, Washington Avenue on the east and south, and Pawling and North Lawn Avenue on the west. To the north, a few scattered homes on County Road CV and Hoepker Road are included. An estimated 216 homes are within the entire area, including 210 on the south side and six on the north side.

These programs would give homeowners who are severely disturbed by noise the assurance that they could leave the neighborhood without risking financial penalty. A purchase assurance program would make the County the buyer of last resort. If, after a given period of time on the market, the homeowner was unable to sell the home for fair market value, as determined through professional appraisals, the County would buy the home. The County would then retain a noise and avigation easement and sell the home, accepting a loss if necessary to put the home back on the tax rolls.

A sales assistance program would be similar, but the County would never take the title to the property. The County would make up the difference between fair market value and the best purchase offer made on the home. The County would secure a noise and avigation easement from homeowners in return for their participation in the program.

Implementation Status: Implemented.

Measure LU-10 recommends a sales assistance or purchase assurance program be established for single-family homes within the 70 dB DNL contour. Recommended areas are shown on NCP Exhibit 5G. The goal of these programs is to provide financial assistance to homeowners wishing to move from the most heavily noise impacted areas. These programs are voluntary, and an avigation easement would be conveyed in exchange for the Airport's assistance in selling the properties.

This measure was implemented; a Home Sales Assistance Program was instituted per the Airport's website (https://www.msnairport.com/about/ecomentality/noise_faq). The Sales Assistance Program was comprised of two components; the sale of an avigation easement in exchange for a $2,000 cash payment or receive assistance from the Airport in the sales of their home. Of the 300 eligible parcels, 185 chose the avigation easement option and 13 parcels chose to have assistance with the sale of their home. There were 102 parcels that did not participate in the program.

2.11 LU-11: Install sound insulation for schools impacted by noise above 65 Ldn

Two schools are impacted by noise above 65 Ldn, based on 1995 baseline conditions – Holy Cross Lutheran School on Milwaukee Avenue and Lowell School, just north of Lake Monona. If technically feasible, sound insulation should be installed in both schools. Both school operators should understand that effective sound insulation requires keeping the windows closed. This could raise heating and cooling costs. While the capital costs of the sound insulation project are eligible for 90% FAA funding assistance, all operating costs must be borne by the school operators.

Implementation Status: Not implemented.

Measure LU-11 pinpoints two schools within the 65 dB DNL contour, based on the 1995 forecast NEM, and recommends them for sound insulation. At the time of publication an estimate of $500,000 was provided for Lowell School and $300,000 for Holy Cross School.

This measure has not been implemented; and will be reassessed during the NCP process.

3 Implementation of Program Management Measures

In the FAA-approved NCP and the 1993 ROA, program management measures (PM) are labeled and referenced as continuing program (CP) measures. For this Part 150 update, existing CP measures are referred to as program management measures.

Three PM measures were recommended in the original Part 150 documentation, all of which the FAA approved. A description of each of these measures is provided below along with information about the implementation status of each measure.

Table 6. Status of 1991 NCP Program Management Measures

Measure Number	Flight Procedures Addressed	Implementation Status
PM-1	Program monitoring and noise contour updating	Implemented
PM-2	Evaluation and update of the plan	Implemented
PM-3	Noise complaint response	Implemented

3.1 PM-1: Program monitoring and noise contour updating

The airport management should follow the progress of the Madison city planning department and the Dane County Regional Planning Commission in implementing the land use recommendations. They also should check periodically with the Airport Traffic Control Tower to verify compliance with the noise abatement procedures. If the airport has a major increase in operations or a major change in the aircraft fleet, the Ldn contour maps should be updated to determine the impact of the changes.

Implementation Status: Implemented

Airport management maintains continued contact with the City of Madison, Dane County, and the FAA Air Traffic Control Tower regarding airport related issues including compliance with noise abatement procedures.

3.2 PM-2: Evaluation and update of the plan

The airport management should periodically review the Noise Compatibility Plan and consider refinements, as necessary. As a rule of thumb, the Plan should be updated every six to eight years.

Implementation Status: Implemented.

Since the 1991 study, the airport has periodically reviewed the Noise Compatibility Plan. As a result of the 115th Fighter Wing transitioning their fleet aircraft from F-16 to F-35A, the airport decided to initiate a Part 150 Study for the first time since 1991. Dane County is currently in the process of updating the MSN Noise Compatibility Planning study.

Dane County website contains a "Part 150 Noise Study" page[3] with the following links:

- Links to current information on this Part 150 Study
- A link to the FAA Part 150 Homepage

[3] Part 150 Noise Study on the Dane County website: Part 150 Noise Study (msnairport.com)

3.3 PM-3: Noise complaint response

The airport management should continue recording and responding to noise complaints. These should be evaluated to determine if a pattern of common problems is occurring and is in need of attention.

Implementation Status: Implemented.

Airport management has implemented an online noise report form for residents to submit noise complaints. This is part of the overall noise complaint program. The airport determines patterns based on the complaints received and follows up as appropriate.

Dane County website contains the following links:

- A "Noise FAQ" page[4] providing answers to frequently asked questions about noise-related issues specific to MSN
- A "Noise Report Form" page[5] for submitting noise complaints or noise questions/comments

[4] Noise FAQ page on the Dane County website: Noise FAQ (msnairport.com)
[5] Noise Report Form on the Dane County website: https://www.msnairport.com/about/ecomentality/noise_report_form

ORDER

MSN ATCT
8400.9I

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
AIR TRAFFIC CONTROL TOWER
MADISON, WISCONSIN

SUBJ: Informal Runway Use Noise Abatement Program, Converging Flow Operations and Opposite Direction

1. PURPOSE. This order establishes facility policy and procedures used for the Converging Flow Operations and the Informal Runway Use Program.

2. DISTRIBUTION. This order is distributed to AGL-530, Wisconsin Terminal Hub, and all facility personnel via facility binders.

3. CANCELLATION. MSN ATCT Order 8400.9H Informal Runway Use Noise Abatement Program and Converging Flow Operations dated September 26, 2002

4. EFFECTIVE DATE. December 17, 2012

5. BACKGROUND. Converging Flow exists (except when applying the provisions of FAA7110.65, par. 5-8-4) if a departing aircraft has the potential of passing within 3 miles of an arriving aircraft.

   Madison's Part 150 Noise Study identifies the most effective noise abatement procedure as placing aircraft over the less densely populated areas north of the airport. This often requires converging flow operations. Due to high closure rates and the low altitude of participating aircraft, converging flow operations require intense air traffic direction and have little margin for error.

   Additionally, converging flow operations may be conducted for reasons other than noise abatement (practice approaches, pilot request, etc.). Therefore, converging flow operations and noise abatement are interdependent but addressed separately.

6. POLICY. It is the policy of the FAA and this facility to help reduce aircraft noise to the extent practical and consistent with safety.

7. PROCEDURES. Noise abatement shall be accomplished using the methods described below as safety allows. Traffic permitting, turbojet aircraft exceeding 12,500 pounds or more departing runway 3, should climb on runway heading to 2,500 feet before turning east or southbound. Turbojet aircraft exceeding 12,500 pounds or more departing runway 32 should climb on runway heading to 2,500 feet before turning southwest bound. Turbojet aircraft 12,500 pounds or more departing runway 21 should be turned to a 200º heading as soon as practicable. Turbojet intersection departures are not authorized except runway 32 from E, runway 36 from A6, and runway 18 from A2. The most effective noise abatement method is to take-off runway 36, 32 and 3, land runway 18, 14 and 21.

   a. Noise Abatement - If aircraft will not be placed in a converging flow situation, the following items apply:
      (1) These procedures apply to all turbojet aircraft 12,500 pounds or heavier.
      (2) Unreasonable delays are defined as a delay exceeding 5 minutes.
      (3) There should be no significant wind shear or thunderstorms, which affect the use of the selected runways such as:
         (a) That reported by the Weather System Processor.
         (b) Pilot reported wind shear.
         (c) No thunderstorms on the initial takeoff departure path or final approach path (within 5 NM) of the selected runway(s).
      (4) When utilizing landing runways associated with this program the visibility shall not be less then one statute mile (RVR 5000).
      (5) There should be no snow, slush, ice, or standing water present or reported (other than isolated patches which do not impact braking effectiveness) on that width of the applicable runway(s). Braking effectiveness must be "good" and no reports of hydroplaning or unusually slippery runway surfaces.

(6) Wind (see appendix 1)
(a) Clear and dry runways.
1. The crosswind component, including gust values, must not exceed 20 knots.
2. The tailwind component must not exceed 5 knots.
(b) Runways not clear or not dry.
1. The crosswind component, including gust values, must not exceed 15 knots.
2. No tailwind component may be present except winds reported as "calm" (0-3 knots) may be considered to have no tailwind component.
3. The runway must be grooved (36, 32 and 21).

b. Converging Flow Requirements – Before placing aircraft in a converging flow situation ensure that the following additional safety parameters exist, otherwise hold traffic until the converging flow aircraft is no longer a factor:
(1) Ceiling and visibility allow the Local Controller a clear view of the inbound aircraft from a point not less than 5 miles from the airport, to the landing runway.
(2) Traffic advisories are exchanged between participating aircraft.

8. CONVERGING FLOW:

a. NORTH TRAFFIC OPERATIONS (RWY 36/32/3) – The operation is conducted per Local Control's approval and restrictions. Approach Controller(s) should determine if the proposed converging flow operation is warranted with regard to traffic and weather conditions. If the operation seems feasible it should be APREQed with Local Control when the aircraft is 20 - 25 miles out. The outcomes are as follows:
(1) LC approves the aircraft "direct." Required phraseology "(*acid*), DIRECT APPROVED". This aircraft is expected to be controlled so as to proceed directly to the specified runway without delay.
(2) LC approves the converging flow runway with restrictions. Required phraseology is "(*acid*) (*restrictions)* APPROVED." Radar shall vector the converging flow arrival so as not to be a factor to LC until on final (i.e. stay wide or maintain an altitude above the departure area).
(3) LC denies approach's request.

b. SOUTH TRAFFIC OPERATIONS (RWY 18/14/21) – The operation is conducted per the Radar Controller(s) approval and restrictions. Ground Control shall APREQ converging flow departures with Local Control prior to taxi. Local Controller must determine the feasibility of the converging flow departure. Aircraft should not be west of the runway 14 final until above 2,500 MSL. The outcomes are as follows:
(1) Radar releases the aircraft.
(a) Required phraseology is, "(heading/on course), (other restrictions as applicable) RELEASED."
(b) The local controller releasing a converging flow departure shall coordinate said release with the receiving radar controller and advise the other radar controller. Advising the other radar controller may be omitted if the departure will not be within 3 NM of that controller's airspace 5 miles after departure, (i.e. a R/W 32 departure enroute to LNR, the East controller need not be advised).
(2) Radar approves the request, but does not release the aircraft.
(a) Required phraseology, "APPROVED HOLD FOR RELEASE"
(b) The aircraft is taxied to runway 36, 32 or 3 and local reinitiates coordination for the actual release.
(3) Radar denies the request.

9. OPPOSITE DIRECTION

a. General:

(1) The initiating area of specialization is responsible for making all verbal coordination required to accomplish an opposite direction arrival or departure.
(2) All coordination must be on a recorded line and must state "opposite direction".
(3) All coordination must include call-sign, aircraft type and arrival or departure runway.

Example-
"RADAR LOCAL APPREQ, OPPOSITE DIRECTION CHQ5018, EMBRAER RUNWAY 36."

LOCAL RADAR APPREQ, OPPOSITE DIRECTION DAL420, AIRBUS, RUNWAY 18."

(4) The cutoff points for the MSN ATCT are the 10 mile final to all runways.
(5) Restrict opposite direction same runway operations with opposing traffic inside the applicable cutoff point unless an emergency exists.
(6) Traffic advisories shall be given to both the arriving and departing aircraft.

Example-
"OPPOSITE DIRECTION TRAFFIC (DISTANCE) MILE FINAL (type aircraft)."

"OPPOSITE DIRECTION TRAFFIC DEPARTING RUNWAY (number), (type aircraft)."

b. Opposite Direction Departures:

(1) The tower must verbally request all opposite direction departures from radar, stating the aircraft call-sign, aircraft type and departure runway.
(2) The tower must ensure that required longitudinal or lateral separation exists before any other type of separation is applied (i.e. Visual Separation).
(3) The tower must ensure that the departing aircraft becomes airborne and has been issued a turn to avoid conflict prior to the cutoff point.

c. Opposite Direction Arrivals:

(1) Radar must verbally request all opposite direction arrivals from the tower, stating the aircraft call-sign, aircraft type and arrival runway.
(2) Radar must ensure that an opposite direction arrival aircraft will not cross the cutoff point prior to an aircraft crossing the opposite runway threshold.
(3) The tower must ensure that the departing aircraft becomes airborne and has been issued a turn to avoid conflict prior to the cutoff point.

Dennis J Vincent
Air Traffic Manager
MSN ATCT

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Appendix C Noise Modeling

This appendix includes:

- AEDT Nonstandard Modeling Request
- Placeholder for the FAA Approval Letter of Nonstandard Aircraft Noise and Performance Data Substitution Request
- TAF Confirmation Memorandum

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HMMH
700 District Avenue, Suite 800
Burlington, MA 01803
781.229.0707

TECHNICAL MEMORANDUM

To:	Bobb A. Beauchamp, Environmental Program Manager, Federal Aviation Administration
From:	Timothy Middleton, C.M., Principal Consultant, HMMH
Date:	September 27, 2021
Subject:	Dane County Regional Airport / Truax Field (MSN) Part 150 Study, Nonstandard Aircraft Noise and Performance Data Substitution Request
Reference:	HMMH Project Number 312360

Harris Miller Miller & Hanson Inc. (HMMH) is assisting Dane County Regional Airport (MSN) with a Noise Exposure Map Update as a component of the Part 150 Noise Compatibility Planning Study that the airport is currently undertaking. Aircraft noise modeling will use the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) Version 3d,[1] combined with modeling with NoiseMAP 7.3 for select military operations.[2] In an initial analysis of flight operations data, HMMH found several aircraft in the flight operations data that are defined in the AEDT database however AEDT does not have representative circuit or touch-and-go profiles (Section 1.0). To accommodate these aircraft, we would perform a nonstandard aircraft noise and performance data substitution in AEDT. This technical memorandum describes the need and requests approval for such a nonstandard aircraft noise and performance data substitution in the model.

HMMH has prepared this technical memorandum in accordance with Section 5 of FAA's document titled "Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA" dated October 27, 2017.[3] This particular request falls under Section 5.2.2 "Analysis methods/data that require AEE review and approval" items:

- "Aircraft that do not exist in AEDT default data."
- "Alternative models and methodologies besides FAA-required and -preferred models and methodologies (e.g., terrain shielding, adjustments to lateral attenuation, etc.), including modifications to AEDT default methodologies."

HMMH believes that this request should be routed in accordance with Section 5.1 of that document. After review at FAA headquarters, we would expect a document from Office of Environment and Energy (AEE) responding to the methods presented in this memorandum. That AEE response would be included in the NEM's noise technical documentation.

1.0 Non-standard Circuit/Touch-and-go Modeling

MSN aircraft operations include local touch-and-go procedures also known as circuits. However, one of the Aircraft Noise and Performance (ANP) types used in this study does not have circuit or touch-and-go profiles.

[1] AEDT 3d was the most current FAA approved noise model available in April 2022 when model flight track development began.

[2] The military aircraft modeling for the NEM is based on NoiseMap modeling presented in the US Department of Defense "United States Air Force F-35A Operational Beddown Air National Guard Environmental Impact Statement", on file with US Environmental Protection Agency as EIS No. 20200051 and available at https://cdxapps.epa.gov/cdx-enepa-II/public/action/eis/details?eisId=290711 and with a Record of Decision announced in the Federal Register On April 23, 2020 and available at https://www.federalregister.gov/documents/2020/04/23/2020-08597/record-of-decisions-for-the-environmental-impact-statement-united-states-air-force-f-35a-operational. We are updating the EIS modeling specifically for this NEM with coordination with the local Air National Guard and Army National Guard units.

[3] https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf

9/27/2022
Bobb Beauchamp

1.1 ANP type PA28

This study includes AEDT operations of ANP type PA28, which does not have circuit or touch-and-go profiles. PA28 is a single engine piston propellor aircraft. Our research indicates that some variants of the Piper 28 are fitted with fixed pitch propellors and others with variable pitch/constant speed propellors. We propose to use AEDT equipment ID 1277/ANP type GASEPV to model the touch-and-go operations that would otherwise be assigned to ANP type PA28. This request would not affect the representation of ANP type PA28 operations within AEDT.

HMMH has prepared a comparison of the noise generated by PA28 and GASEPV arrival-departure cycles as well as the noise produced by a GASEPV circuit operation. Figure 1 below presents the comparison of the PA28 to the GASEPV 75 – 95 dB SEL contours produced by AEDT for an arrival-departure cycle on Runway 18. The PA28 contours are shown in red and the GASEPV contours are shown in black. Figure 2 presents the 75 – 95 dB SEL contours for a GASEPV circuit operation, again on Runway 18.

Figure 1. Comparison of SEL Contours for PA28 and GASEPV Arrival-Departure Cycles

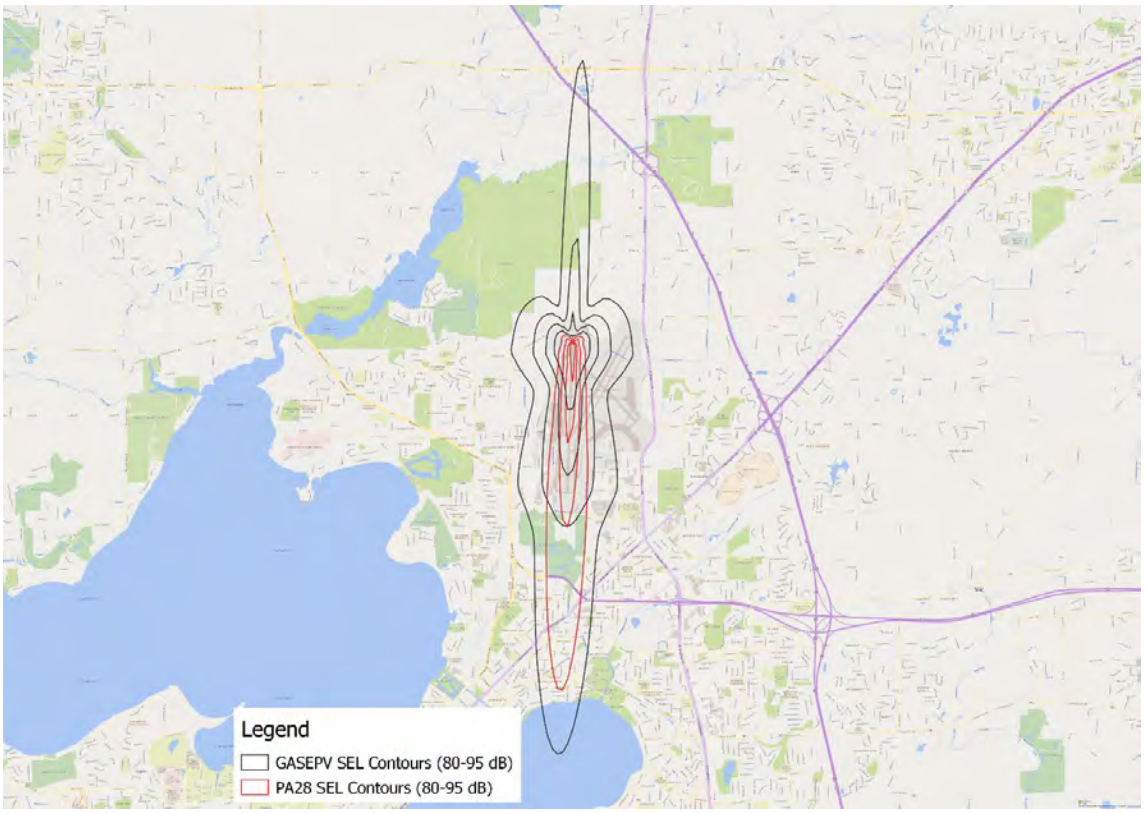
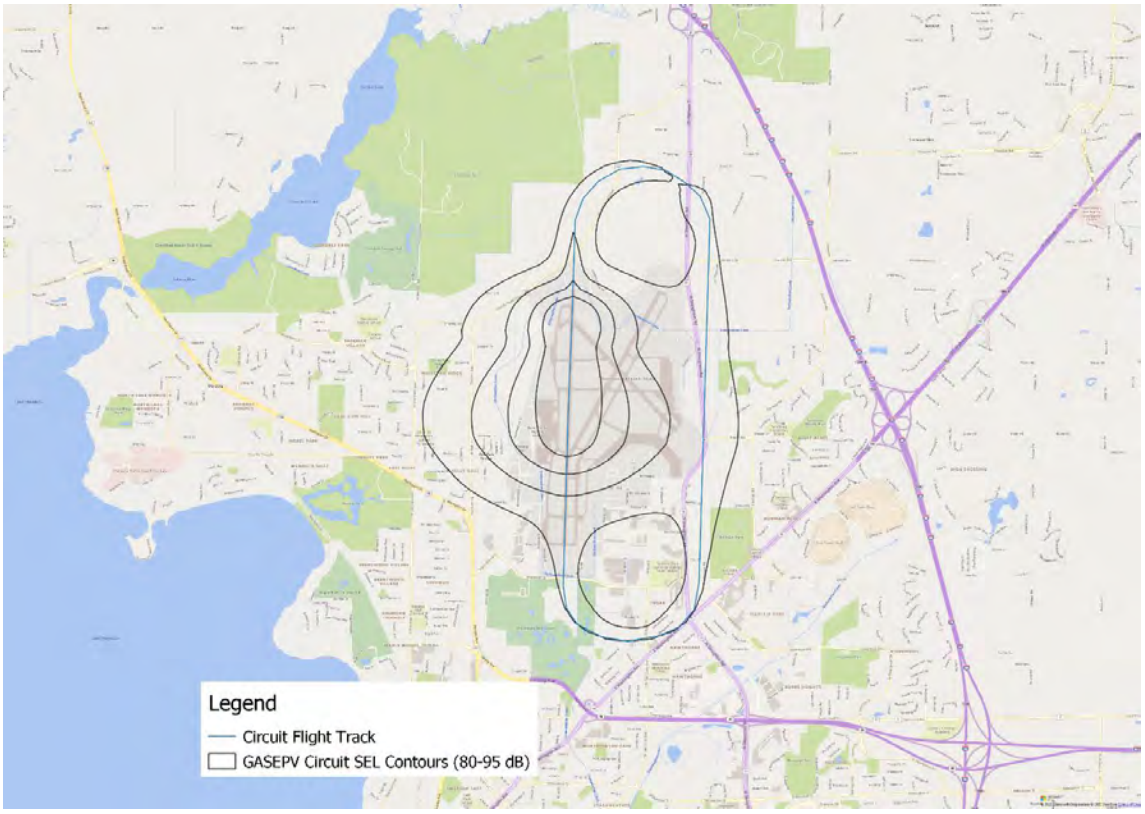


Figure 2. SEL Contours for GASEPV Circuit Operation



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Placeholder for the FAA Approval Letter of Nonstandard Aircraft Noise and Performance Data Substitution Request

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Planning Memorandum – MSN TAF Confirmation

Date: October 10, 2022

To: Timothy Middleton, C.M. and Julia Nagy,
HMMH

From: Ryan Hayes and Patricia Song,
Mead & Hunt

Re: MSN Part 150 Study – FAA TAF Confirmation

INTRODUCTION AND BACKGROUND

This memo summarizes past aviation activity at the Dane County Regional Airport (MSN or the Airport) and presents an analysis of the Federal Aviation Administration's (FAA's) 2021 Terminal Area Forecast (TAF) published in March 2022, as well as some additional projections of future aviation activity levels at MSN for comparison purposes. This memo serves as the basis for the MSN existing and forecast aircraft operations assessed in the Airport Noise Compatibility Planning study under Title 14 of the Code of Federal Regulations (CFR) Part 150. Forecasting, by its very nature, is not exact, but it does provide some general indicators of how activity may change in the future. In that manner, this memo serves as a basis for evaluating how aircraft operations may change in the future at MSN. The past conditions serve as the basis for the future fleet mix forecasts described in more detail in the Part 150 study chapters.

In preparing a Part 150 study, one of the key products is the Noise Exposure Maps (NEMs). The NEMs include the existing and future (typically five years into the future) noise exposure contours prepared using the FAA's Aviation Environmental Design Tool (AEDT) noise model. This memo presents estimates of future aircraft operations and will serve as the basis for developing the future noise exposure contour maps.

HISTORICAL DATA

The memo presents the results of two forecasting methods that are later compared to the 2021 FAA TAF: regression analysis and historical trend forecasting methods. Regression analysis forecasts examine the effects of local socioeconomic variables on aviation demand while the latter is based on aviation demand at MSN in the recent past and present future activity levels assuming those trends continue into the future. Both methods account for factors local to the Airport itself or the region that MSN serves.

Base Data

Historical data regarding passenger enplanement and aircraft operations provided by the Airport was assessed and compared against the 2021 FAA TAF. Airport data was recorded monthly and categorized by calendar year. The data was converted to match the FAA fiscal year (FY) of October to September to be comparable to the TAF for this analysis. Thus, the range of historical data used begins in FY 2012 and goes to FY 2021, the most recent full fiscal year of data. **Tables 1 and 2** present the 2021 FAA TAF and

Airport provided data along with a percentage difference or delta (negative percentage implying more enplanements from the Airport data source) for comparison.

Table 1: FY 2012-2021 MSN Passenger ENPLANEMENT Data Comparison – TAF and Airport Records

Fiscal Year	TAF	Airport Data	Delta
2012	779,010	801,674	-2.91%
2013	815,913	834,622	-2.29%
2014	828,052	835,753	-0.93%
2015	827,520	842,419	-1.80%
2016	882,228	906,994	-2.81%
2017	927,071	952,504	-2.74%
2018	1,005,835	1,032,948	-2.70%
2019	1,142,812	1,184,493	-3.65%
2020	633,489	646,222	-2.01%
2021	551,317	560,152	-1.60%
CAGR ’12-‘21	-3.8%	-3.9%	N/A
Sources: 2021 TAF, Dane County Regional Airport			

Comparing the TAF records and Airport records, there is generally less than 3% difference between the TAF and Airport enplanement records. The largest difference is for 2019 where there is a difference of more 41,681 enplanements with the Airport data showing more enplanements than the TAF.

Table 2: FY 2012-2021 MSN Aircraft OPERATIONS Data Comparison – TAF and Airport Records

Fiscal Year	Total Operations			Itinerant Operations			Local Operations		
	TAF	Airport Data	Delta	TAF	Airport Data	Delta	TAF	Airport Data	Delta
2012	84,853	84,695	0.19%	66,200	66,212	-0.02%	18,653	18,483	0.91%
2013	83,926	83,926	0.00%	66,170	66,170	0.00%	17,756	17,756	0.00%
2014	80,585	80,584	0.00%	65,966	65,965	0.00%	14,619	14,619	0.00%
2015	77,716	77,667	0.06%	63,804	63,839	-0.05%	13,912	13,828	0.60%
2016	80,631	80,631	0.00%	65,265	65,265	0.00%	15,366	15,366	0.00%
2017	83,889	83,874	0.02%	65,643	65,628	0.02%	18,246	18,246	0.00%
2018	85,893	85,902	-0.01%	68,030	68,035	-0.01%	17,863	17,867	-0.02%
2019	82,085	82,261	-0.21%	69,341	69,321	0.03%	12,744	12,940	-1.54%
2020	73,170	73,170	0.00%	57,836	57,836	0.00%	15,334	15,334	0.00%
2021	75,957	76,035	-0.10%	59,246	59,264	-0.03%	16,711	16,771	-0.36%
CAGR ’12-‘21	-1.2%	-1.2%	N/A	-1.2%	-1.2%	N/A	-1.2%	-1.1%	N/A
Sources: 2021 TAF, Dane County Regional Airport									

Comparing the TAF records and Airport records for itinerant and local aircraft operations, there is generally less than 1% difference between the TAF and Airport records. The exception would be in local

operations in 2019 which can mainly be attributed to the Airport records noting 378 local military operations while the TAF estimates 276, which is a 0.37% difference.

Regional Population and Economic Data

The geographic region analyzed for the forecast is the Madison, WI Metropolitan Area (MSA) which includes Columbia, Dane, Green, and Iowa counties. Socioeconomic variables typically related to aviation demand forecasting were examined and include MSA population, income per capita, gross regional product (GRP), earnings, retail sales, and employment. The socioeconomic variables were utilized in the regression analysis forecast method. **Table 3** shows the 2012-2021 historical socioeconomics of the MSA. Historical growth rates range from approximately 1 to 3 percent.

Table 3: Historical Madison, WI MSA Socioeconomics (2012-2021)

CY	Population	Income/ Capita	Gross Regional Product	Total Earnings	Total Retail Sales	Total Employment
2012	608,979	60,035	48,257	29,428	15,962	462
2013	614,364	60,573	49,829	30,756	16,369	468
2014	619,677	61,819	52,949	31,413	16,845	478
2015	626,171	64,671	56,011	32,990	17,257	489
2016	636,340	65,690	58,005	34,055	17,635	502
2017	642,550	66,903	58,180	34,988	18,107	507
2018	648,478	68,625	59,507	35,803	18,633	514
2019	655,592	70,074	61,372	36,945	19,025	522
2020	661,424	71,241	62,796	37,782	19,665	529
2021	671,135	72,461	64,308	38,672	20,059	537
CAGR '12-'21	1.1%	2.1%	3.2%	3.1%	2.6%	1.7%
Sources: Wisconsin Department of Administration, Woods & Poole Economics, Inc.						

Future population data was sourced from the Wisconsin Department of Administration's (DOA) annual population estimates. However, the most recent update to population projections was in 2013. Thus, to provide the most recent as possible population forecast, the Woods & Poole Economics, Inc. (W&P) population forecast for the MSA was used to calculate the population growth rate. This growth rate was then applied to DOA base year 2021 data to calculate future MSA population. W&P provides socioeconomic data for gap years in the U.S. Census.

The historical and projected economic data was sourced from W&P data. The economic data was provided in 2012 dollars and have been converted to 2022 dollars using the CPI Inflation Calculator by the U.S. Bureau of Labor Statistics.

Table 4 shows the forecasts for population, income per capita, GRP, earnings, retail sales, and employment. Future growth rates range from approximately one half of a percent to 2 percent.

Table 4: Projected Madison, WI MSA Socioeconomics (2021-2041)

CY	Population	Income/Capita	Gross Regional Product	Total Earnings	Total Retail Sales	Total Employment
2021	671,135	72,461	64,308	38,672	20,059	537
2026	694,664	78,509	71,828	43,096	22,005	572
2031	719,018	84,753	79,775	47,775	23,841	605
2036	739,715	91,385	88,358	52,842	25,702	638
2041	761,008	98,551	97,782	58,425	27,690	672
CAGR	0.6%	1.5%	2.1%	2.1%	1.6%	1.1%
Sources: Wisconsin Department of Administration, Woods & Poole Economics, Inc.						

FORECASTS OF AVIATION ACTIVITY

Regression Analysis Forecast Method

The first forecasting method assessed was based on multi-variable regression analysis. This method links conditions local to the Airport to changes in aviation demand (passenger enplanements and aircraft operations). It examines what effects, if any, local population or economics may have in influencing enplanements and/or operations.

The first step of this method is a correlation analysis of the socioeconomic variables with passenger enplanements and aircraft operations at MSN. Correlation describes how strongly related the rates of change between two variables are to each other. The stronger the correlation, the more linear their relationship is – a positive correlation means two variables increase together while a negative correlation means one variable decreases while the other increases. The stronger the positive correlation, the closer the correlation coefficient approaches the value of 1.0. Strong negative correlations are closer to -1.0 while having no correlation equals a correlation coefficient of 0.

Each of the socioeconomic variables were assessed against total enplanements, itinerant operations, local operations, and total operations using data between 2012 and 2021. Initial assessment resulted in no strong (correlation coefficient greater than 0.8) correlation between any of the socioeconomic variables with total operations. Sales represent the only moderate (greater than 0.7) correlation with total operations. Conversely, historical passenger enplanement strongly correlated with socioeconomic factors. Enplanements rose as population and economic indicators increased over time. **Table 5** shows the correlation coefficients of enplanements and total operations against the socioeconomic variables assessed.

Table 5: 2012-2021 MSN Passenger ENPLANEMENT and Total Aircraft OPERATIONs Correlation Analysis

Correlation Coefficient						
Regression Analysis	**Population**	**Income/Cap**	**GRP**	**Earnings**	**Sales**	**Employment**
Enplanements	0.922	0.906	0.834	0.902	0.921	0.893
Total Operations	0.103	0.040	-0.116	0.031	0.074	0.034

Additional multi-variable analysis was conducted to examine the effects of multiple variables on enplanements and operations. Three multi-variable regression models were tested against historical enplanements and total operations. Multi-variable models allow forecast to account for variables with different scale such as geography (local, county, state) or focus (population, income, employment). In the case of multi-variable regression, the adjusted R^2 is used to decide the level of confidence each model has. Every variable added to a model increases the R^2 and never decreases it, which can lead to an incorrectly high R^2 value. The adjusted R^2 value accounts for this effect and avoids the issue of not knowing if the R^2 value is high due to the model being better or because it has more predictor variables. **Table 6** shows the adjusted R^2 results of the multi-variable analysis.

Table 6: Multi-Variable Regression Analyses for ENPLANEMENTS and OPERATIONS

Multi-variable Analysis - Adjusted R Square	Enplanements	Total Operations
Population, Income/Capita, GRP, Earnings, Sales, Employment	0.932	0.773
Population, Income/Capita, GRP	0.958	0.696
Population, GRP	0.910	0.052
Population, Sales	0.833	0.460

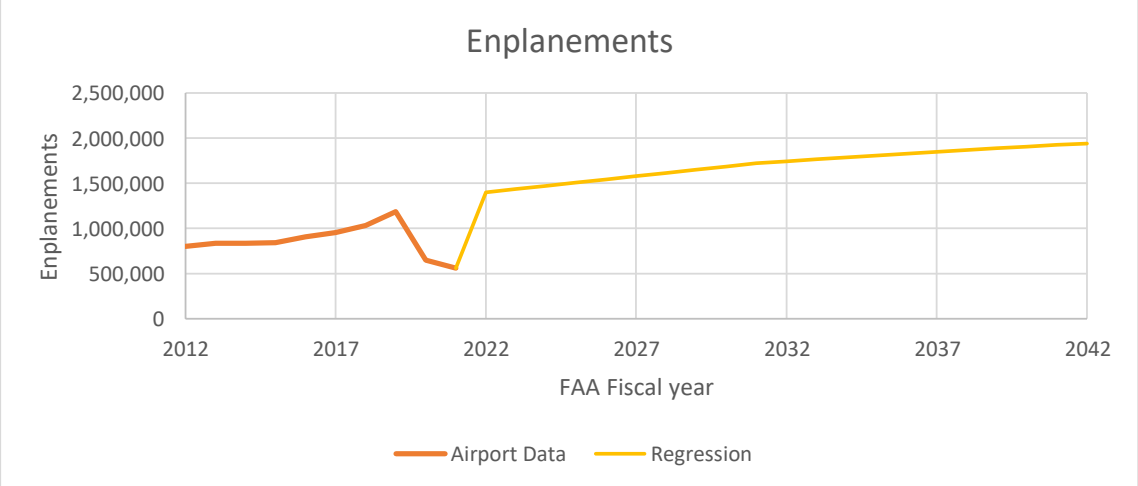
Regression Analysis Forecast of Passenger Enplanements

Due to the strong adjusted R^2 of the passenger enplanement multivariable analysis, a regression forecast using a two-variable model with population and GRP was used to project future enplanements. A forecast for total operations was not completed as the strongest adjusted R^2 is from the five-variable model using all the socioeconomic variables assessed. This is likely due to the result of the use of multiple variables which, as explained previously, naturally increases the R^2 that even the adjusted R^2 does not fully mitigate. Additionally, most of the socioeconomic variables have no correlation to historical total operations rules out regression-based projections for total operations at MSN as a forecasting method. **Table 7** and **Figure 1** show the enplanement forecast results using the population and GRP two-variable forecast method.

Table 7: Two-Variable Regression – Passenger ENPLANEMENT Forecast

FY	Enplanements
2019	1,184,493
2021	560,152
2027	1,576,918
2032	1,742,176
2037	1,847,539
2042	1,940,355
CAGR '21-'42	6.09%

Figure 1: Two-Variable Regression - Passenger ENPLANEMENT Forecast



Historical Trend Forecast Method

The historical trend forecast method is based on using the annual growth rate of the historical period (CAGR) to determine the future growth rate. **Table 8** shows the historical trends for enplanements and each operation category based on Airport provided data. The 2012 to 2019 CAGR was used for the historical trend forecast growth rate as it excludes the 2020 and 2021 COVID-19 related impacts years.

Table 8: 2012-2021 MSN Passenger ENPLANEMENT and Aircraft OPERATIONS Historical Trends

FY	Enplane-ments	ITINERANT					LOCAL			Total Opera-tions
		AC	AT	GA	MI	Total	Civil	Military	Total	
2012	801,674	11,738	19,670	29,940	4,864	66,212	17,542	941	18,483	84,695
2013	834,622	15,256	18,261	27,861	4,792	66,170	17,103	653	17,756	83,926
2014	835,753	15,022	18,014	28,741	4,188	65,965	14,274	345	14,619	80,584
2015	842,419	16,335	14,432	28,944	4,128	63,839	13,438	390	13,828	77,667
2016	906,994	18,530	11,086	30,559	5,090	65,265	14,916	450	15,366	80,631
2017	952,504	18,755	11,700	31,306	3,867	65,628	18,004	242	18,246	83,874
2018	1,032,948	21,912	10,899	30,704	4,520	68,035	17,581	286	17,867	85,902
2019	1,184,493	24,286	11,612	28,665	4,758	69,321	12,562	378	12,940	82,261
2020	646,222	20,069	6,168	27,058	4,541	57,836	15,065	269	15,334	73,170
2021	560,152	17,730	6,747	29,931	4,856	59,264	16,587	184	16,771	76,035
CAGR										
'12-'21	-3.9%	4.7%	-11.2%	0.0%	0.0%	-1.2%	-0.6%	-16.6%	-1.1%	-1.2%
'12-'19	5.7%	10.9%	-7.3%	-0.6%	-0.3%	0.7%	-4.7%	-12.2%	-5.0%	-0.4%
'19-'20	-45.4%	-17.4%	-46.9%	-5.6%	-4.6%	-16.6%	19.9%	-28.8%	18.5%	-11.1%
'20-'21	-13.3%	-11.7%	9.4%	10.6%	6.9%	2.5%	10.1%	-31.6%	9.4%	3.9%
'19-'21	-31.2%	-14.6%	-23.8%	2.2%	1.0%	-7.5%	14.9%	-30.2%	13.8%	-3.9%
Source: Dane County Regional Airport										

The historical trend method assumes past growth rates (positive or negative) to carry into the future. Thus, factors that have grown or declined in the historical period would continue to grow or decline through the forecast period. In this case, enplanements at MSN between 2012 and 2019 grew at an average annual rate of 5.7%. Based on the trend forecasting method, this growth would be carried into the future with total enplanements reaching over 1.7 million enplanements. Similarly, itinerant air carrier operations will continue to increase at an average annual rate of 10.9%, recovering to 2019 levels by 2025 and then growing to over 100,000 operations by 2042. In contrast, air taxi operations would decrease at an average annual rate of 7.3% and be reduced to less than 2,000 operations during the same period.

Table 9 shows the forecasted passenger enplanements and aircraft operations at MSN using the historical trend method.

Table 9: Historical Trend Method Forecast for MSN Passenger ENPLANEMENTS and Aircraft OPERATIONS

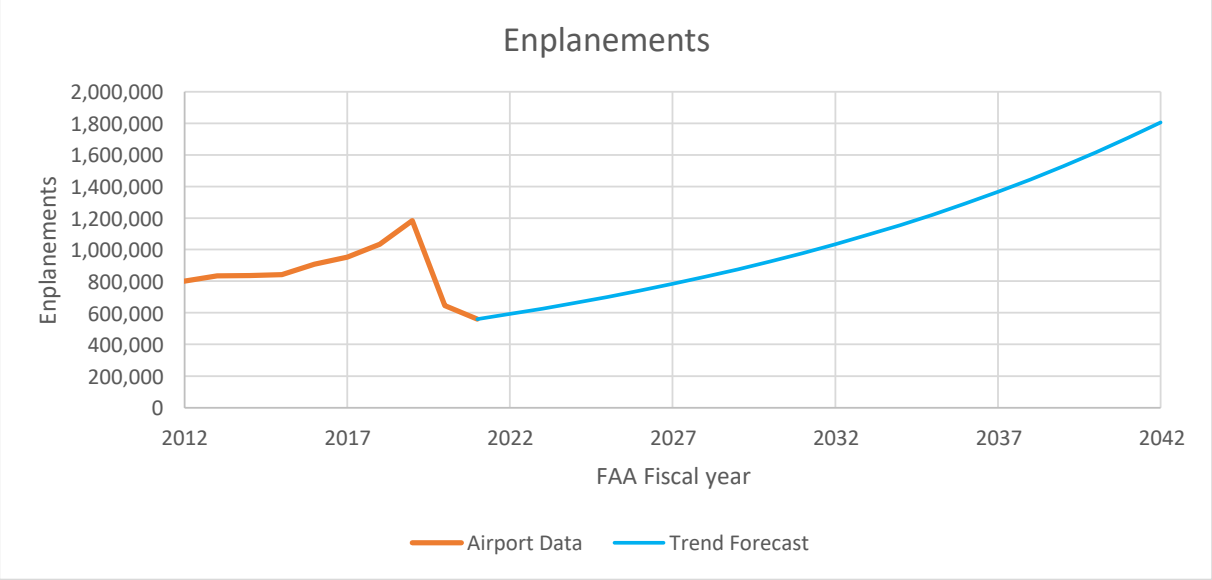
FY	Enplane-ments	ITINERANT					LOCAL			Total Opera-tions
		AC	AT	GA	MI	Total	Civil	Military	Total	
2019	1,184,493	24,286	11,612	28,665	4,758	69,321	12,562	378	12,940	82,261
2021	560,152	17,730	6,747	29,931	4,856	59,264	16,587	184	16,771	76,035
2026	740,290	29,803	4,630	29,015	4,780	61,239	13,067	96	13,001	74,468
2031	978,359	50,095	3,178	28,127	4,706	63,279	10,294	50	10,078	72,933
2036	1,292,988	84,206	2,181	27,266	4,632	65,387	8,110	26	7,812	71,429
2041	1,708,798	141,542	1,497	26,431	4,560	67,566	6,389	14	6,056	69,957
CAGR										
'21-'41	5.74%	10.95%	-7.25%	-0.62%	-0.31%	0.66%	-4.66%	-12.22%	-4.97%	-0.42%
Source: Dane County Regional Airport										

The historical trend forecast method is not a preferred forecast method due its prediction of declining total operations at MSN. This method does not account for factors such as market maturation in terms of enplanements or factors such as different airlines having different rates of aircraft adoption or retirement, airline route planning, or potential changes in the general aviation industry that might increase activity at MSN.

Historical Trend Forecast of Passenger Enplanements

Figure 2 illustrates the enplanement forecast results historical trend method.

Figure 2: ENPLANEMENT Forecast Comparison – 2021 TAF and Historical Trend Methods



Historical Trend Forecast of Aircraft Operations

Figure 3 through **Figure 5** focus on future aircraft operations. The trend forecast for local operations is steadily declining throughout the planning period while itinerant operations are forecast to slightly increase.

The total operation forecasts in **Figure 5** are the sum of the local and itinerant operations and thus combine the characteristics of the two forecasts. The historical trend forecast estimates overall operations will very gradually decline throughout the planning period.

Figure 3: Local Aircraft OPERATIONS Historical Trend Forecast

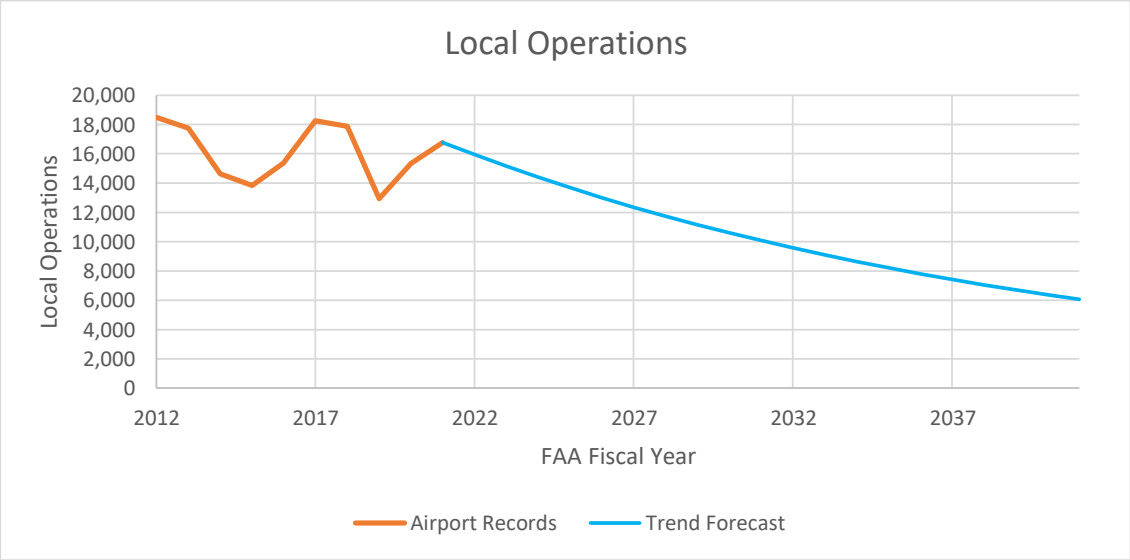


Figure 4: Itinerant Aircraft OPERATIONS Historical Trend Forecast

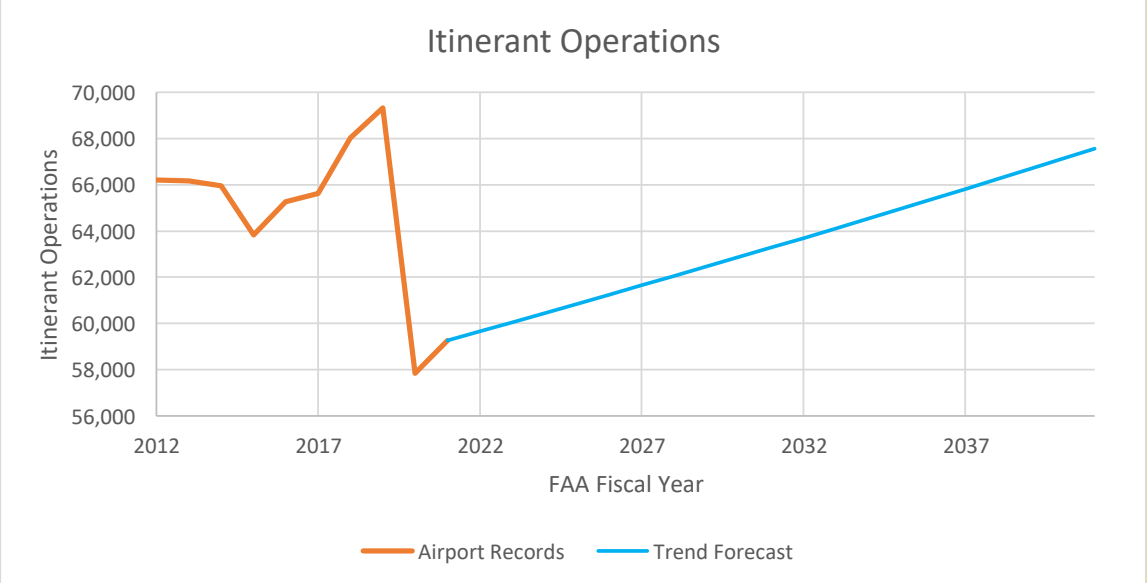


Figure 5: Total Aircraft OPERATIONS Historical Trend Forecast

2021 FAA TAF Comparison

The 2021 FAA TAF projects all passenger enplanements and aircraft operations except for military operations to grow within the forecast period. Military operations are held constant through the forecast period because the Department of Defense typically does not disclose its future plans to utilize civilian airports. Compared to the historical trend forecast, operation types that declined with the trend method are instead growing or projected to be relatively constant.

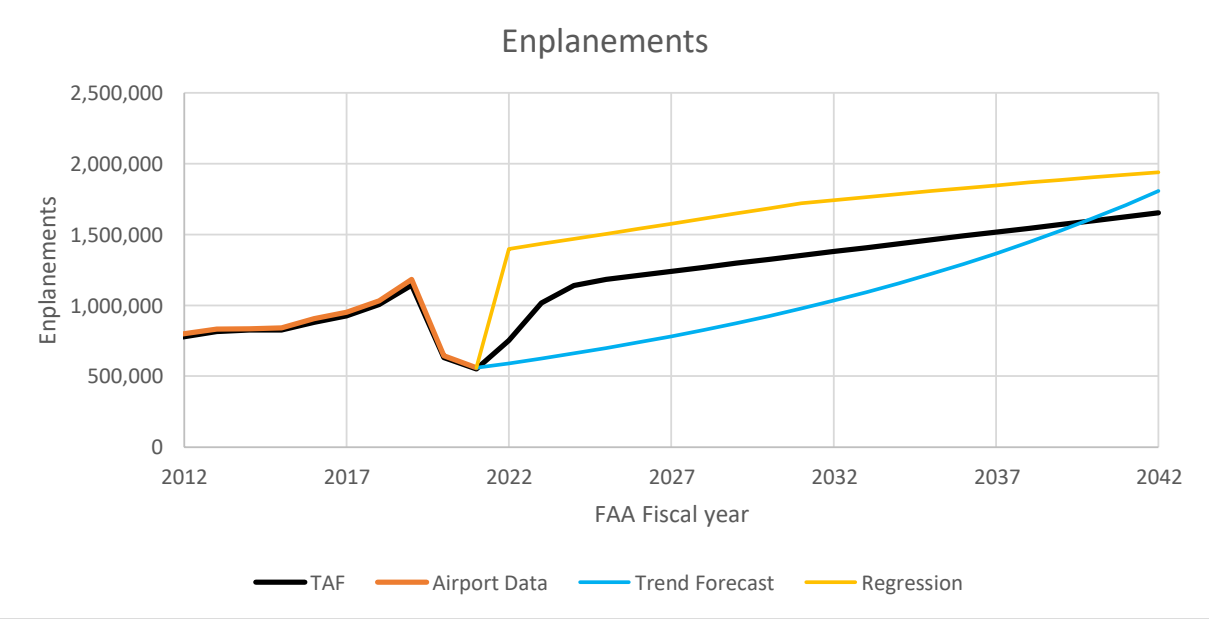
Table 10: 2021 FAA Terminal Area Forecast for MSN for ENPLANEMENTS and OPERATIONS

FY	Enplane-ments	ITINERANT					LOCAL			Total Opera-tions
		AC	AT	GA	MI	Total	Civil	Military	Total	
2019	1,142,812	24,284	11,655	28,689	4,713	69,341	12,468	276	12,744	82,085
2021	551,317	17,728	6,747	29,916	4,855	59,246	16,541	170	16,711	75,957
2027	1,240,424	34,654	6,606	31,990	4,855	78,105	16,025	170	16,195	94,300
2032	1,380,356	37,751	7,024	32,971	4,855	82,601	16,267	170	16,437	99,038
2037	1,518,024	40,618	7,446	33,983	4,855	86,902	16,514	170	16,684	103,586
2042	1,654,384	44,434	7,867	35,025	4,855	92,181	16,764	170	16,934	109,115
CAGR										
'21-'42	5.56%	4.64%	0.72%	0.76%	0.00%	2.19%	0.05%	0.00%	0.05%	1.79%
Source: 2021 FAA Terminal Area Forecast										

Enplanements Comparison

Figure 6 compares the enplanement forecast results of the 2021 TAF to the regression method and the historical trend method. While the enplanement projections in 2042 are relatively similar, the 2021 TAF forecast projects a COVID-19 recovery period of 13% CAGR where enplanements recover to 2019 levels by 2025 before growth tapers to 2% CAGR for the rest of the forecast period. This contrasts with the historical trend method which does not include a post-COVID-19 recovery period and instead projects a constant increase in enplanements for the forecast period, surpassing the 2021 TAF enplanement projections by 2040. As shown in **Figure 6**, the FAA TAF is considered a reasonable, middle of the road forecast for future passenger enplanements at MSN for the purposes of this study as its slightly less optimistic than the regression forecast and slightly more optimistic than the trend forecast.

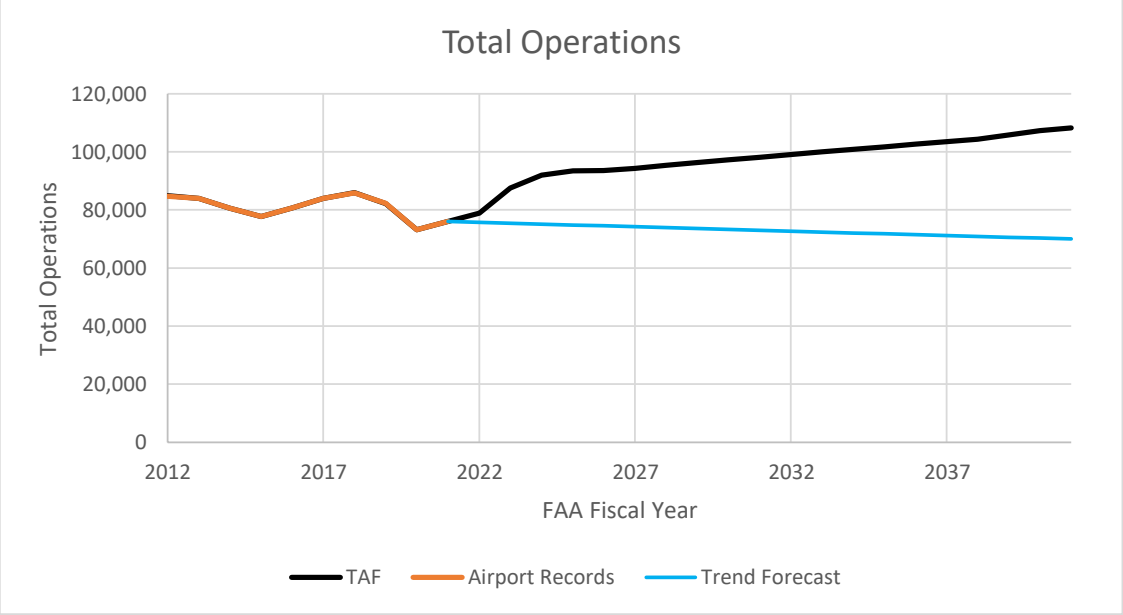
Figure 6: ENPLANEMENT Forecast Methods Comparison



Operations Comparison

The total operation forecasts in **Figure 7** are the sum of the local and itinerant operations and thus combine the characteristics of the forecasts. The historical trend forecast estimates overall operations will very gradually decline throughout the planning period. while the 2021 TAF projects a modest increase in total operations at MSN from 75,957 operations in 2021 to 109,115 operations by 2042.

Figure 7: Total Aircraft OPERATIONS Forecast Comparison – 2021 TAF and Historical Trend Method



Forecast Summary and Recommended Part 150 Forecasts

Analysis of the three forecast methods (regression, trend and FAA TAF) results in the 2021 TAF being the preferred forecast as it most accurately accounts for COVID-19 impacts and likely recovery scenarios. The lack of correlation between regional socioeconomics results in regression-based forecasts not being considered as reliable while historical trends forecasting methods are hindered by their inability to account for how COVID-19 impacts. The historical trend method also does not include a means to which adjust for market maturation in the airline industry or current positive growth trends in general aviation, particularly business aviation. One recommended adjustment to the 2021 FAA TAF is to include military operations as projected by the local Air National Guard and the Army National Guard units at MSN/Truax Field. Both units provided current and detailed operations statistics and aircraft fleet management information to the MSN Part 150 Study team for their respective military operations during the Part 150 forecast period.

Part 150 Forecast of Aircraft Operations by Category

As shown in **Table 11**, the most recent full year of normal operations (2019), existing year, also known as year of submission (2022) and study forecast year (2027) are depicted. The baseline year is the last full year of activity prior to the impacts of the pandemic. The existing/year of submission of 2022 is still pandemic impacted, but less so than 2020 and 2021, and the future year of 2027 assumes MSN has fully recovered from the pandemic and is again experiencing positive growth in both commercial aircraft

operations and general aviation aircraft operations. According to the 2021 FAA TAF, total operations at MSN are forecast to increase at a Compound Annual Growth Rate (CAGR) of 3.7% percent through 2027.

Because FAA TAF historical numbers are based on ATCT counts (FAA OPSNET) and the ATCT at Dane County Regional Airport is closed from 11 pm to 6 am local time, the FAA TAF projections for 2022 and 2027 were adjusted to account for the nighttime closure and capture these operations based on 2021 data. Projections for military operations in 2022 and 2027 were also adjusted based on input from the Air National Guard and Army National Guard.

These forecasts are shown in **Table 12** and again depict the most recent full year of normal operations (2019 base year), existing year (2022) and study forecast year (2027). As previously described the 2027 forecast of operations by aircraft type will be used to develop the future noise contours for the purposes of this study. **Table 13** includes the 2022 and 2027 TAF Adjusted forecast operations by aircraft type.

Table 11: Summary of Aircraft OPERATIONS Forecast by Aircraft Category

Aircraft Operation Category	2019 Baseline Year	2022 Existing Year/ Year of Submission	2027 Forecast Year
Air Carrier	24,284	19,702	34,654
Air Taxi	11,655	7,231	6,606
General Aviation	41,157	46,917	48,015
Military	4,989	5,025	5,025
Total Operations	82,085	78,875	94,300
2019 Source: Dane County Regional Airport 2022 and 2027 Source: FAA TAF Note: CY operations were used for 2021 as they are the most recent 12 months of available data.			

Table 12: Summary of Aircraft OPERATIONS Forecast by Aircraft Category – TAF Adjusted

Aircraft Operation Category	2019 Baseline Year	2022 Existing Year/ Year of Submission	2027 Forecast Year
Air Carrier	24,284	20,306	35,714
Air Taxi	11,655	7,395	6,757
General Aviation	41,157	47,735	48,825
Military	4,989	6,047	7,470
Total Operations	82,085	81,483	98,793
2019 Source: Dane County Regional Airport 2022 and 2027 Source: FAA TAF with Mead & Hunt/HMMH adjustments			

Table 13: Summary of Aircraft OPERATIONS Forecast by Aircraft Type – TAF Adjusted, 2022 and 2027

Aircraft Category	Aircraft Noise Performance (ANP) ID	Aircraft Type	2022 Operations	2027 Operations
AC	A300-622R	Jet	795	1,441
AC	757PW	Jet	250	453
AC	757RR	Jet	240	435
AC	A320-271N	Jet	343	1,198
AC	A319-131	Jet	1,932	6,748
AC	A320-211	Jet	341	1,191
AC	717200	Jet	1,473	-
AC	737800	Jet	879	3,070
AC	CRJ9-ER	Jet	10,609	10,934
AC	EMB170	Jet	725	747
AC	EMB175	Jet	2,719	9,497
AT	EC130	Helicopter	17	25
AT	CNA182	Piston	692	1,009
AT	CNA208	Turboprop	904	1,317
AT	FAL20	Jet	36	52
AT	BEC58P	Piston	11	16
AT	SD330	Turboprop	513	748
AT	CNA680	Jet	938	1,367
AT	CL600	Jet	1,906	825
AT	CNA55B	Jet	959	1,398
AT	EMB14L	Jet	1,419	-
GA	A109	Helicopter	473	484
GA	MU3001	Jet	408	418
GA	CNA525C	Jet	1,847	1,890
GA	CNA55B	Jet	628	643
GA	CNA560U	Jet	808	827
GA	CNA560XL	Jet	576	589
GA	CNA680	Jet	813	832
GA	CL600	Jet	664	680
GA	CL601	Jet	424	434
GA	EMB145	Jet	605	619
GA	CNA750	Jet	667	683
GA	FAL900EX	Jet	523	535
GA	GIV	Jet	557	570
GA	LEAR35	Jet	1,714	1,754
GA	GASEPV	Piston	4,935	5,051
GA	GASEPF	Piston	5,666	5,799
GA	CNA172	Piston	9,574	9,798
GA	CNA182	Piston	1,635	1,673
GA	BEC58P	Piston	2,657	2,719
GA	PA28	Piston	7,873	8,057
GA	COMSEP	Piston	1,258	1,287
GA	DHC6	Turboprop	1,739	1,780
GA	CNA441	Turboprop	692	708
GA	CNA208	Turboprop	999	1,022
MIL	F35A	Jet	0	4,304
MIL	F16C	Jet	3,081	0
MIL	RC26	Turboprop	120	0
MIL	C26	Turboprop	342	342
MIL	UH60A	Helicopter	2,132	2,452
MIL	F18	Jet	142	142
MIL	C130	Turboprop	74	74
MIL	C17	Jet	16	16
MIL	KC135R	Jet	22	22
MIL	T38	Jet	118	118
TOTALS			81,483	98,793
Sources: M&H, HMMH, Air National Guard, Army National Guard				

Appendix D Stakeholder Consultation

This appendix includes:

- TAC Meeting Presentations and Summaries
- Public Open House Boards (PowerPoint)
- Social Media Postings
- Newsletter 1
- Newsletter 2

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Noise Compatibility Planning Study

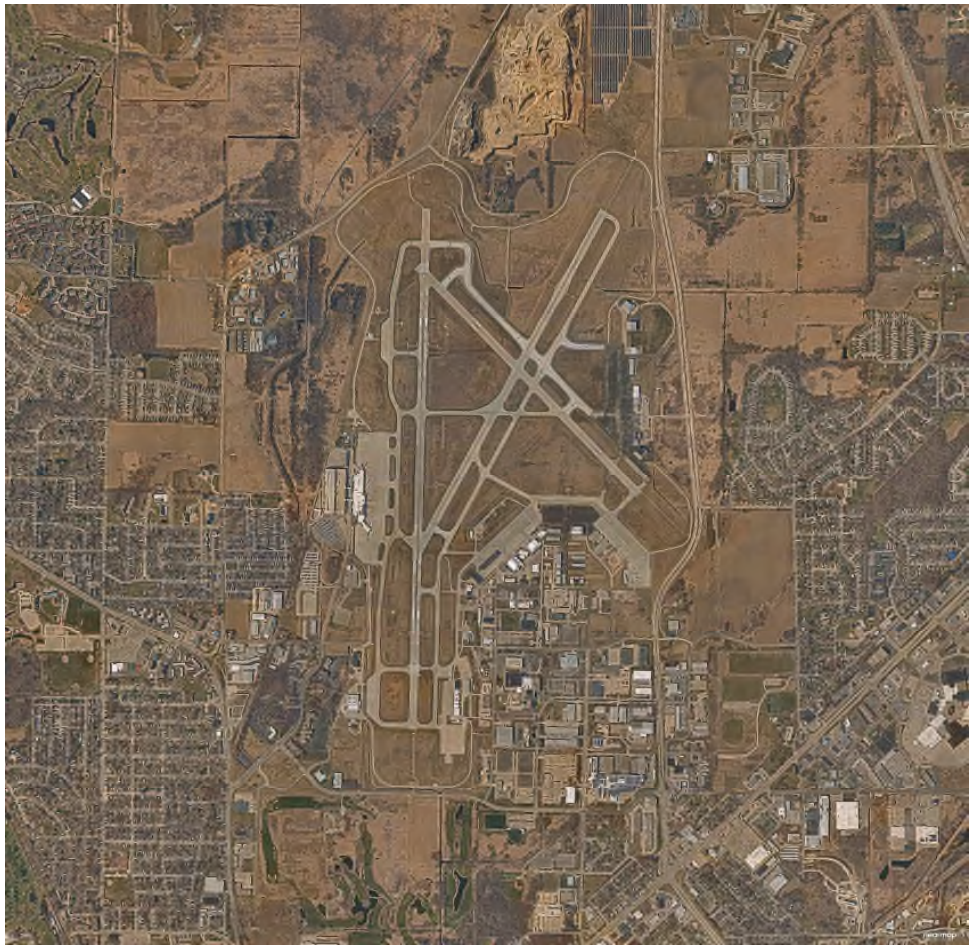
Dane County Regional Airport

Technical Advisory Committee Meeting #1

April 26, 2022

TAC#1 Agenda

- Introductions
- Roles and Responsibilities
- Airport Overview
- Aircraft Noise Terminology
- Airport Noise Compatibility Planning
- Schedule and Meeting Topics
- Project Contacts and Website
- TAC Member Discussion
- Wrap-up



Source: NearMap USA, April 2021

Introductions – Study Team

Dane County Regional Airport Team

- Wisconsin Department of Transportation Bureau of Aeronautics
  - Matt Messina – Airport Development Engineer
- Airport (MSN)
  - Kim Jones – Airport Director
  - Michael Kirchner – Engineering Director
  - Lowell Wright – Airport Noise Abatement/ Environmental Officer

Project Team

- HMMH
  - Gene Reindel – Principal-in-Charge
  - Tim Middleton – Project Manager
  - Julia Nagy – Assistant Project Manager
- Mead & Hunt
  - Kate Andrus – Project Lead, Airport Planning and Forecasts
  - Ryan Hayes – Airport Planning and Forecasts
  - Chris Reis – Local Client Lead
  - Ryk Dunkelberg - Vice President
- The Jones Payne Group
  - Diane Carter – Project Lead, Principal-in-Charge
  - Brianna Whiteman – Assistant Project Manager, QA/QC

Introductions – TAC Members

Organization	TAC Member
MSN staff	Michael Kirchner
WBOA staff	Matt Messina
FAA Airport District Office (ADO)	Bobb Beauchamp
FAA Air Traffic Control Tower (ATCT)	John Vagedes
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Daniel Statz
Army Guard	Major Lucas Sivertson
Delta Airlines	Jason Pace
Wisconsin Aviation	Brian Olson
City of Madison Planning Division	Dan McAuliffe
Dane County Department of Planning and Development	Todd Violante

Roles and Responsibilities Airport Noise Compatibility

Stakeholder	Responsibilities
Federal government (FAA)	Regulate source noise emissions, air traffic control, funding, and safety oversight
Airport operators	Plan and implement noise compatibility measures
State and local government	Compatible land use planning and control
Aircraft operators	Develop noise-sensitive schedules, cockpit procedures, and fleet improvements
Air travelers and shippers	Bear the costs (through ticket tax)
Current and potential residents	Seek to act in an informed manner

Roles and Responsibilities Part 150 Study

Airport

- Project sponsor
- Certification that documentation is true and accurate
- Recommend measures to address incompatible land use

Consultant Team

- Overall project management, documentation, and outreach
- Aircraft noise analysis and abatement planning
- Noise compatibility analysis and planning
- Aviation forecast and airfield analysis

FAA

- Certification that the documentation meets federal regulations and guidelines
- Approval of Airport-recommended measures

Technical Advisory Committee

- Review study inputs, assumptions, analyses, documentation, etc.
- Input, advice, and guidance related to NEM and NCP development

Public

- Provide input on study during comment period
- Review public draft documents

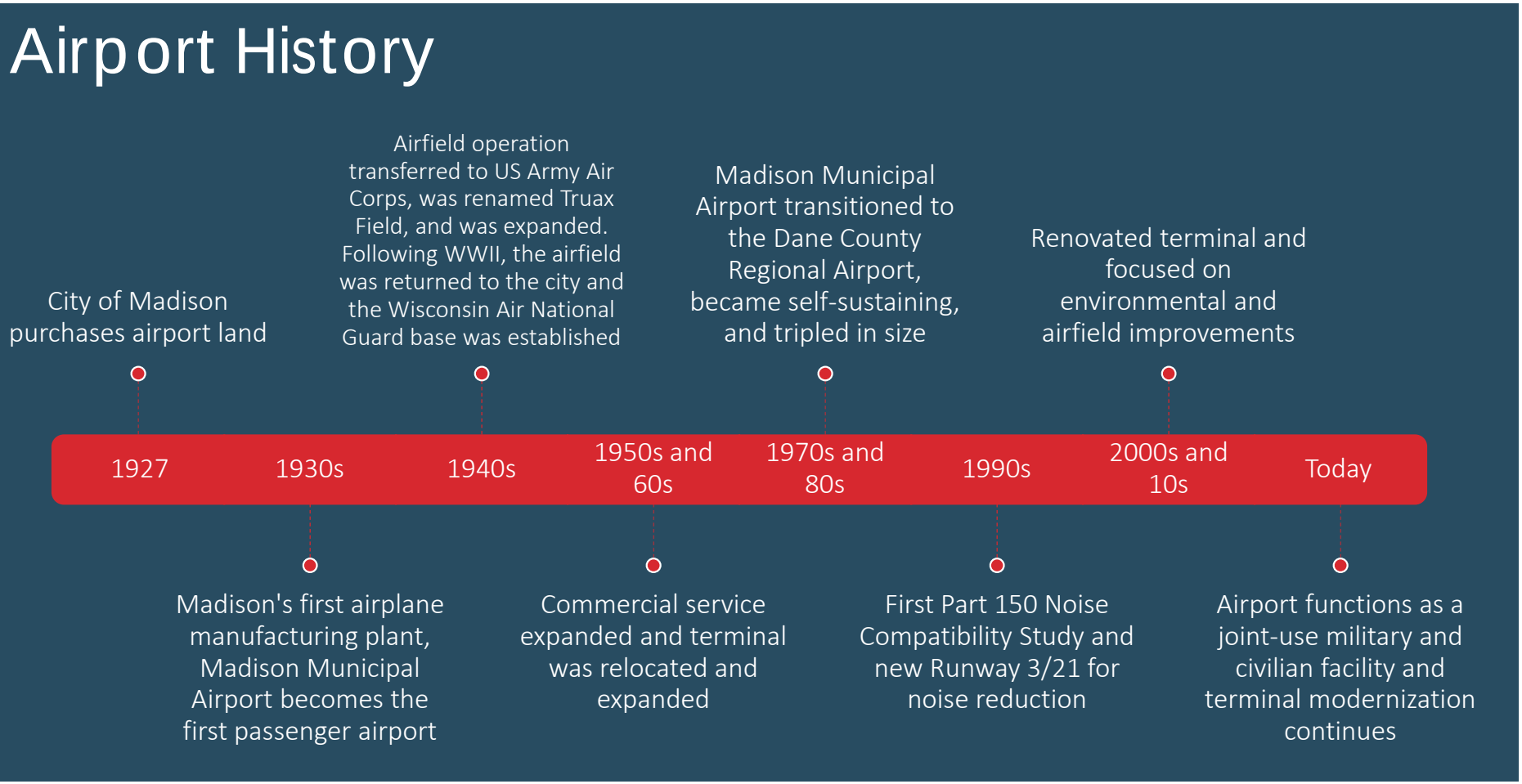
Roles and Responsibilities
Technical Advisory Committee

- The TAC is advisory to MSN solely for purposes of the MSN Part 150 Study, including:
  - Review of study inputs, assumptions, analyses, documentation, etc.
  - Input, advice, and guidance related to NEM and NCP development
- TAC provides two-way communication between the committee and their respective organizations / constituents
- MSN shall respect and consider TAC input, but must retain overall responsibility for the Part 150 Study and NCP recommendations
- The TAC and MSN recognize FAA is responsible for accepting NEM and NCP submissions and for approving NCP proposals

TAC Participation Agreement

- Participation Agreement was sent with TAC invitations
  - Describes TAC's role, member responsibilities, participation expectations, etc.
- Six to eight meetings anticipated - approximately one every two to three months for approximately 2 years
  - Agendas and background material will be provided in advance of each meeting
  - Dates and times will be sought that are convenient to a majority of members
  - Meetings are expected to be two to three hours in length

Airport History



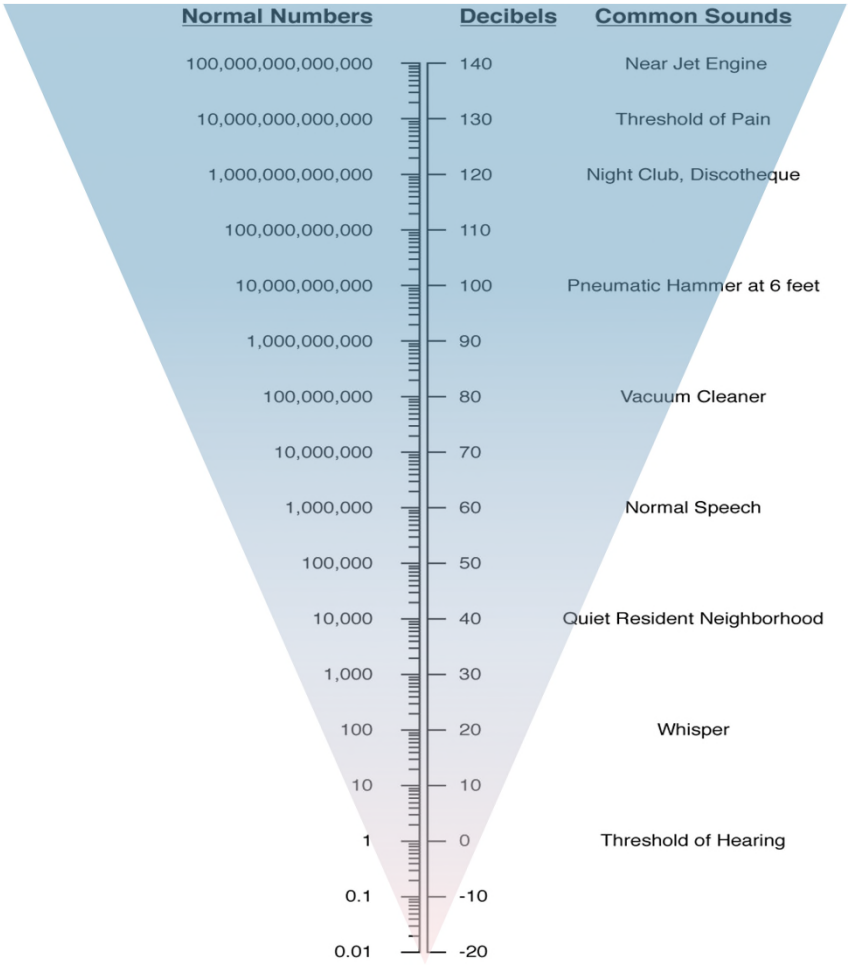
Airport Facility Overview

- MSN
  - Covers 3,500 acres and serves over 2.2 million commercial passengers each year
  - Fixed-Base Operator Wisconsin Aviation is located on the east side of the airport
- 115th Fighter Wing of the Wisconsin Air National Guard (ANG)
  - Chosen to host the F-35A mission and receive a new fleet of F-35A Lightning II aircraft beginning in Spring of 2023
- Wisconsin Army National Guard (ARNG) 64th Troop Command
  - Operates UH-60 Black Hawk helicopters at Truax Field

Aircraft Noise Terminology

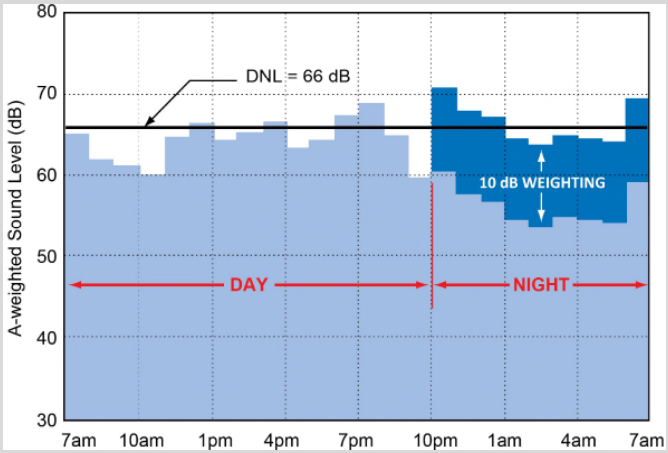
Noise Terminology

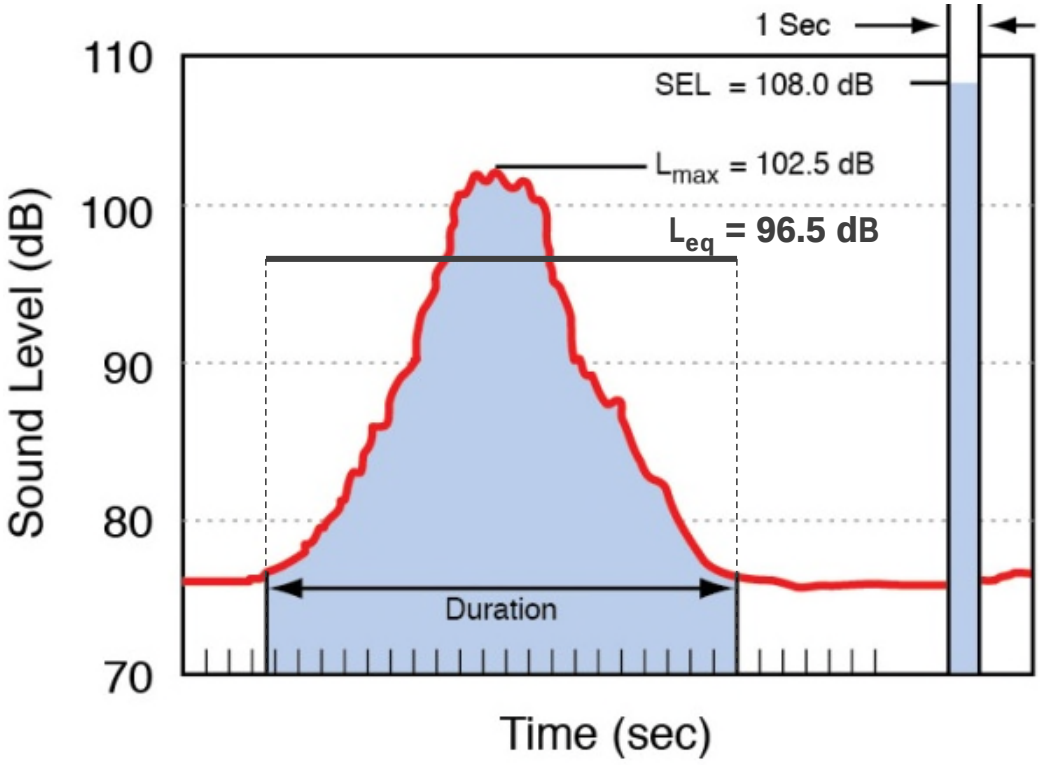
- Reported in A-weighted decibels (dB)
  - Logarithmic scale base 10
  - We hear sound pressures over a large range
  - We perceive sounds in decibels



Noise Terminology

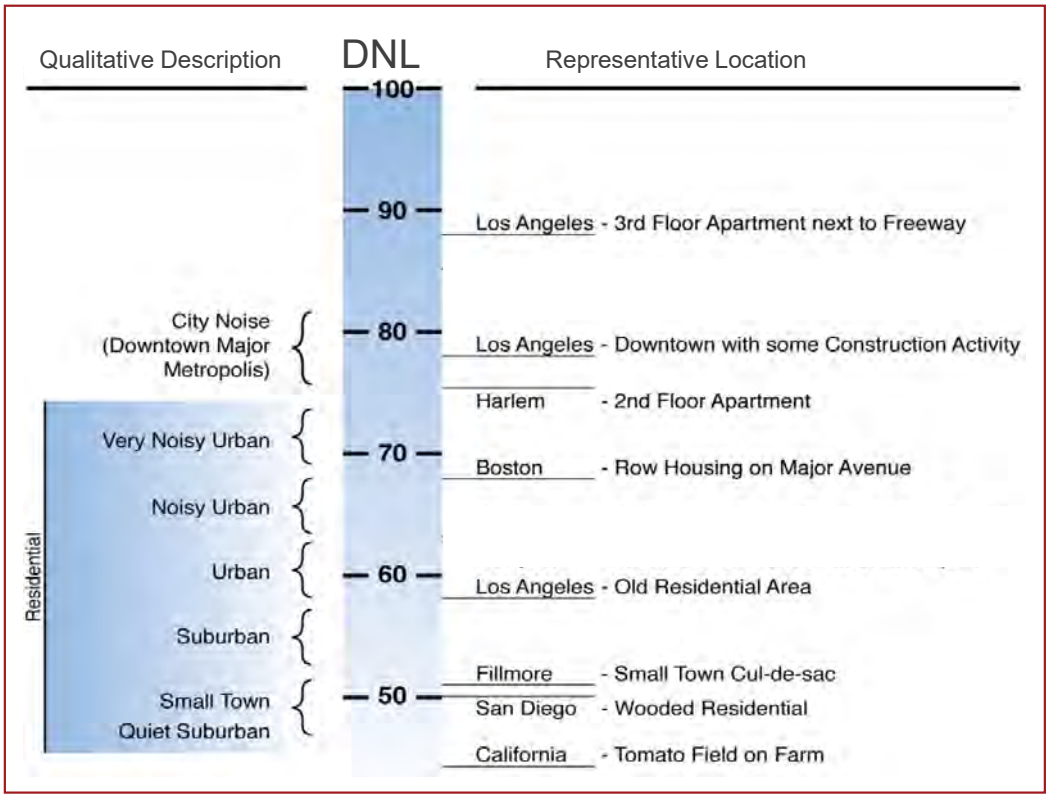
- Maximum Noise Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Day-Night Average Sound Level (DNL)





Noise Terminology

- FAA land use compatibility guidelines:
  - All land use is compatible with aircraft noise less than DNL 65 dB
  - Land use compatibility assessments use 5-dB contour bands
    - 65 to 70 dB
    - 70 to 75 dB
    - Greater than 75 dB



Source: United States Environmental Protection Agency, Information on Levels Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974, p. 14.

Noise Terminology Summary

- The decibel is a complex logarithmic quantity based on sound pressure
- A-weighted decibels correlate well with how we hear
- Noise levels can be expressed many ways, including but not limited to:
  - Instantaneous maximum noise levels (Lmax)
  - Single event dose (SEL)
  - Long-duration exposure (DNL)
- Best metric to use depends on purpose
- FAA requires use of DNL in a Part 150 study
- Part 150 guidelines consider all land uses compatible below 65 dB DNL

Airport Noise Compatibility Planning

Title 14 of the Code of Federal Regulations Part 150

Airport Noise Compatibility Planning

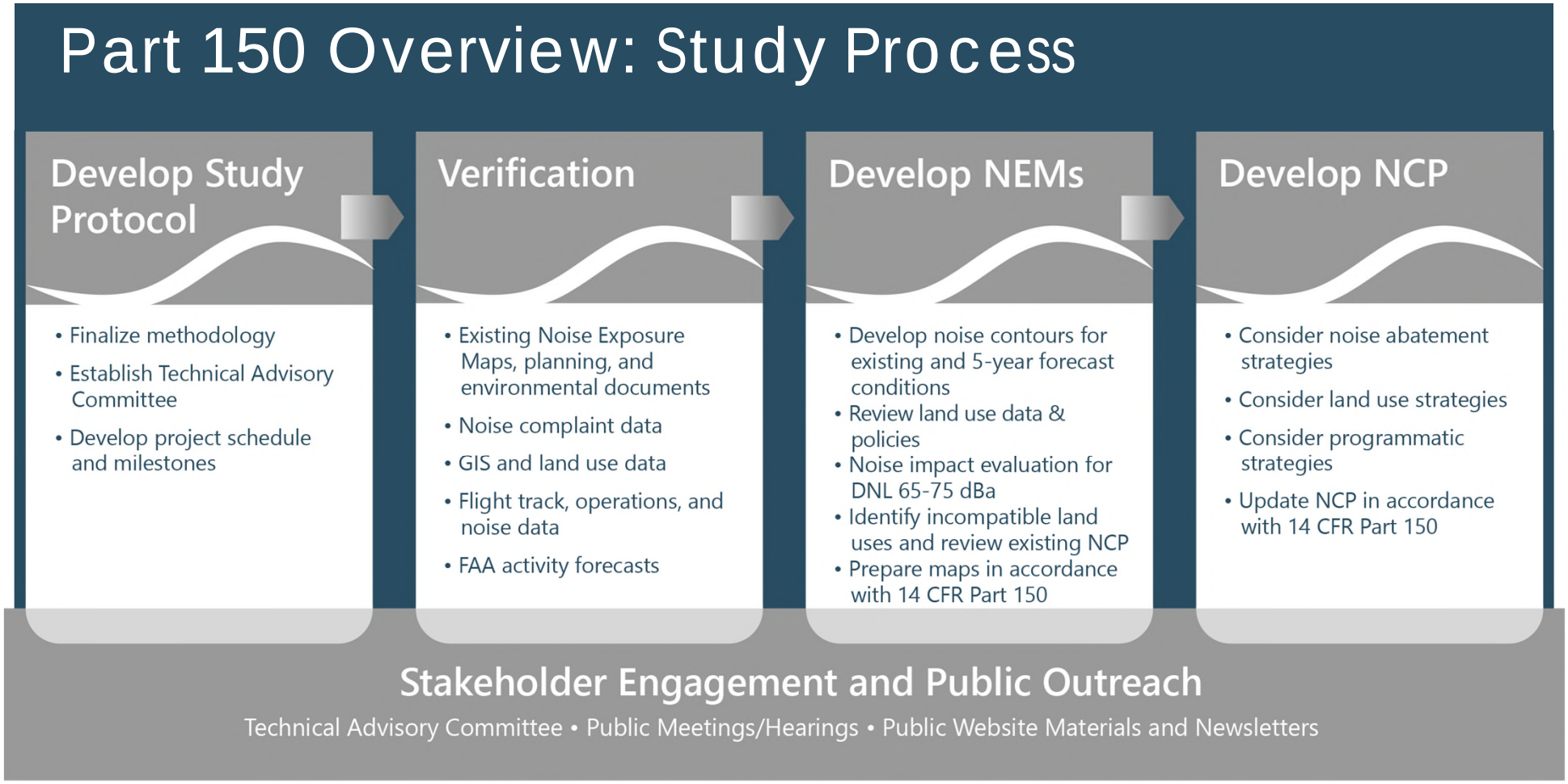
- FAA created in response to Federal Aviation Safety and Noise Abatement Act of 1979 (ASNA)
- Codified under Title 14 of the Code of Federal Regulations Part 150
  - Formal *citation* is "14 CFR Part 150," informal is "Part 150"
- *Voluntary* FAA-defined process for airport noise studies
  - 250+ airports have participated
- *Why do airports participate*? Primary reasons include:
  - Provides access to FAA funding of some approved measures
  - Well-established, understood, accepted, and comprehensive process

Part 150 Overview: Major Elements

- Two primary elements
  - Noise Exposure Map (NEM)
  - Noise Compatibility Program (NCP)

  Detailed FAA guidance at www.faa.gov/airports/environmental/airport_noise/
- Consultation required with:
  - All local, state, and federal entities with control over land use within DNL 65+ dB
  - FAA regional officials, regular aeronautical users of the airport
  - All parties interested in review of and comment on the draft
- Opportunity must be offered for a final public hearing on the NCP
- MSN will exceed all consultation requirements
  - Improved stakeholder relations is typically one of the most valuable study results

Part 150 Overview: Study Process

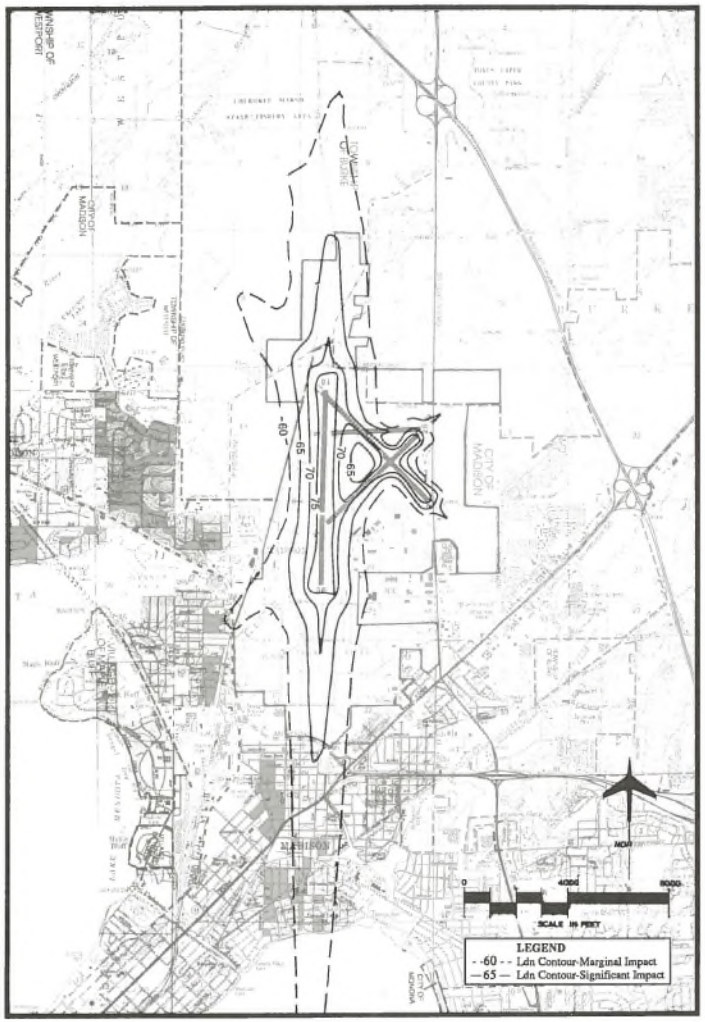


Part 150 Overview: Noise Exposure Map

- FAA “accepts” NEM as compliant with Part 150 standards
- NEM must include detailed description of
  - Airport layout, aircraft operations, and other inputs to noise model
  - Aircraft noise exposure in terms of Day-Night Average Sound Level (DNL)
  - Land uses within DNL 65+ decibel (dB) contours
  - Noise / land use compatibility statistics within DNL 65+ dB contours
- NEM must address two calendar years
  - Year of submission (2022)
  - Forecast (at least five years from year of submission; 2027)
  - FAA reviews forecasts for consistency with Terminal Area Forecast (TAF)

Part 150 Overview: Noise Exposure Map Development

- ✓ Develop noise contours for existing (2022) and 5-year forecast (2027) conditions
- ✓ Collect land use data and policies
- ✓ Assess noise compatibility for aircraft exposure of DNL 65 dB and greater
- ✓ Prepare documentation in accordance with 14 CFR Part 150

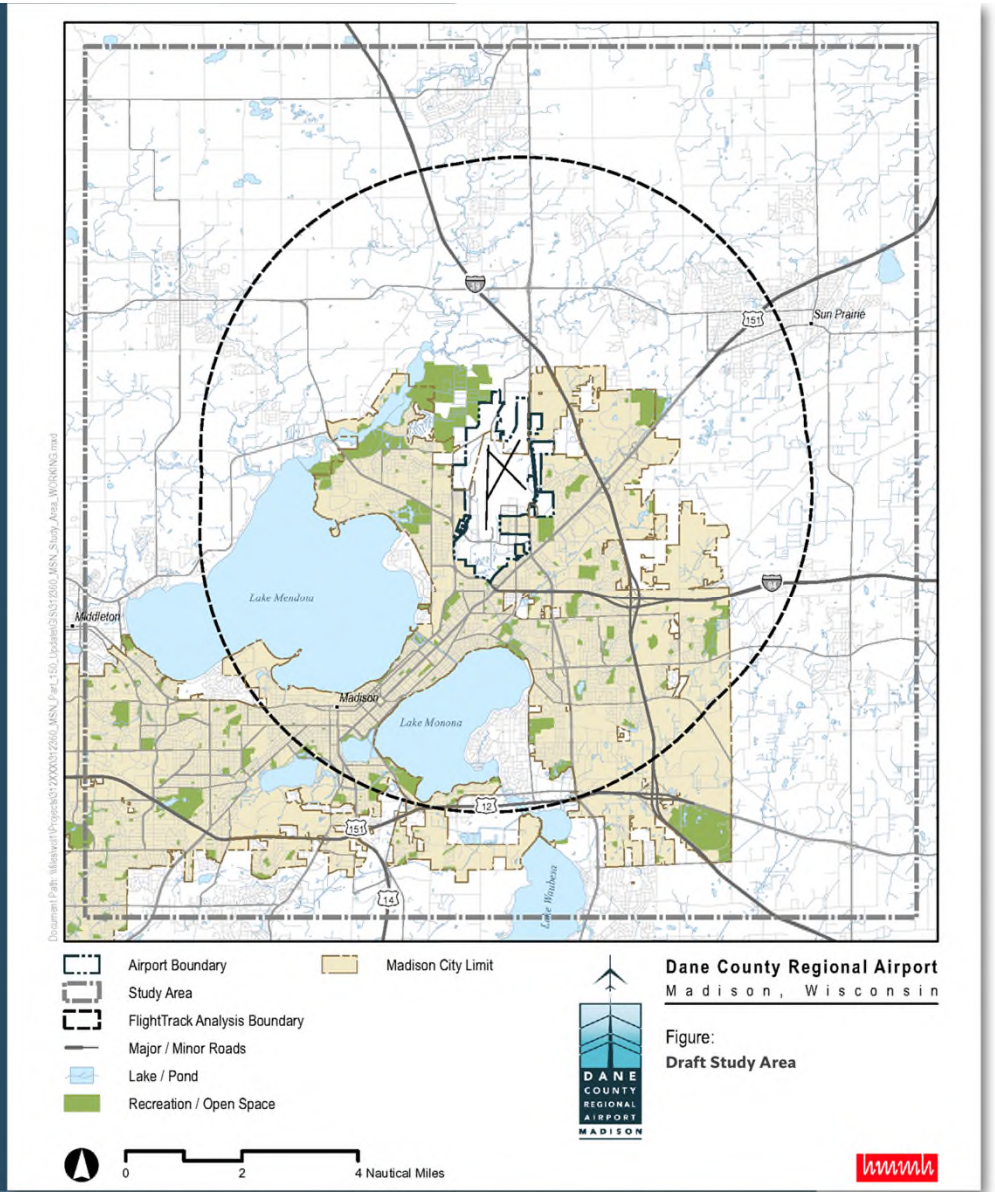


2010 BASELINE NOISE EXPOSURE

Part 150 Overview: NEM Data Sources

- Best available source(s) will be used for each specific category
  - *Airport layout* - MSN drawing files, FAA airport diagram, MSN Airport Layout Plan (ALP)
  - *Meteorological* - NOAA National Climatic Data Center
  - *Terrain* - U.S. Geological Survey
  - *Baseline operations* - 2021 FAA National Offload Program (NOP) data
  - *Forecast operations* - FAA's Terminal Area Forecast (TAF)
  - *Flight tracks, profiles, and runway use* - 2021 FAA National Offload Program (NOP) data
- Data will be compared to formal and informal procedures
  - FAA Standard Instrument Departure (SID) and approach procedures (APs), etc.
  - MSN and industry noise abatement procedures
- Modeling assumptions will be documented in detail and shared with:
  - All interested stakeholders at workshops and on website
  - TAC members - *Please offer feedback on sources or assumptions at any time*

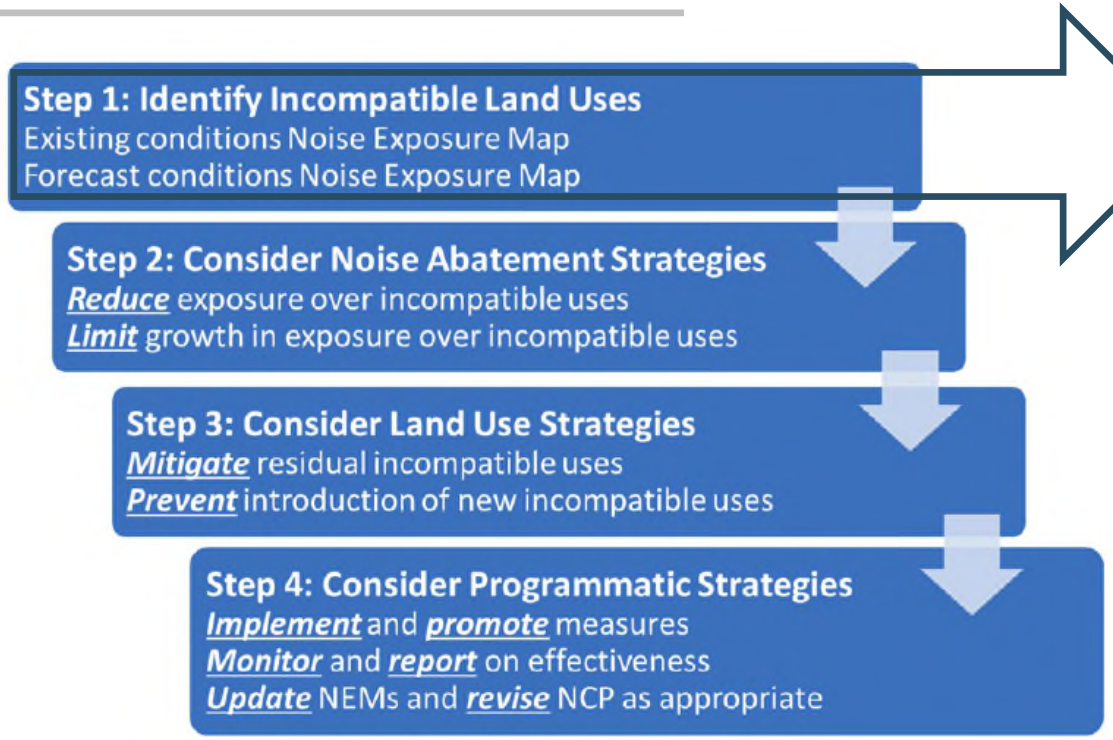
Part 150 Overview: Draft Study Area



Part 150 Overview: Noise Compatibility Program

- NCP must address three major categories of proposed actions
  1. Noise abatement measures
  2. Compatible land use measures
  3. Program management/administrative measures
- FAA *accepts* NCP as compliant with Part 150 standards
- FAA reviews and *approves* or *disapproves* proposals as compliant with Part 150 standards on a measure-by-measure basis

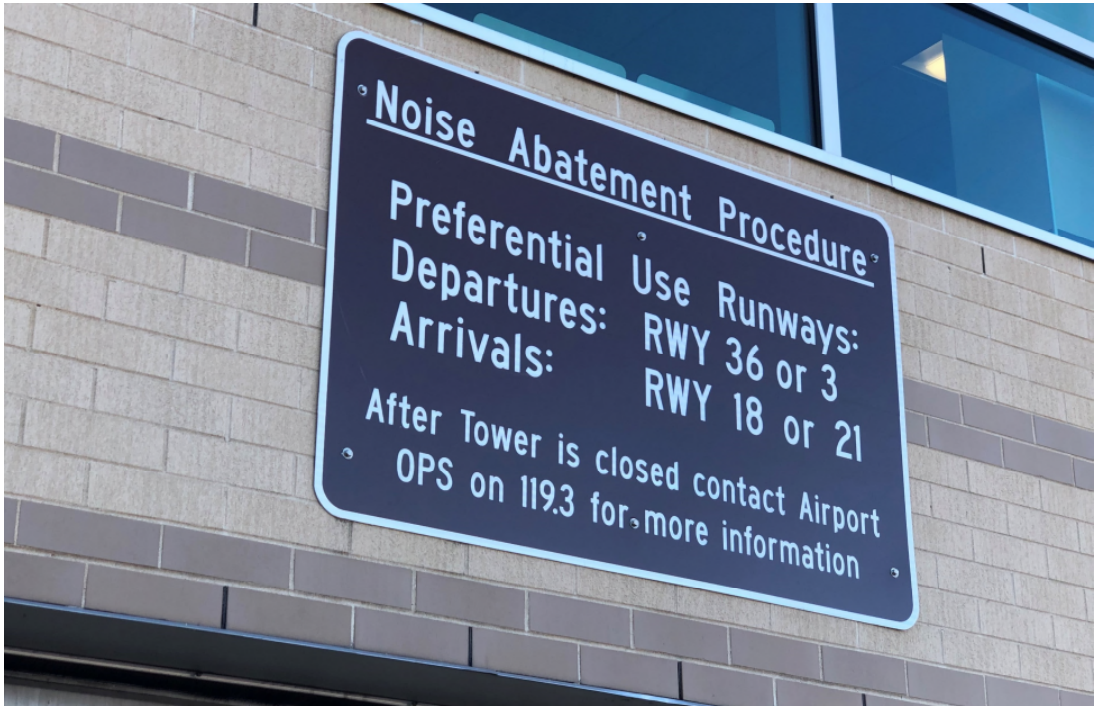
Part 150 Overview:
Noise Compatibility Program Development



This step occurs in Phase 1/ NEM

Existing NCP Measures at MSN

- 1991 MSN NCP included:
  - Noise abatement measures (9)
  - Land use measures (11)
  - Programmatic measures (3)



Schedule and Meeting Topics

Proposed Schedule: Phase 1

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
Kick-Off Meeting with MSN and the Part 150 Team	Define organizational and procedural matters and public outreach, review and refine scope and schedule details.	January 20, 2022
1st Technical Advisory Committee Meeting	Introduction to Part 150, discuss stakeholder roles, identify issues of concern	April 26, 2022
1st Public Open House	Introduction to Part 150, set expectations, discuss stakeholder roles, identify issues of concern	April 26, 2022
2nd Technical Advisory Committee Meeting	Discussion on Aviation forecasts, F35 Operations, and noise modeling inputs	July 2022
3rd Technical Advisory Committee Meeting	Noise modeling results and presentation of the draft NEM Update	September 2022
NEM Public Comment Period and 2nd Public Open House	NEM thirty-day public comment period and second Public Open House	Sep-Oct 2022
MSN to Submit Final NEM to FAA	MSN submits final updated NEM to FAA for review and approval. Respond to FAA questions as needed.	December 2022

Note: Schedule is subject to change

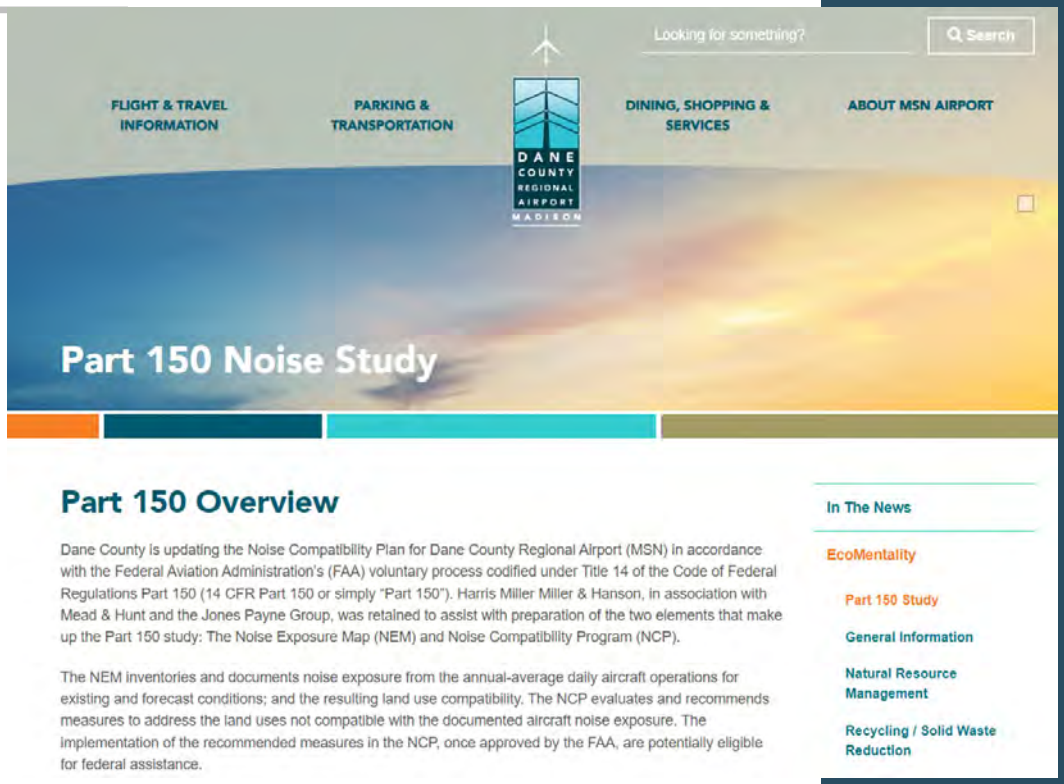
Proposed Schedule: Phase 2

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
4th Technical Advisory Committee Meeting	Review of the existing Noise Compatibility Program (NCP) and discussion of Potential changes to the Noise Compatibility Program	1st Quarter 2023
5th Technical Advisory Committee Meeting	Evaluation results of the proposed Noise Compatibility Program measures	2nd Quarter 2023
6th Technical Advisory Committee Meeting	Presentation of the draft Noise Compatibility Program Update	3rd Quarter 2023
NCP Public Comment Period, 3rd Public Open House, and NCP hearing	NCP thirty-day public comment period and third Public Open House and NCP Hearing.	4th Quarter 2023
MSN to Submit Final NCP to FAA	MSN submits final updated NCP to FAA for review and approval. Respond to FAA questions as needed.	1st Quarter 2024

Note: Schedule is subject to change

MSN Part 150 Study Website and Project Contacts

- Website: https://www.msnairport.com/about/ecomentality/Part-150-Study
- Project email address: part150study@msnairport.com
- Tim Middleton – HMMH Project Manager, Contact: tmiddleton@hmmh.com 339.234.2816
- Michael Kirchner – MSN Engineering Director, Contact: kirchner@msnairport.com 608.279.0449



TAC Member Discussion

Wrap Up

- Next TAC meeting:
  - Date: July 2022 (actual date to be determined)
  - Location: Dane County Regional Airport
  - Primary topics:
    - Aviation forecasts
    - Military aircraft operations/noise modeling
    - Overview of noise modeling process and inputs

HMMH
700 District Avenue, Suite 800
Burlington, MA 01803
781.229.0707

MEMORANDUM

Subject: Dane County Regional Airport
Part 150 Study
TAC Meeting 1 Summary

Meeting Date: April 26, 2022

Reference: HMMH Project Number 312360

TAC Member Attendance:

Organization	TAC Member	Attendance
MSN staff	Michael Kirchner	Yes
WBOA staff	Matt Messina	Yes
Federal Aviation Administration (FAA) Airport District Office (ADO)	Bobb Beauchamp	No
FAA Air Traffic Control Tower (ATCT)	John Vagedes	No
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Dan Statz	Yes
Army Guard	Major Lucas Sivertson	Alternate – Henderson in attendance
Delta Airlines	Jason Pace	No
Wisconsin Aviation	Brian Olson	No
City of Madison Planning Division	Dan McAuliffe	Yes
Dane County Department of Planning and Development	Todd Violante	Yes

Study Team Members Attendance:

Organization	TAC Member	Attendance
MSN staff	Michael Riechers	Yes
MSN staff	Tomasz Pajor	Yes
Jones Payne Group	Diane Carter	Yes
HMMH	Tim Middleton	Yes
HMMH	Gene Reindel	Yes
HMMH	Julia Nagy	Yes
Mead & Hunt	Chris Reis	Yes
Mead & Hunt	Levi Ney	Yes
Mead & Hunt	Ryk Dunkelberg	Yes

Meeting summary notes follow.

Summary Notes:

Mike Kirchner provided welcome remarks to the TAC and Tim Middleton introduced the Part 150 Process.

TAC Members and Study Team Members went around the room and introduced themselves and their role on the project.

Action: Lt Col Dan Statz asked that for future meetings and documentation that the team refer to the 115th Fighter Wing of the Wisconsin Air National Guard that is stationed at Truax Field.

Tim Middleton provided an overview of roles and responsibilities for various stakeholders, including the consultant team and the FAA, throughout the Part 150 process. He provided an overview of the consultant's roles and expertise that HMMH, Mead & Hunt, and Jones-Payne will bring to various components of the project. Tim explained the components of the project that involve FAA approval. Tim shared TAC roles and responsibilities.

TAC members agreed that it is important for the TAC to review technical information and ensure accuracy and consensus before any data or study results are shared with the public." It was agreed that the TAC meetings will be invite only and that the public will be able to participate through public comments, public meeting notices, and attendance at public open-houses throughout the study process.

The Airport asked if it would be beneficial to share the previous Part 150 documentation with the TAC members.

Action: HMMH responded to the affirmative and agreed to share prior Part 150 documentation with the TAC prior to 2nd TAC Meeting.

Tim Middleton provided an overview of the airport related to airport operations, history, and noise compatibility planning. He shared some context that building new runways at airports for noise abatement in the 80s and 90s was more common but now it is more difficult to do that.

Lt Col Dan Statz emphasized the importance of including the history of the airport and the military's historic presence at the airport in the Part 150 documentation. Tim Middleton confirmed that the NEM documentation will include this information and HMMH will coordinate with TAC members to ensure accuracy of historic information.

Tim Middleton provided a noise methodology and noise metrics overview and shared that single event sound levels versus DNL (Day-Night Average Sound Level) is often a question from the public related to noise studies.

There was a question about whether noise from local highways/freeways, other city sounds, etc. will be represented in this study. Tim Middleton replied that the only inputs are related to aircraft for this study and Gene Reindel added context related to considerations for sound insulation.

Tim Middleton provided a noise terminology summary explaining that long duration exposure is used for land use compatibility planning and provides a holistic view. The FAA requires the use of the DNL metric. Tim explained Airport Noise Compatibility Planning under Part 150 and shared that it is important for the public to understand what the airport can and cannot do under the regulation. Tim reviewed the Part 150 process and the steps it includes. Tim introduced the Terminal Area Forecast (TAF) and enplanements and emphasized that for this study, it is critical to work with the military to understand their operations. Military representatives confirmed that they will work with the team on this item.

Tim Middleton explained the process for developing baseline and future military operations and that the HMMH team will summarize this information in a noise modeling memo for military review. Tim provided an overview of what is included in the Noise Exposure Map (NEM) and shared that the consultant team will need input from the TAC to determine the who, what, when, why, of aircraft operations at the airfield. Tim then discussed the NEM

data sources and noise model inputs. He discussed how flight track and aircraft identification data is used in noise modeling.

There was a question about how the model includes aircraft operations that do not land on runways, i.e. helicopters. Tim replied that HMMH will coordinate with the Army Guard and other tenants that operate helicopters to determine where and how helicopters arrive and depart. He explained that typically helicopter operations do not influence the DNL noise exposure contours. Aircraft engine run-ups will likely be modeled if there are maintenance activities. TAC members then discussed military engine run-ups.

Tim Middleton presented the draft study area and explained how the study area boundaries are determined.

There was a question about whether HMMH has access to the EIS data. Tim replied that HMMH is in contact with Cardno, the consultant that worked with the government to conduct the EIS for the F35s, to obtain the noise modeling data. HMMH expects that EIS projections will be different from the Part 150 forecasts. There was discussion that the NEM document should provide clear information about the differences between military modeling for the EIS purposes versus the Part 150 study and how that may influence the size of the contours.

Tim Middleton provided an overview of the Noise Compatibility Program (NCP) and how review of the NCP occurs. Gene Reindel discussed the various types of NCP measures and the NCP's objective of preventing future incompatible land uses. Tim provided an overview of the Part 150 schedule. He discussed agenda items for TAC meeting 2 and critical work over the next few months.

Action: Set future TAC meeting dates within the next month.

Tim Middleton provided overview of the study website and project contacts. There was discussion about setting up a file sharing site for TAC members.

Action: HMMH to create a Sharepoint folder that only TAC members have permission to access.

There was discussion about the open house format for the first public meeting and the objectives of the meeting. There was discussion that the team should be prepared for questions from the public related to other topics, including the EIS and F-35s.

Tim Middleton briefed the baseline year is the year of submission (CY22) and the future model year is 5-years later (CY27). There was a discussion that CY21 might be a better baseline year due to F-16 drawdown in CY22 and DCRA Runway construction in CY22.

Action: HMMH is to request FAA approval for CY21 baseline year vs. CY22.

There was discussion of public perception of military noise, afterburner use, transient military operations, possible public mistrust of study results, and housing concerns from the public.

Tim Middleton reviewed next steps in the study process and what to expect at the next TAC meeting.

Action: The TAC agreed on July 12th for the next TAC meeting date.

Meeting adjourned.

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MSN Part 150 Study

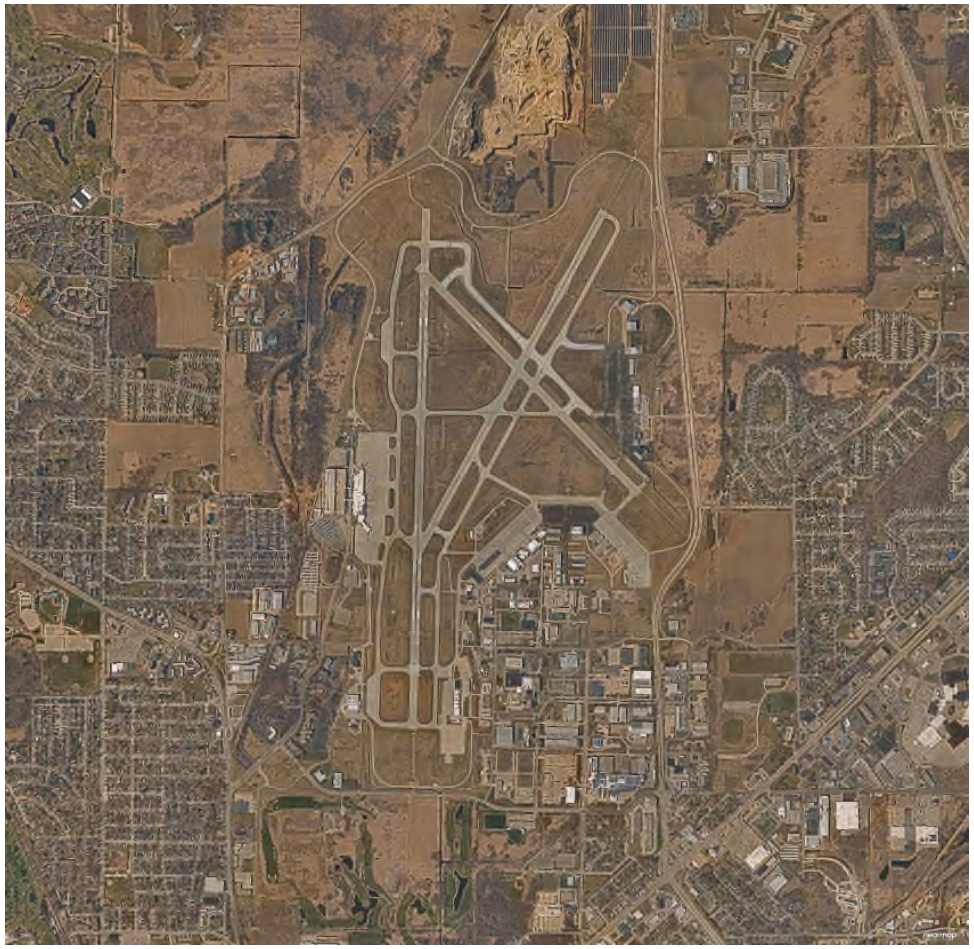
Dane County Regional Airport

Technical Advisory Committee Meeting #2

July 26, 2022

TAC #2 Agenda

- Introductions
  - Study Team, TAC Members, Roles & Responsibilities
  - Airport Facility Overview
- Operations Forecast
  - FAA TAF Confirmation
- Noise Model Inputs
  - Noise Modeling Process
- Runway Use
- Flight Track Review
  - Noise Model Flight Track Development
- Military Noise Modeling
- Land Use
- NCP Review
- Next Steps
  - TAC Member Discussion
  - Wrap-up



Source: NearMap USA, April 2021

Study Team

Dane County Regional Airport Team

- Wisconsin Department of Transportation Bureau of Aeronautics
  - Matt Messina – Airport Development Engineer
- Airport (MSN)
  - Kim Jones – Airport Director
  - Michael Kirchner – Engineering Director
  - Lowell Wright – Airport Noise Abatement/ Environmental Officer

Project Team

- HMMH
  - Gene Reindel – Principal-in-Charge
  - Tim Middleton – Project Manager
  - Julia Nagy – Assistant Project Manager
- Mead & Hunt
  - Kate Andrus – Project Lead, Airport Planning and Forecasts
  - Ryan Hayes – Airport Planning and Forecasts
  - Chris Reis – Local Client Lead
  - Ryk Dunkelberg - Vice President
- The Jones Payne Group
  - Diane Carter – Project Lead, Principal-in-Charge
  - Brianna Whiteman – Assistant Project Manager, QA/QC

TAC Members

Organization	TAC Member
MSN staff	Michael Kirchner
WBOA staff	Matt Messina
FAA Airport District Office (ADO)	Bobb Beauchamp
FAA Air Traffic Control Tower (ATCT)	John Vagedes
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Daniel Statz
Army Guard	Major Lucas Sivertson
Delta Airlines	Jason Pace
Wisconsin Aviation	Brian Olson
City of Madison Planning Division	Dan McAuliffe
Dane County Department of Planning and Development	Todd Violante
Town of Burke	

Roles and Responsibilities Airport Noise Compatibility

Stakeholder	Responsibilities
Federal government (FAA)	Regulate source noise emissions, air traffic control, funding, and safety oversight
Airport operators	Plan and implement noise compatibility measures
State and local government	Compatible land use planning and control
Aircraft operators	Develop noise-sensitive schedules, cockpit procedures, and fleet improvements
Air travelers and shippers	Bear the costs (through ticket tax)
Current and potential residents	Seek to act in an informed manner

Roles and Responsibilities Part 150 Study

Airport

- Project sponsor
- Certification that documentation is true and accurate
- Recommend measures to address incompatible land use

Consultant Team

- Overall project management, documentation, and outreach
- Aircraft noise analysis and abatement planning
- Noise compatibility analysis and planning
- Aviation forecast and airfield analysis

FAA

- Certification that the documentation meets federal regulations and guidelines
- Approval of Airport-recommended measures

Technical Advisory Committee

- Review study inputs, assumptions, analyses, documentation, etc.
- Input, advice, and guidance related to NEM and NCP development

Public

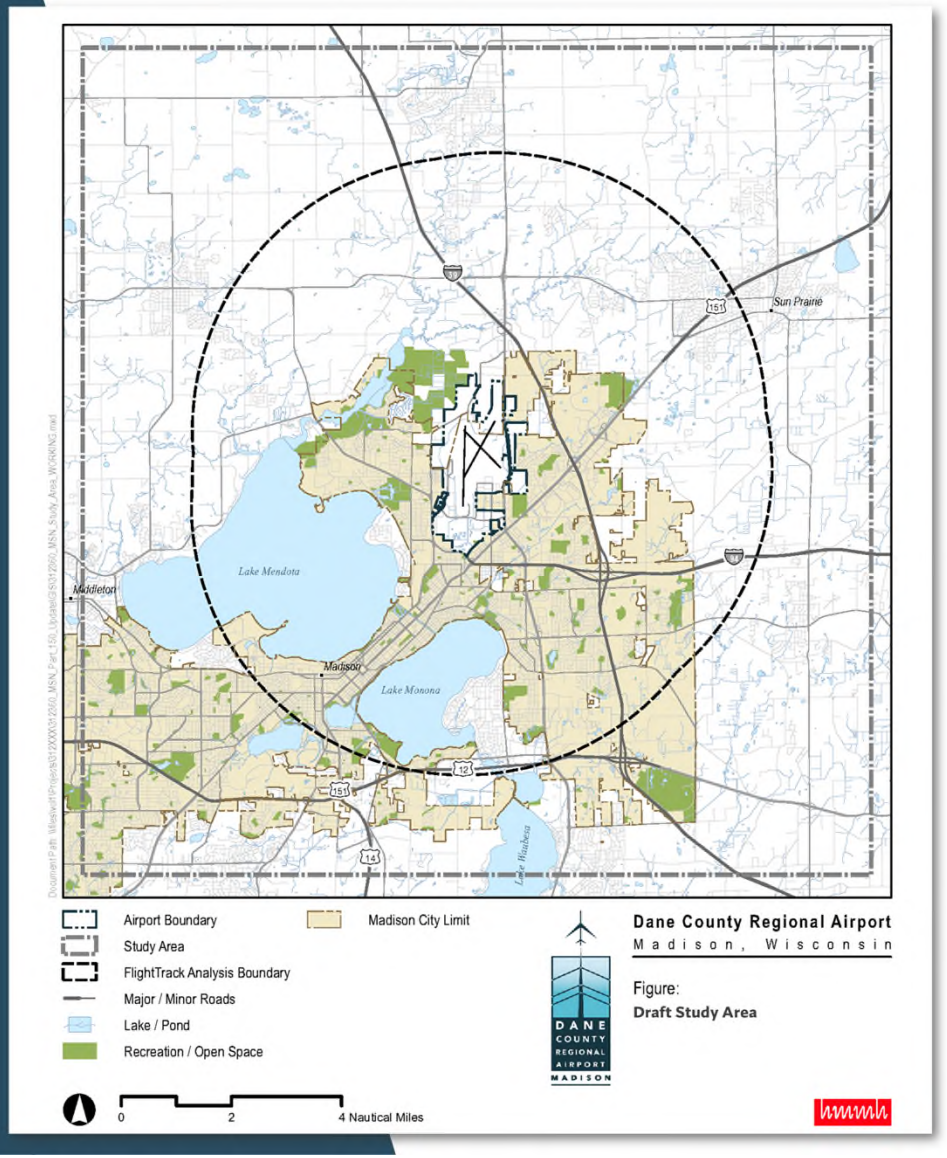
- Provide input on study during comment period
- Review public draft documents

Roles and Responsibilities
Technical Advisory Committee

- The TAC is advisory to MSN solely for purposes of the MSN Part 150 Study, including:
  - Review of study inputs, assumptions, analyses, documentation, etc.
  - Input, advice, and guidance related to NEM and NCP development
- TAC provides two-way communication between the committee and their respective organizations / constituents
- MSN shall respect and consider TAC input, but must retain overall responsibility for the Part 150 Study and NCP recommendations
- The TAC and MSN recognize FAA is responsible for accepting NEM and NCP submissions and for approving NCP proposals

Airport Facility Overview

- MSN
  - Covers 3,500 acres and serves over 2.2 million commercial passengers each year
  - Fixed-Base Operator Wisconsin Aviation is located on the east side of the airport
- 115th Fighter Wing of the Wisconsin Air National Guard (ANG)
  - Chosen to host the F-35A mission and receive a new fleet of F-35A Lightning II aircraft beginning in Spring of 2023
- Wisconsin Army National Guard (ARNG) 64th Troop Command
  - Operates UH-60 Black Hawk helicopters at Truax Field



Part 150 Components

- Part 1: Noise Exposure Map (NEM)
  - Define an existing (2022) and forecast (2027) aircraft noise exposure
  - Assess land use compatibility with the aircraft noise exposure
- Part 2: Noise Compatibility Program (NCP)
  - The Airport's program to address noncompatible land use identified in the NEM

Operations Forecast

For NEM Years 2022 and 2027

FAA Terminal Area Forecast (TAF)

- The Terminal Area Forecast (TAF) is the official FAA forecast of aviation activity for U.S. airports
  - The TAF contains active airports in the National Plan of Integrated Airport Systems (NPIAS)
  - Forecasts are prepared for major users of the National Airspace System including air carrier, air taxi/commuter, general aviation, and military
  - The forecasts are prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public
- The Part 150 will use the 2021 (published March 2022) FAA TAF as the basis for the forecast aircraft operations at MSN
  - The TAF has been validated
  - Detailed aircraft operations as required in Part 150 are being developed from the TAF

Source: https://www.faa.gov/data_research/aviation/taf

FAA TAF Confirmation

- Passenger Enplanements Forecast Results:
  - Trend and regression forecasts completed
  - Multi-variable regression showed strong correlation
  - TAF enplanement projections (5.56% CAGR) reaching 1.6M enplanements by 2042 considered reasonable
- Aircraft Operations Forecast Results:
  - Regression not used – poor historical correlation
  - Trend forecast shows aircraft operations to remain relatively flat
  - TAF operations projections (1.79% CAGR), exceeding 109,000 operations by 2042 considered reasonable

Historic Enplanements

FY 2012-2021 MSN Passenger ENPLANEMENT Data Comparison – TAF and Airport Records

Fiscal Year	TAF	Airport Data	Difference
2012	779,010	801,674	-2.91%
2013	815,913	834,622	-2.29%
2014	828,052	835,753	-0.93%
2015	827,520	842,419	-1.80%
2016	882,228	906,994	-2.81%
2017	927,071	952,504	-2.74%
2018	1,005,835	1,032,948	-2.70%
2019	1,142,812	1,184,493	-3.65%
2020	633,489	646,222	-2.01%
2021	551,317	560,152	-1.60%
CAGR '12-'21	-3.8%	-3.9%	N/A
Sources: 2021 TAF, Dane County Regional Airport			

Historic Operations

FY 2012-2021 MSN Aircraft OPERATIONS Data Comparison – TAF and Airport Records

Fiscal Year	Total Operations		
	TAF	Airport Data	Difference
2012	84,853	84,695	0.19%
2013	83,926	83,926	0.00%
2014	80,585	80,584	0.00%
2015	77,716	77,667	0.06%
2016	80,631	80,631	0.00%
2017	83,889	83,874	0.02%
2018	85,893	85,902	-0.01%
2019	82,085	82,261	-0.21%
2020	73,170	73,170	0.00%
2021	75,957	76,035	-0.10%
CAGR '12-'21	-1.2%	-1.2%	N/A
Sources: 2021 TAF, Dane County Regional Airport			

Historic Socioeconomic Growth Rates

Historical Madison, WI MSA Socioeconomics (2012-2021)

CY	Population	Income/ Capita	Gross Regional Product	Total Earnings	Total Retail Sales	Total Employment
2012	608,979	60,035	48,257	29,428	15,962	462
2013	614,364	60,573	49,829	30,756	16,369	468
2014	619,677	61,819	52,949	31,413	16,845	478
2015	626,171	64,671	56,011	32,990	17,257	489
2016	636,340	65,690	58,005	34,055	17,635	502
2017	642,550	66,903	58,180	34,988	18,107	507
2018	648,478	68,625	59,507	35,803	18,633	514
2019	655,592	70,074	61,372	36,945	19,025	522
2020	661,424	71,241	62,796	37,782	19,665	529
2021	671,135	72,461	64,308	38,672	20,059	537
CAGR '12-'21	**1.1%**	**2.1%**	**3.2%**	**3.1%**	**2.6%**	**1.7%**

Sources: Wisconsin Department of Administration, Woods & Poole Economics, Inc.

Projected Socioeconomic Growth Rates

Projected Madison, WI MSA Socioeconomics (2021-2041)

CY	Population	Income/Capita	Gross Regional Product	Total Earnings	Total Retail Sales	Total Employment
2021	671,135	72,461	64,308	38,672	20,059	537
2026	694,664	78,509	71,828	43,096	22,005	572
2031	719,018	84,753	79,775	47,775	23,841	605
2036	739,715	91,385	88,358	52,842	25,702	638
2041	761,008	98,551	97,782	58,425	27,690	672
CAGR	0.6%	1.5%	2.1%	2.1%	1.6%	1.1%

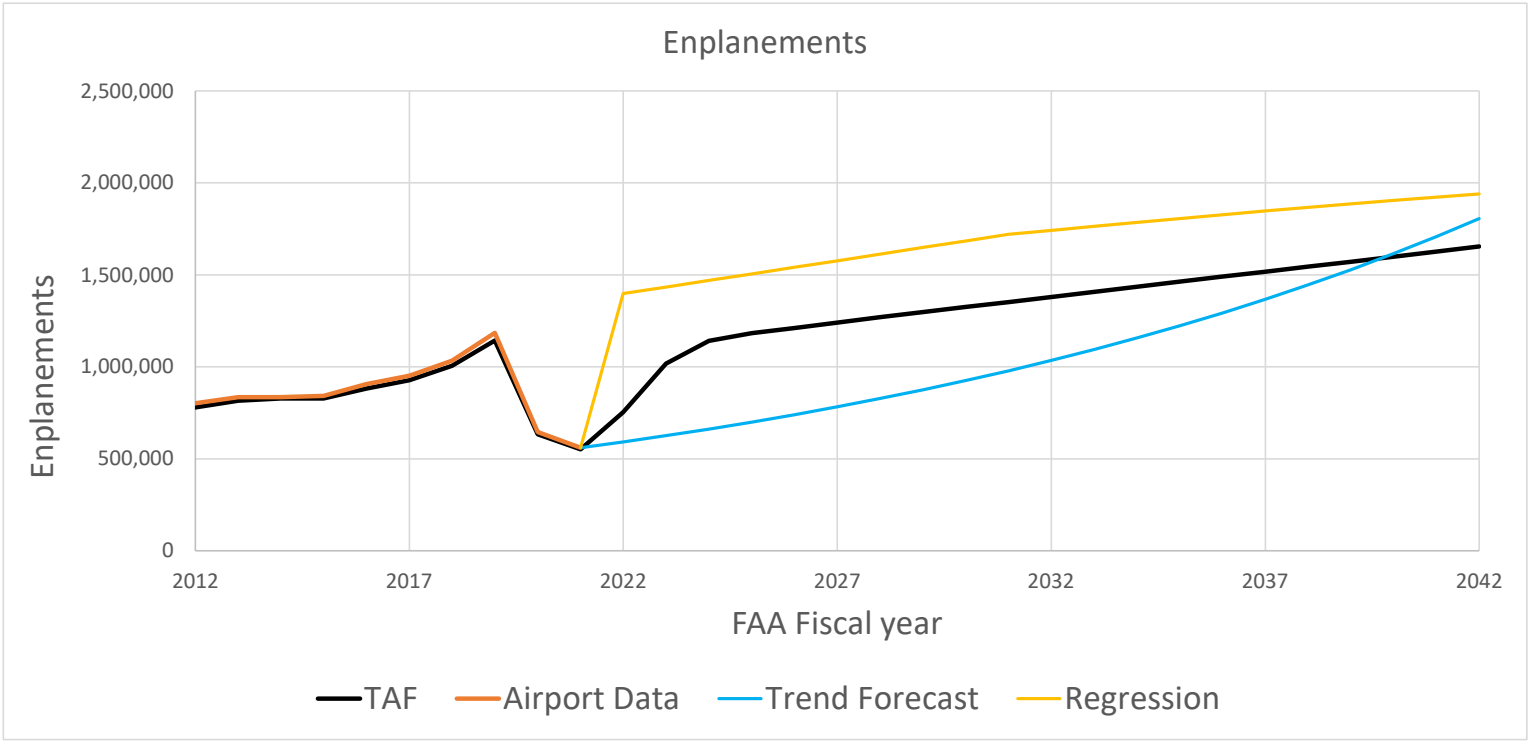
Sources: Wisconsin Department of Administration, Woods & Poole Economics, Inc.

Correlation Analysis

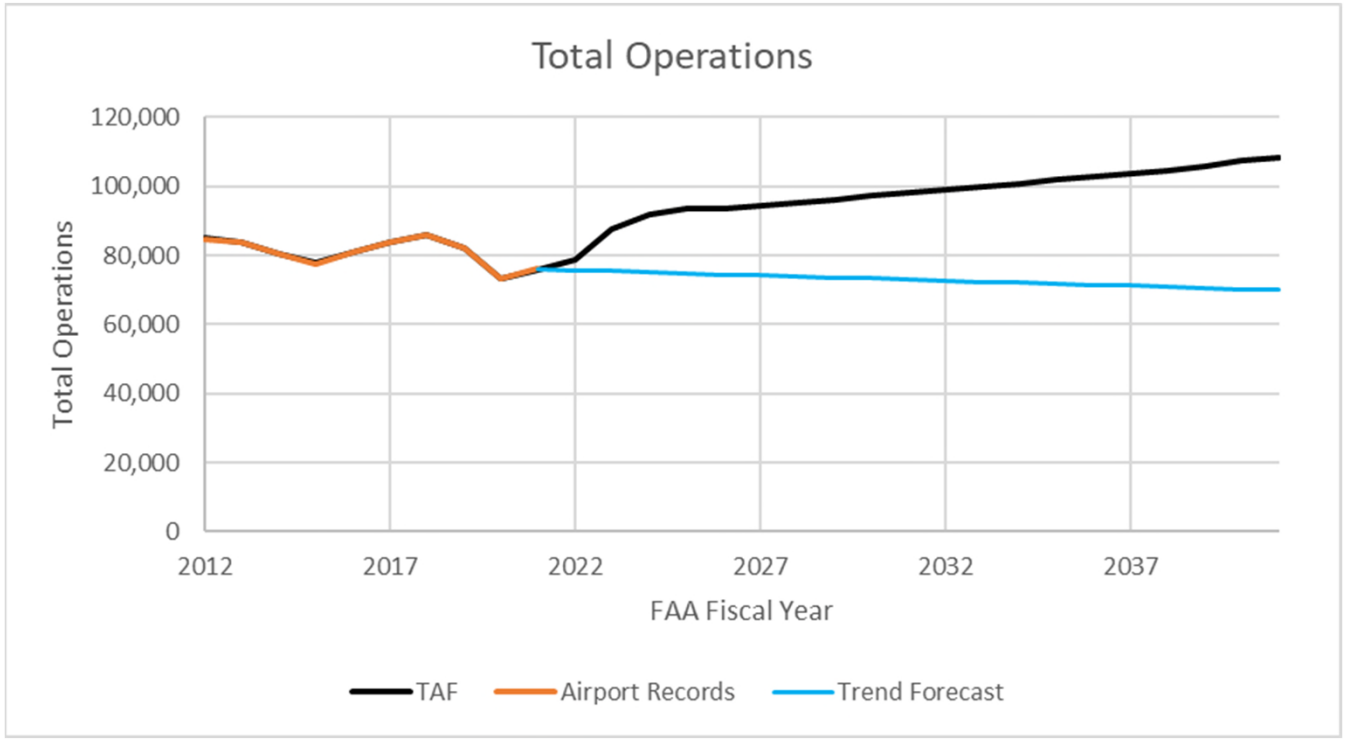
2012-2021 MSN Passenger Enplanement and Total Aircraft Operations Correlation Analysis

Correlation Coefficient						
Regression Analysis	Population	Income/Cap	GRP	Earnings	Sales	Employment
Enplanements	0.922	0.906	0.834	0.902	0.921	0.893
Total Operations	0.103	0.040	-0.116	0.031	0.074	0.034

Enplanement Forecast Methods Comparison



Total Aircraft Operations Forecast Comparison



2021 FAA Terminal Area Forecast for MSN

FY	Enplanements	ITINERANT					LOCAL			Total Operations
		AC	AT	GA	MI	Total	Civil	Military	Total	
2019	1,142,812	24,284	11,655	28,689	4,713	69,341	12,468	276	12,744	82,085
2021	551,317	17,728	6,747	29,916	4,855	59,246	16,541	170	16,711	75,957
2027	1,211,674	33,841	6,935	31,797	4,855	77,428	15,977	170	16,147	93,575
2032	1,352,756	37,150	6,941	32,773	4,855	81,719	16,219	170	16,389	98,108
2037	1,491,362	40,079	7,362	33,778	4,855	86,074	16,464	170	16,634	102,708
2042	1,626,176	43,877	7,781	34,814	4,855	91,327	16,713	170	16,883	108,210
CAGR										
'21-'41	5.56%	4.64%	0.72%	0.76%	0.00%	2.19%	0.05%	0.00%	0.05%	1.79%

Source: 2021 FAA Terminal Area Forecast

Operations Forecast Summary

Summary of Aircraft Operations Forecast by Aircraft Category

Aircraft Operation Category	2019 Baseline Year	2022 Year of Submission	2027 Forecast Year
Air Carrier	24,284	19,702	34,654
Air Taxi	11,655	7,231	6,606
General Aviation	41,157	46,917	48,015
Military	4,989	5,025	5,025
Total Operations	82,085	78,875	94,300

2019 Source: Dane County Regional Airport
2021 Source: FAA OpsNet
2027 Sources: FAA TAF
Note: calendar year operations were used for 2021 as they are the most recent 12 months of available data.

Detailed Forecast Data

- Base fleet mix developed from flight track and aircraft identification data
- Fleet mix then assigned to Air Carrier, Air Taxi, General Aviation and Military
- Base fleet mix then scaled to the 2022 and 2027 Forecast levels for each category.
- Military operations will be augmented with information from 115th Fighter Wing and Army Guard

Aircraft Operations Forecast by Aircraft Category

Aircraft Operation Category	2019	2022	2027
Air Carrier	24,284	19,702	34,654
Air Taxi	11,655	7,231	6,606
General Aviation	41,157	46,917	48,015
Military	4,989	5,025	5,025
Total Operations	82,085	78,875	94,300

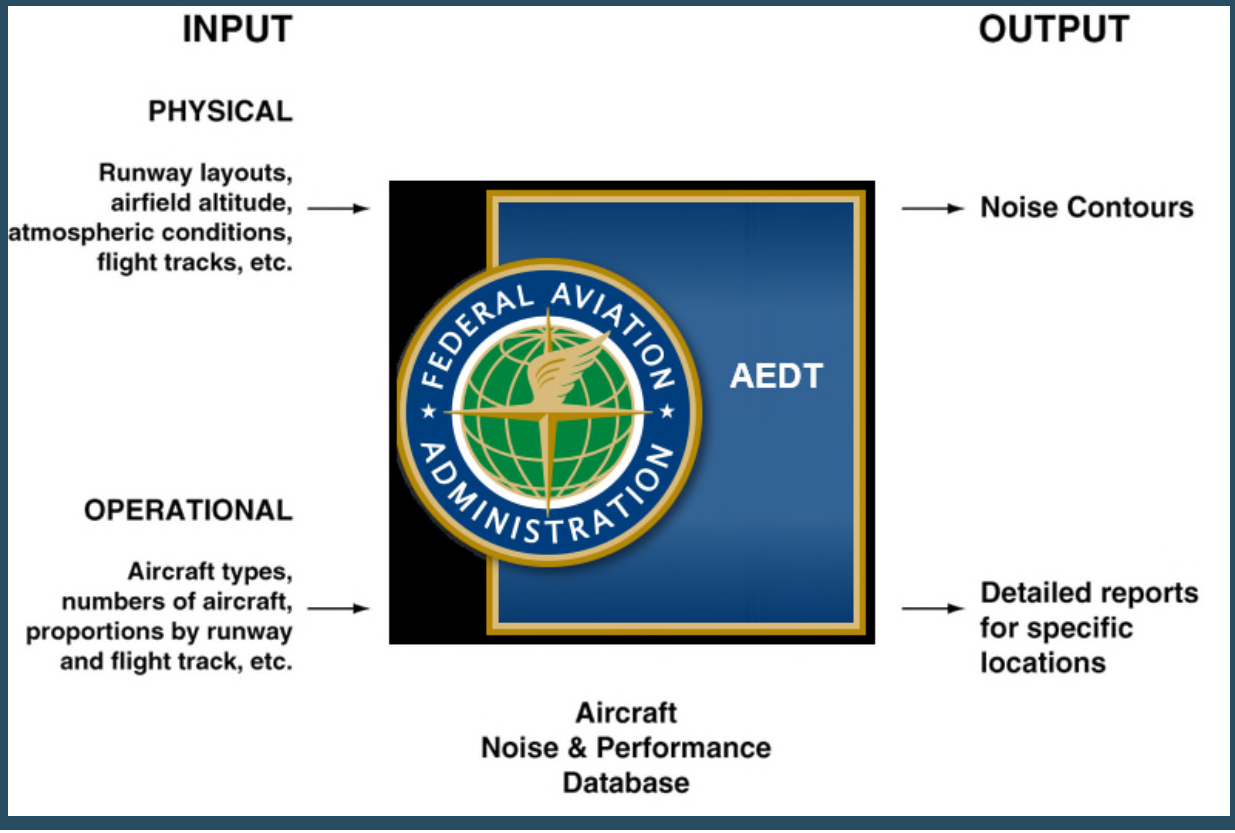
2019 Source: Dane County Regional Airport
2021 Source: FAA OpsNet
2027 Sources: FAA TAF
Note: calendar year operations were used for 2021 as they are the most recent 12 months of available data.

Noise Model Inputs

Noise Modeling Overview

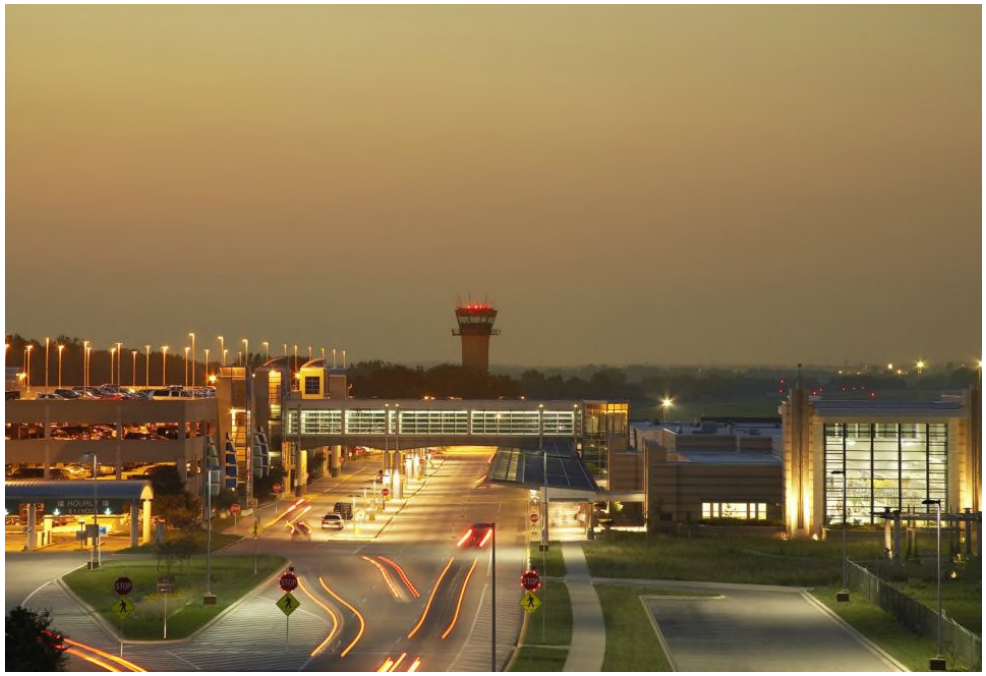
- Use of FAA's Aviation Environmental Design Tool (AEDT) noise modeling software is required
  - Version 3d SP2: https://aedt.faa.gov/
- AEDT requires noise model input data in three categories:
  1. Aircraft noise and performance data
     - Aircraft performance profiles
     - Noise level vs. distance curves
  2. Airport physical inputs
  3. Aircraft operational inputs
     - Number of aircraft operations
     - Aircraft fleet mix
     - Day-night split of operations
     - Runway utilization
     - Flight track geometry and utilization

How AEDT Works



Physical Input Requirements

- Airport layout
  - Runway configuration (including displaced landing or takeoff thresholds)
- Flight tracks
- Airport elevation
  - Terrain data were obtained from the United States Geological Survey National Elevation Dataset
- Airport weather
  - The AEDT database includes 30-year average weather for each airport.
    - Temperature
    - Station pressure
    - Relative humidity
    - Dew point
    - Wind speed
- Related requirements:
  - runway use rates
  - flight track use rates



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Operational Input Requirements

- Total operations
  - Existing year 2022
  - Forecast year 2027
- Aircraft Type
  - Jet, Turboprop, Helicopter, Prop
- AEDT Equipment Type (~4,600 airframe/engine combinations)
  - 737800, A320-200, CRJ800, etc.
- Day-Night Split
  - Day 7:00AM-10:00PM
  - Night 10:00PM-7:00AM
- Stage length
  - Surrogate for aircraft weight; determined by distance from departure to destination airport
- Runway utilization rates by aircraft categories
- Flight track geometry and use by aircraft categories

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Additional Operational Inputs

Helicopter Operations

- Civilian operations on the East Ramp, near Wisconsin Aviation
- Military operations based on operational discussions with Army Guard

Runups

- Very few civilian annual run-ups
- Military run-ups on ANG (restricted area)

Noise Modeling Process

- Study years for this Part 150 Update: 2022, 2027
  - First step, analyze existing radar data
- Base Year (year of data obtained) - 2021
- Existing Condition (year of submittal) – 2022
  - Determine base year AEDT inputs
  - Develop base year conditions and DNL/Ldn contours
  - Utilize a 12-month set of flight tracks from 2021
- Forecast Condition (five years from year of submittal) - 2027
  - TAF Confirmation
  - No changes to flight tracks, runway use
  - Mostly a process of scaling aircraft operations and updating the fleet mix

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AEDT Data

- Arrivals
  - AEDT noise and performance database has standard arrival profiles
- Departures
  - AEDT noise and performance database has departure profiles by stage length; all small aircraft are assumed to fly less than 500 nm
  - Stage lengths for modeling will be determined based on analysis of radar data that includes city pair information
- Fixed wing touch & go pattern (circuit) profiles
- Engine Run-ups
  - Location, duration, power setting, heading, time of day

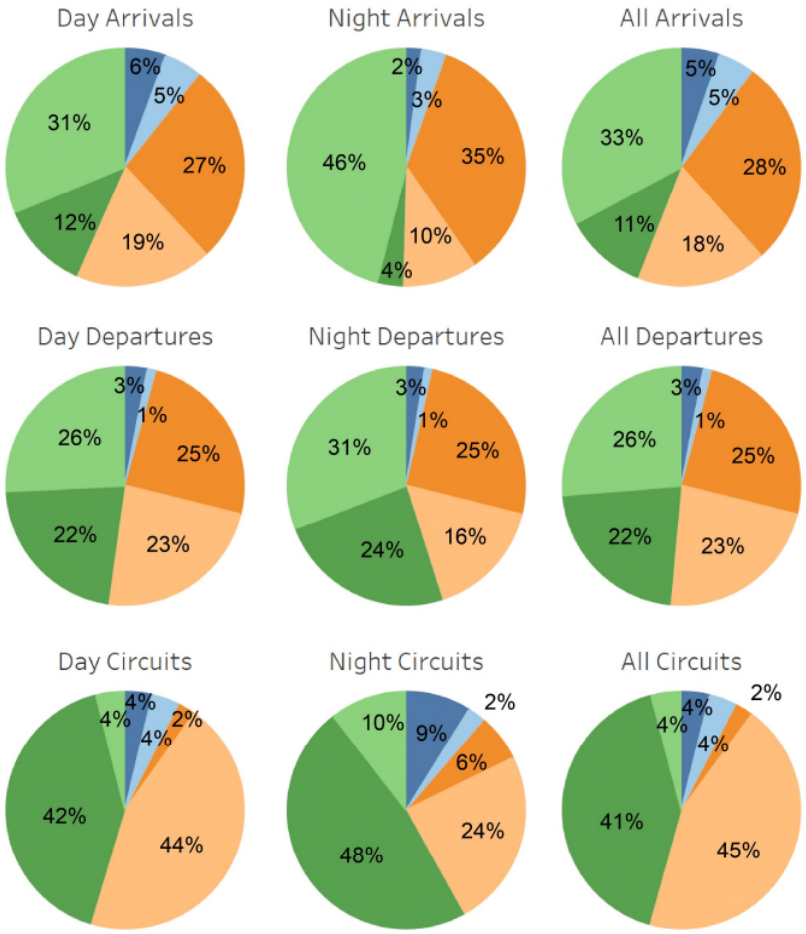
Runway Use

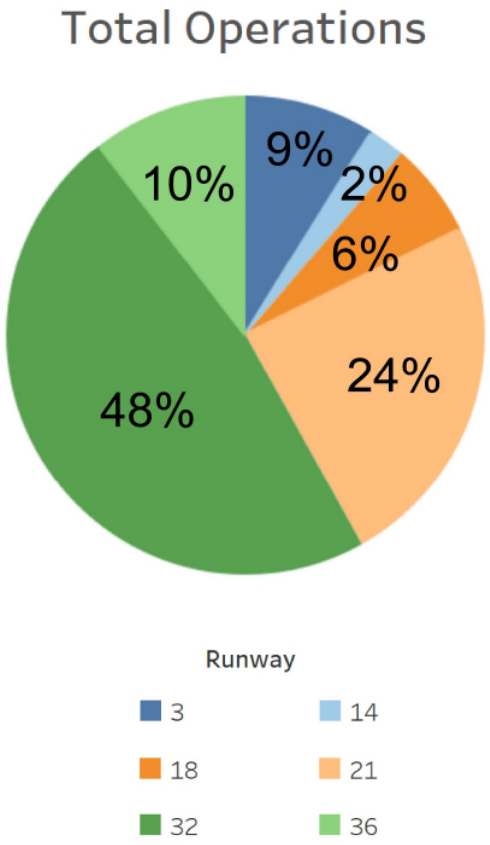
12 months of flight track data – 2021 (baseline)

Runway Use

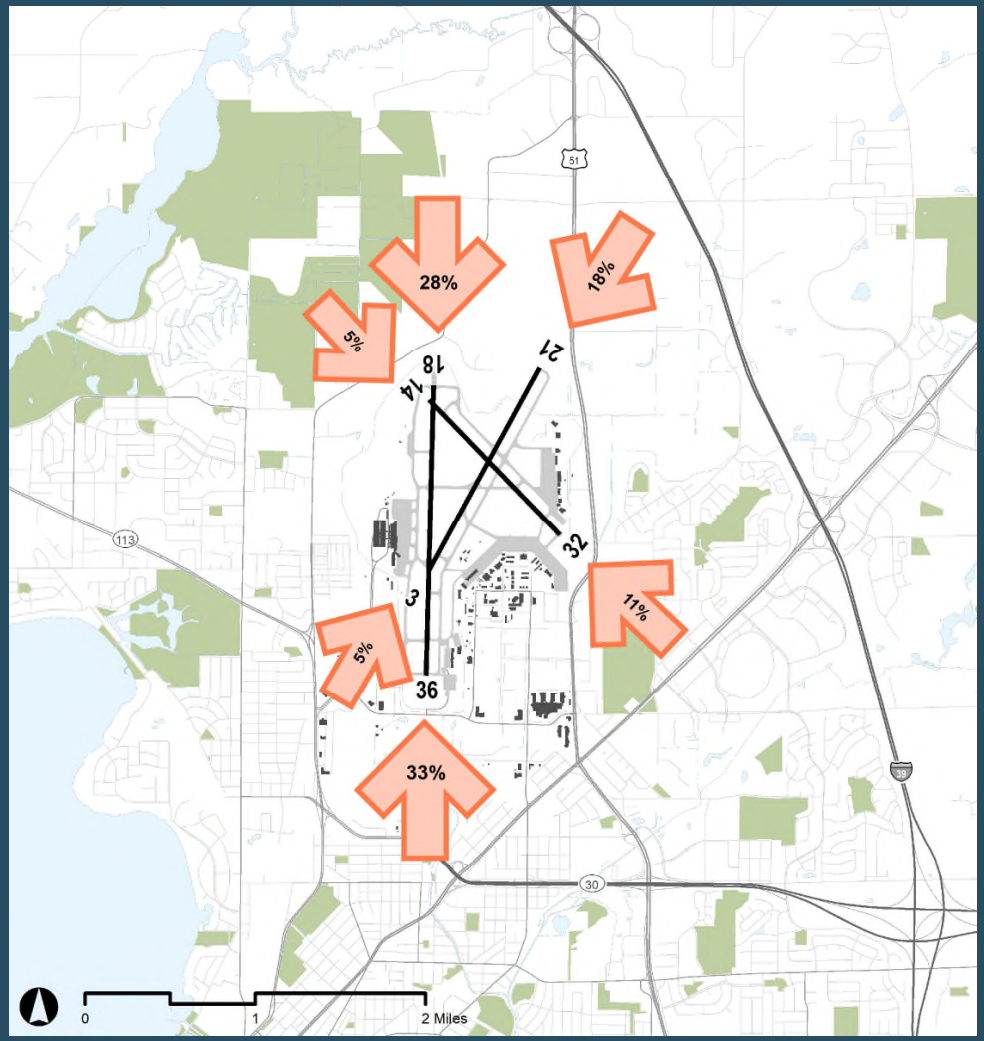
- Graphical summaries in the form of “pie charts” depicting percentage runway use on each of the six runway ends
  - Pie charts are used to provide a clear visual basis for comparison of relative runway use
- Further analyzed by Runway End Usage, and Time of Day
- Developed from 2021 FAA NOP Data and SWIM data
  - NOP: National Offload Program
  - SWIM: System Wide Information Management System

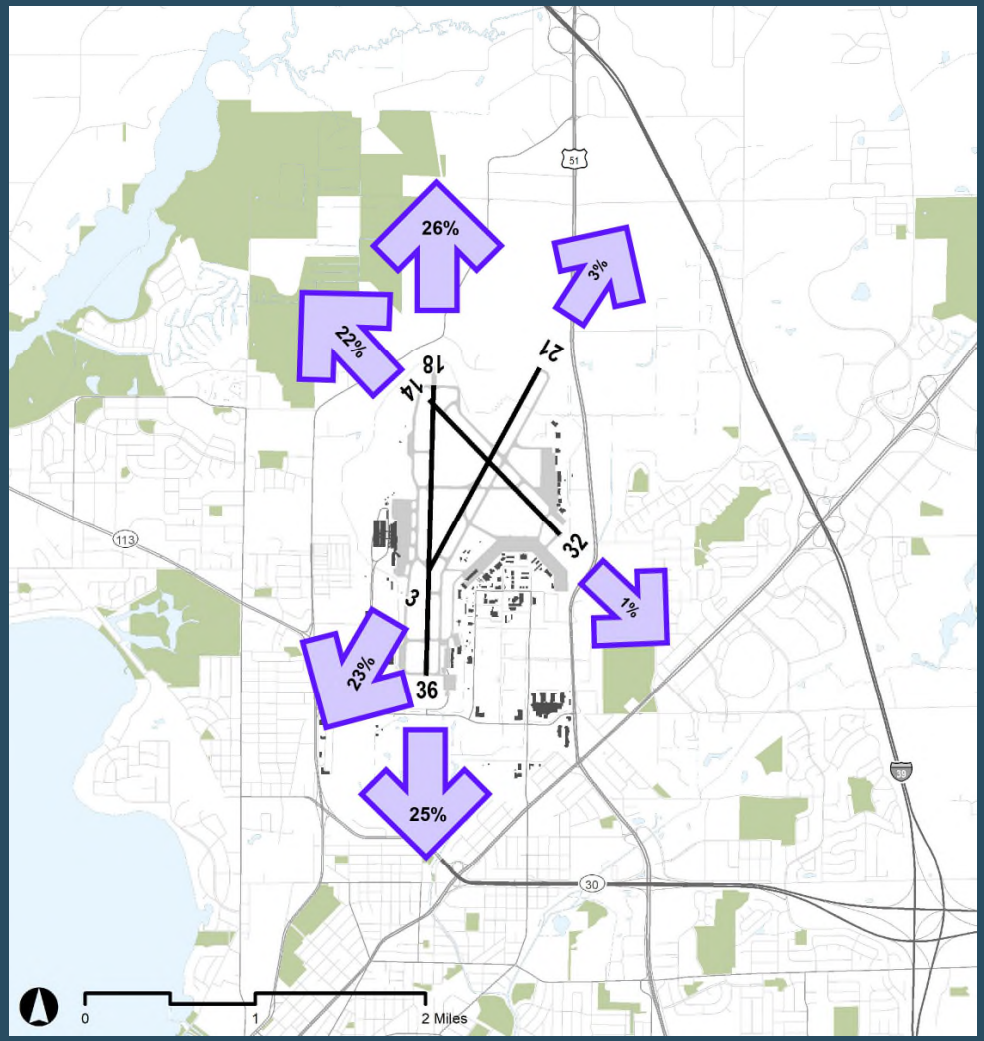
Runway Use Summary



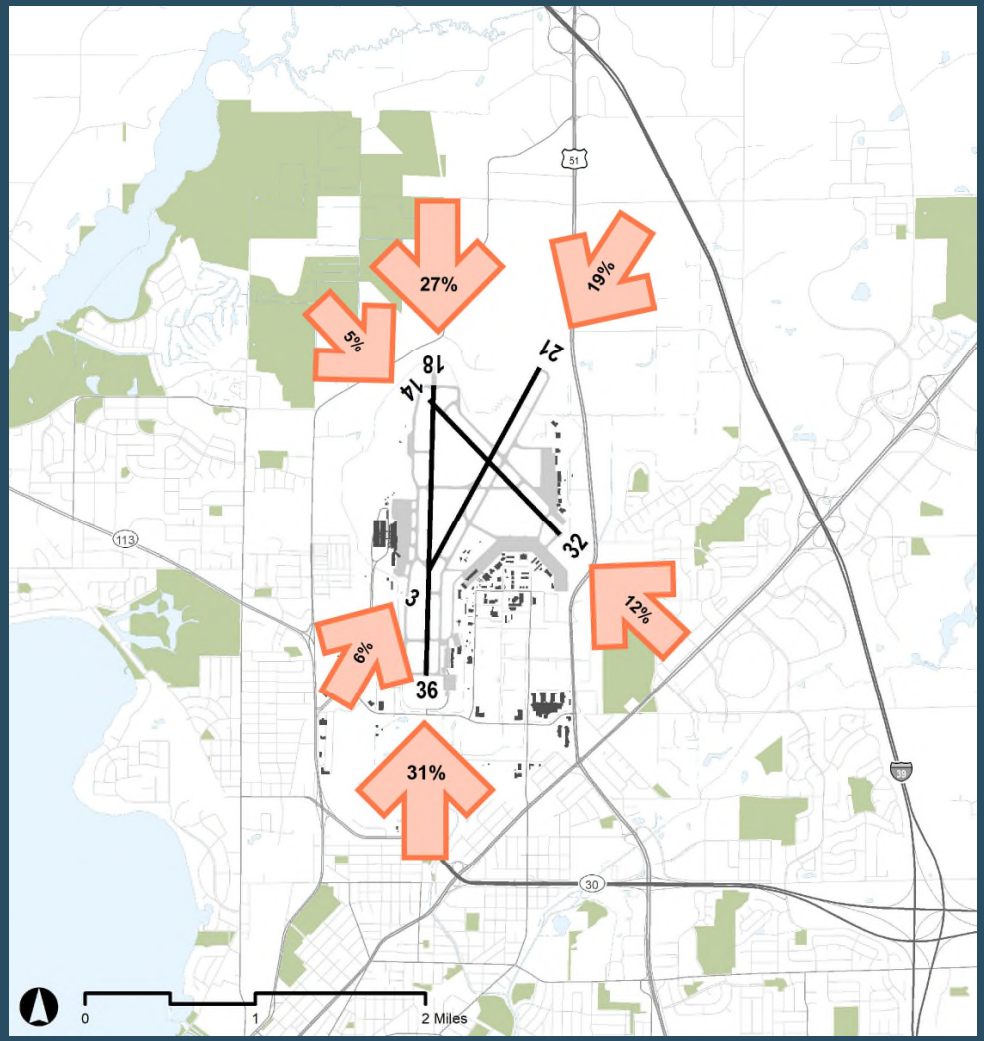


Runway Use – All Arrivals

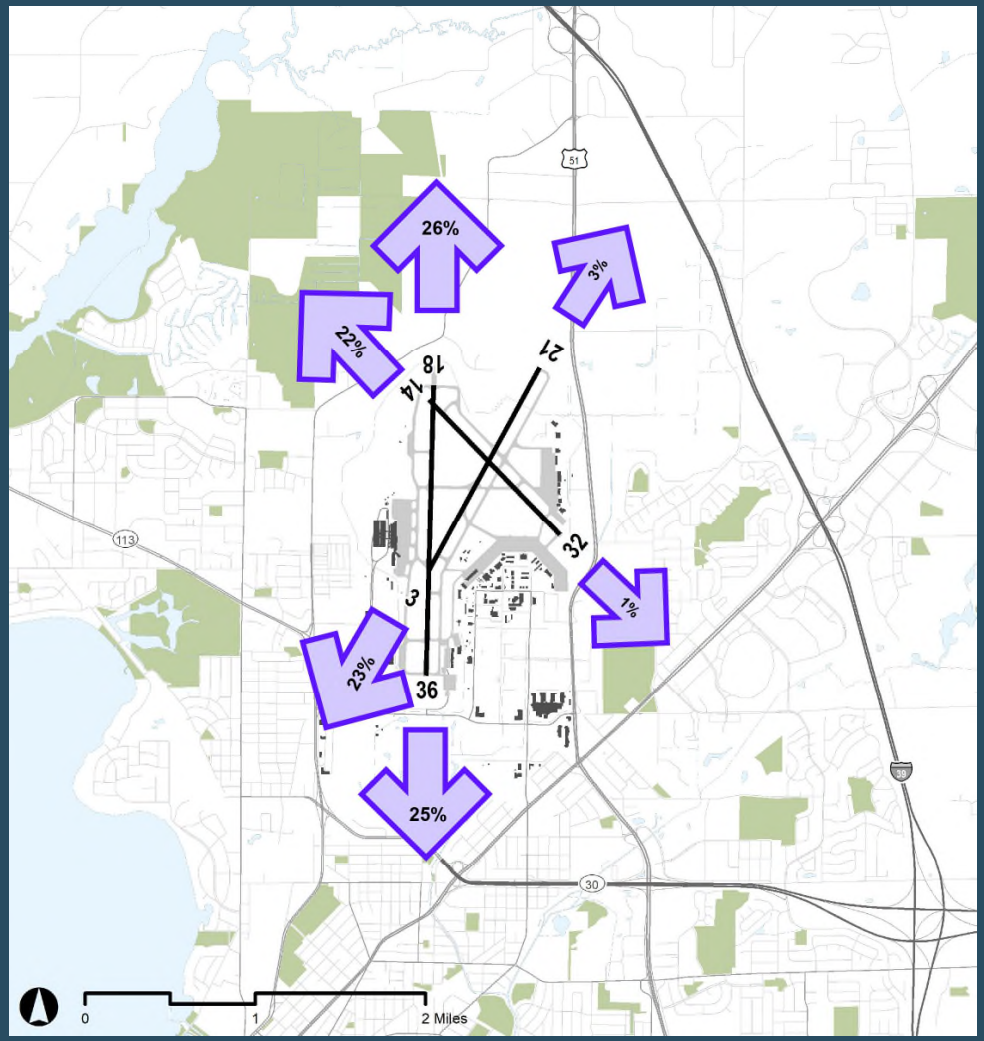




Runway Use – All Departures

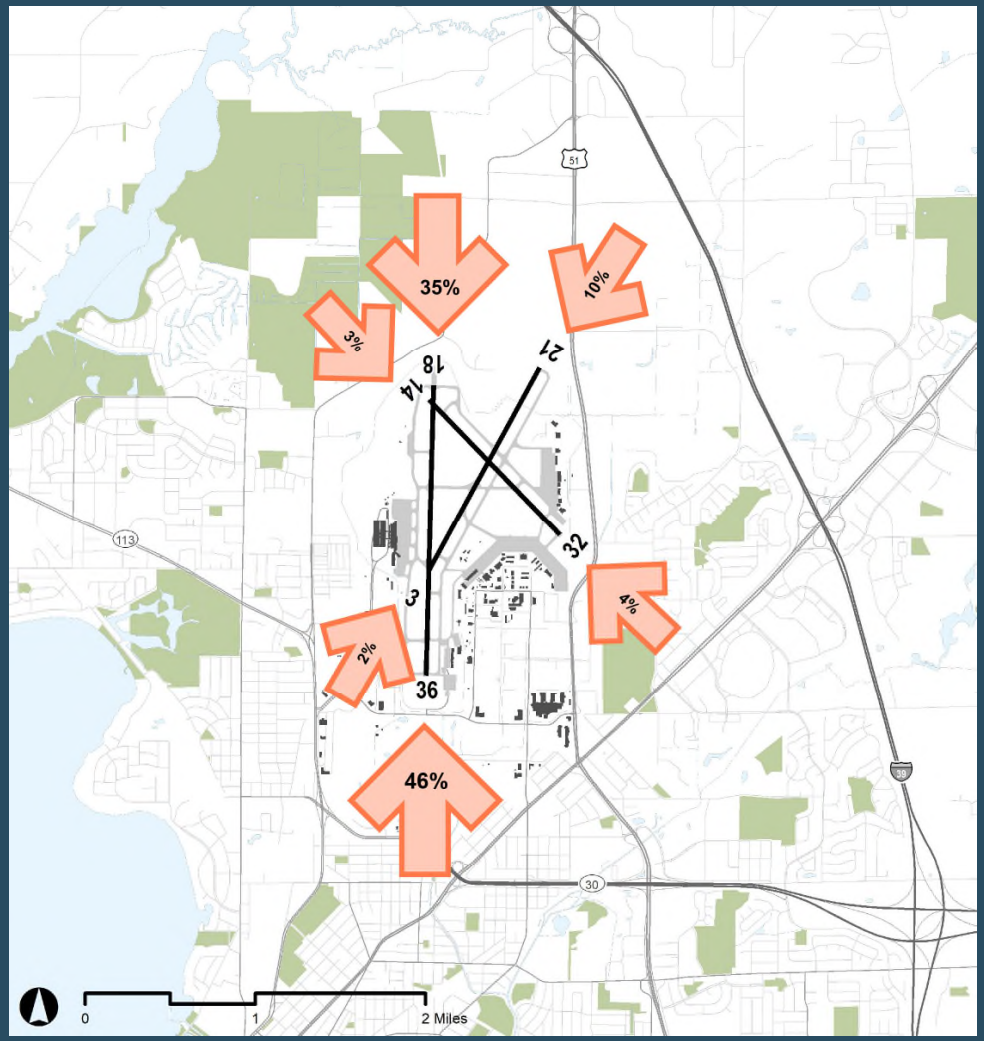


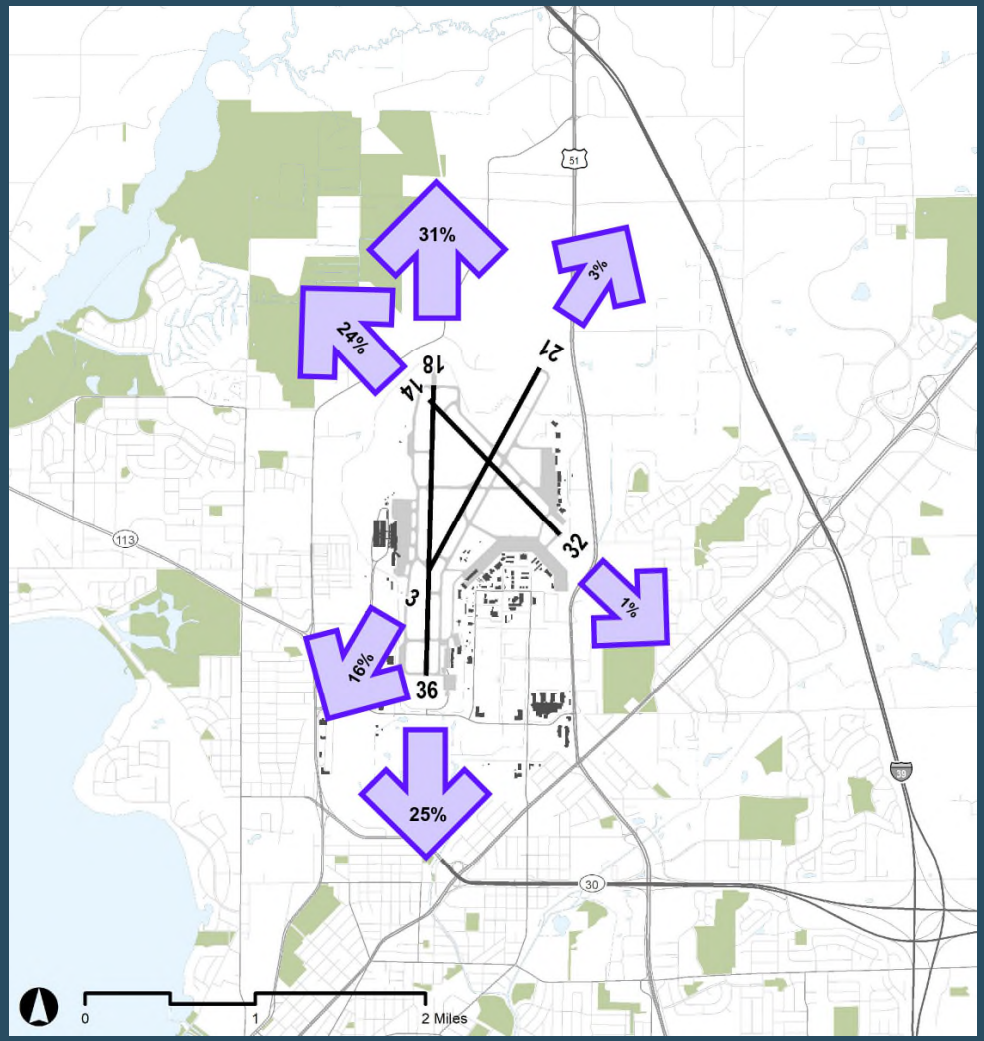
Runway Use – Day Arrivals



Runway Use – Day Departures

Runway Use – Night Arrivals



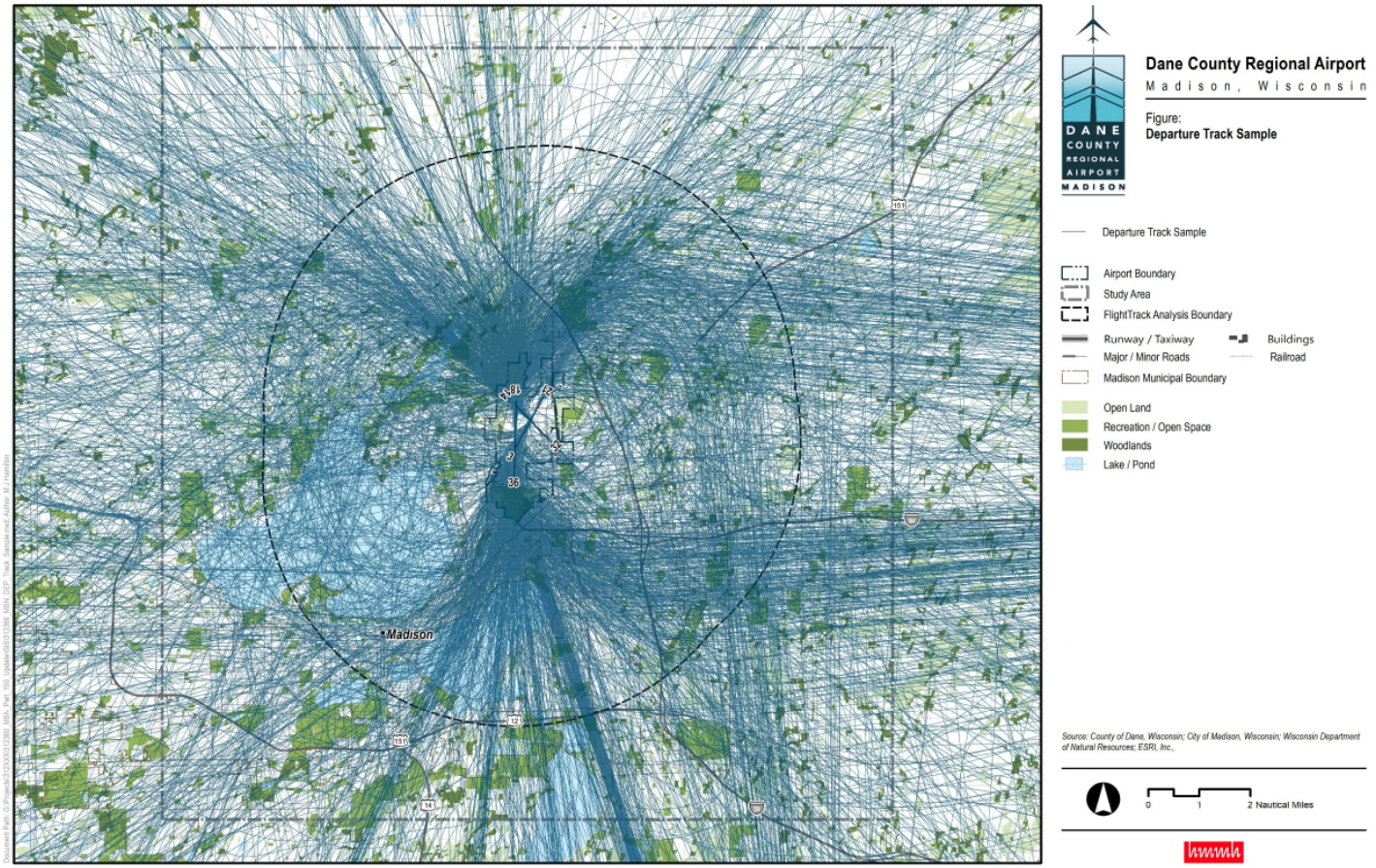


Runway Use – Night Departures

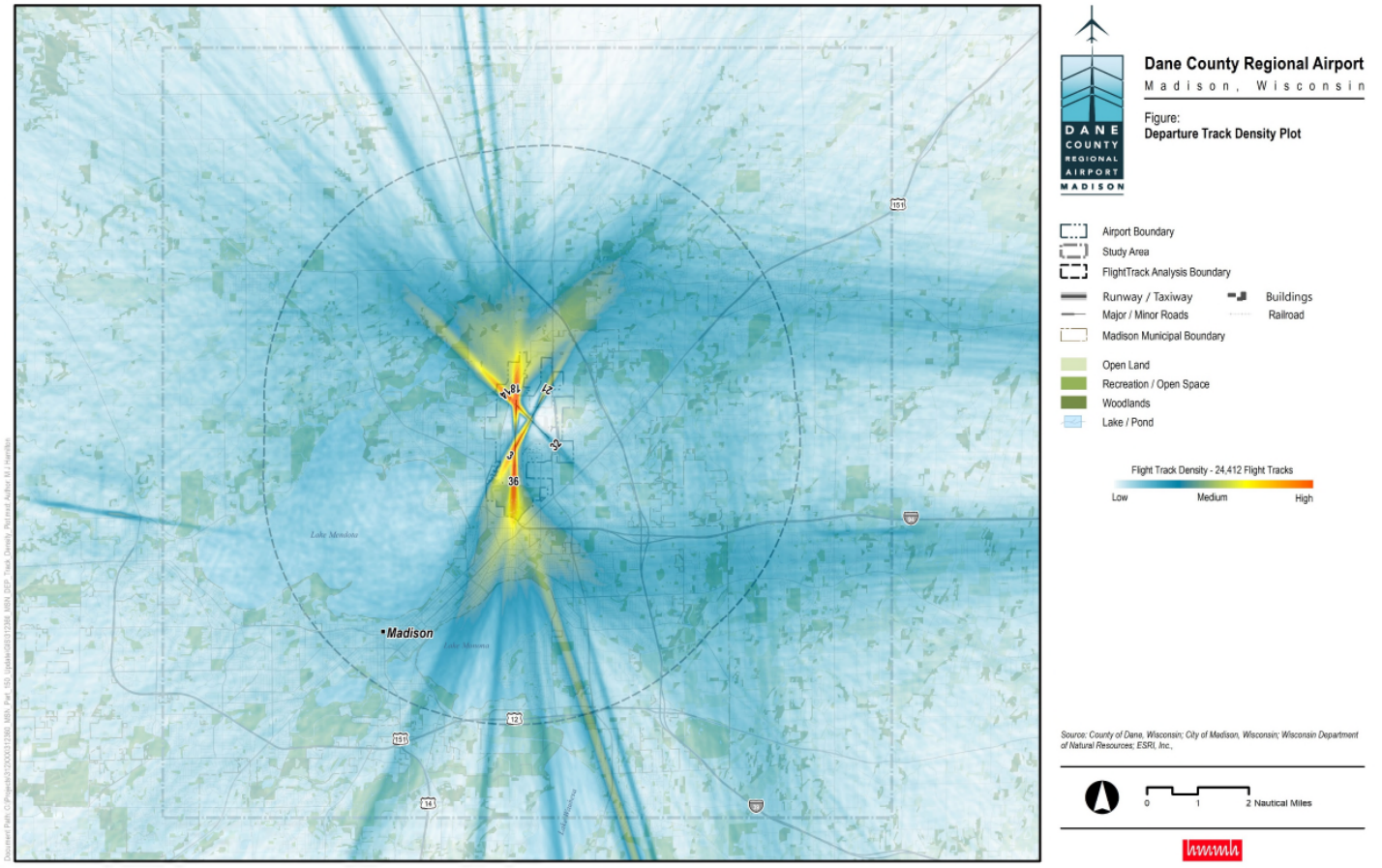
Noise Modeling Flight Track Development

- Tracks have been developed for arrivals and departures
- “Backbone” tracks are developed for major origin/destination directions
- Subsequent slides
  - Illustrate the results of HMMH development of model tracks
  - Present overall arrival and departure flight track figures for each aircraft group

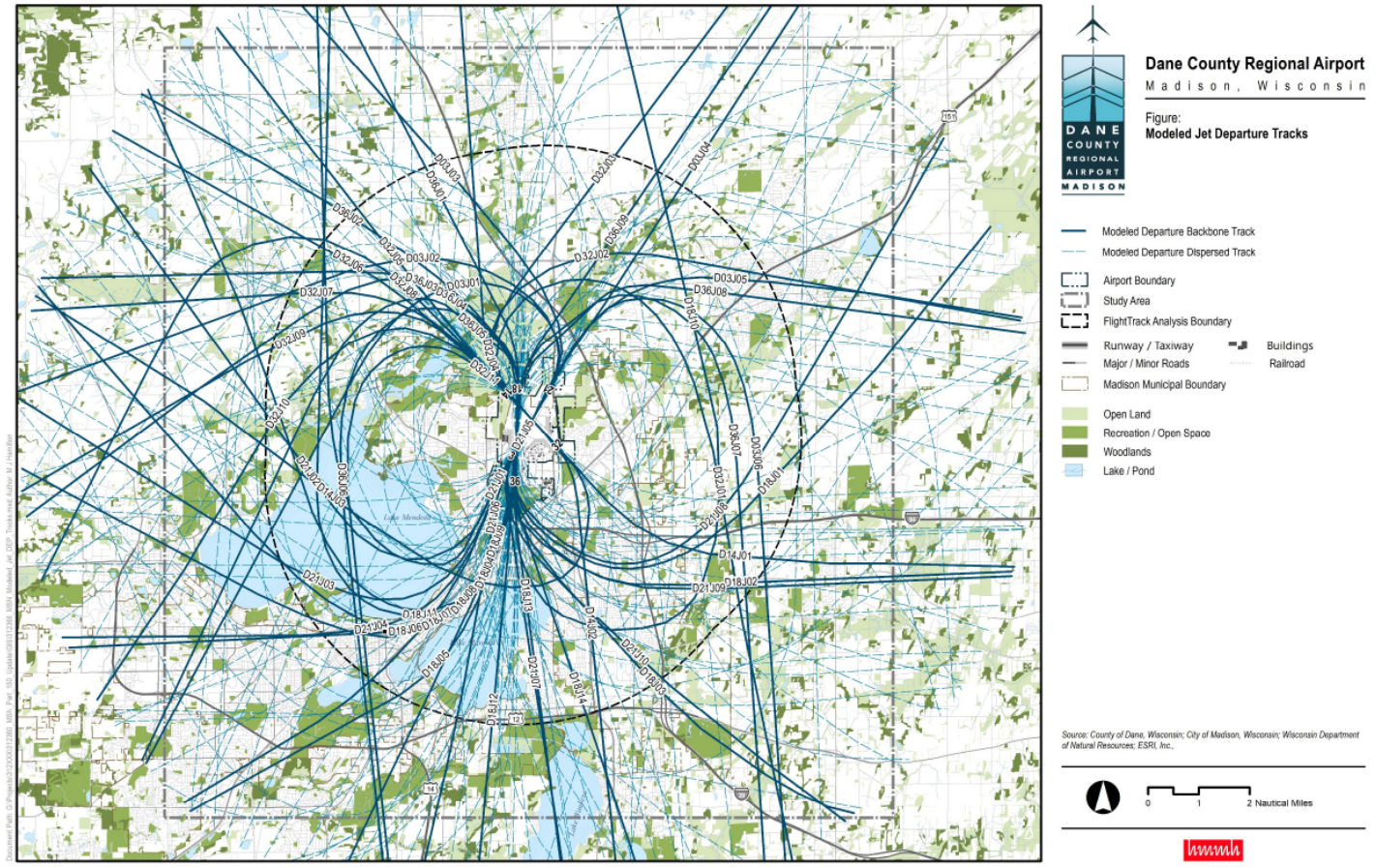
Departure Tracks Sample



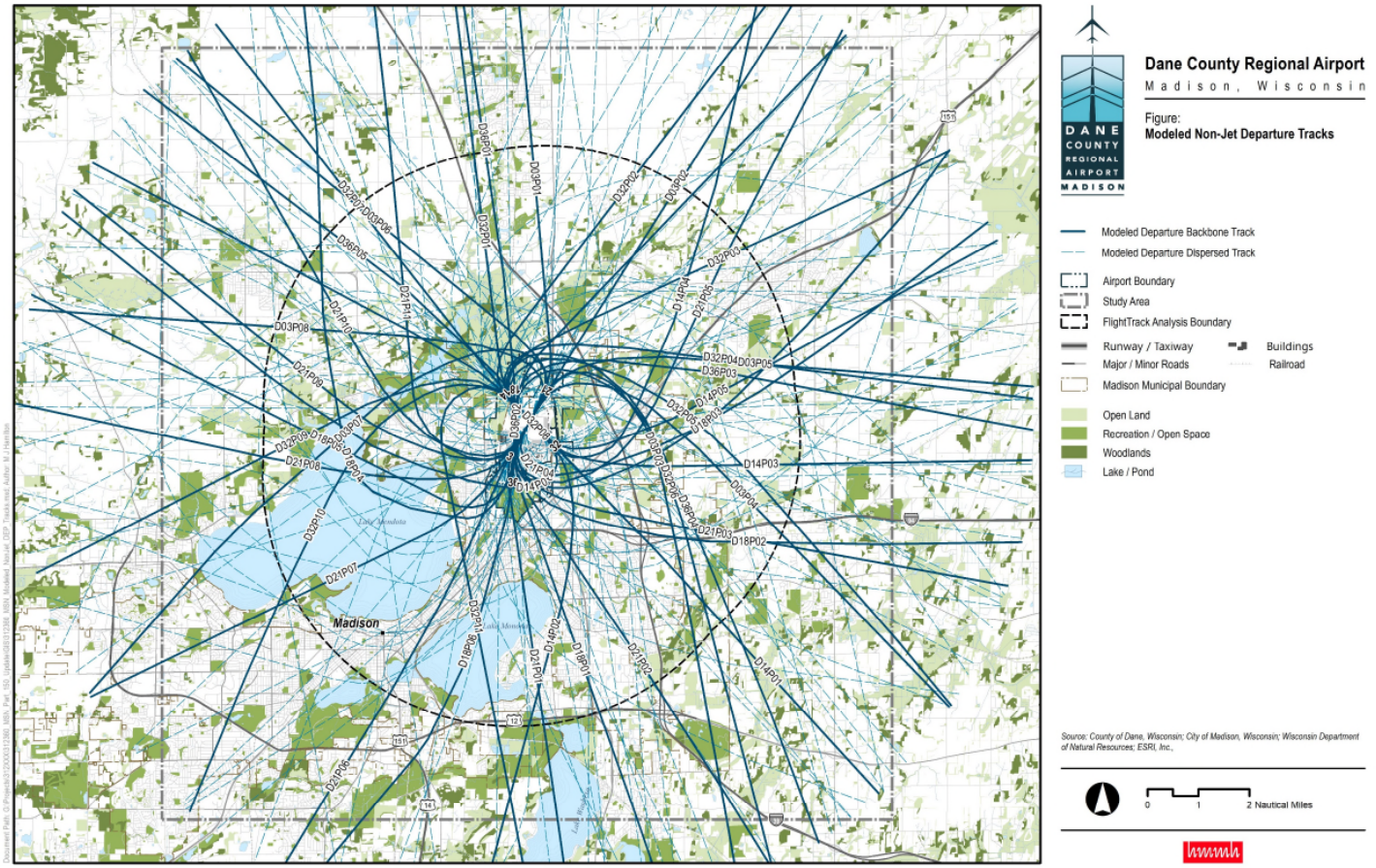
Departure Track Density



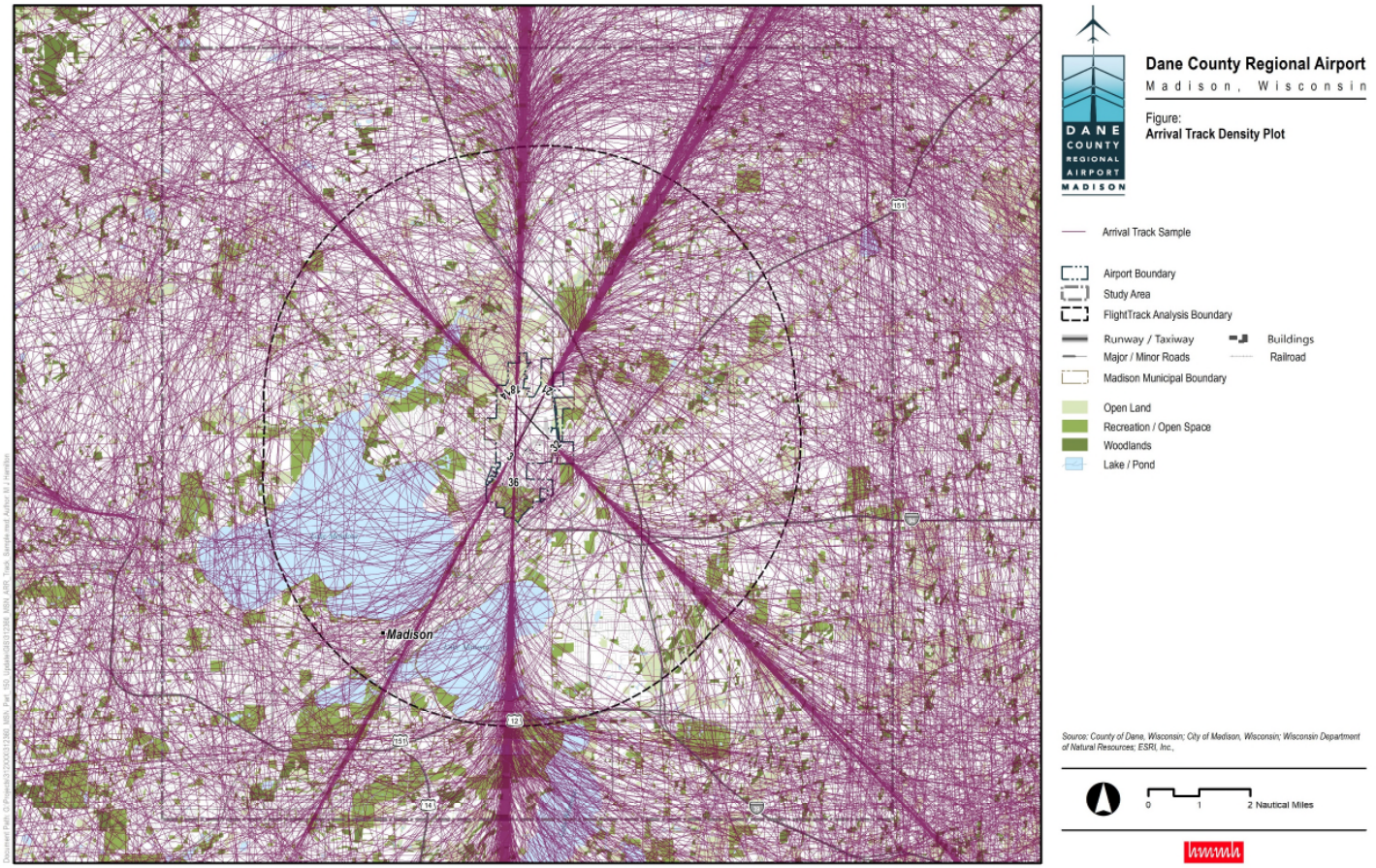
Jet Departure Model Tracks



Non-Jet Departure Tracks



Arrival Tracks Sample



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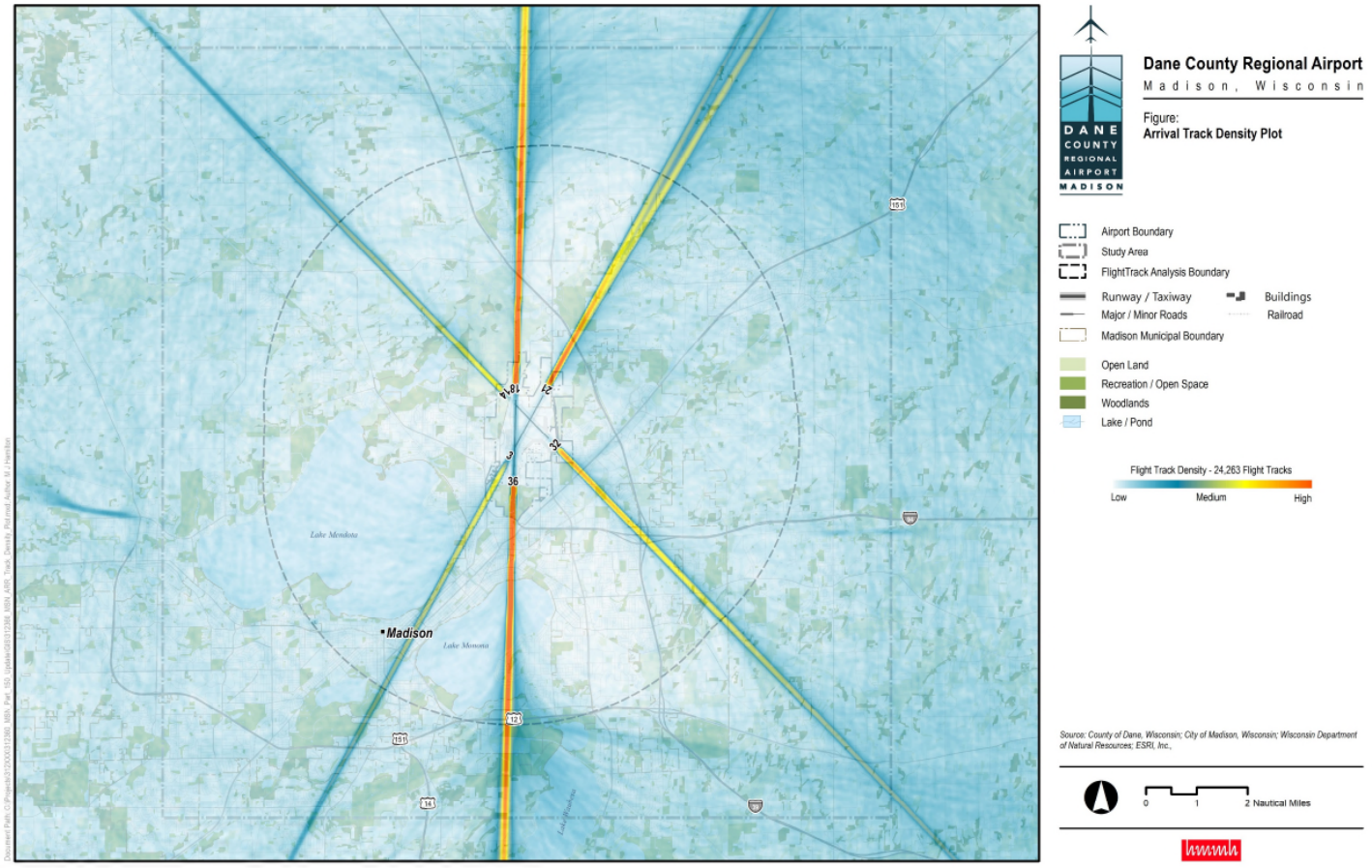
Arrival Track Density



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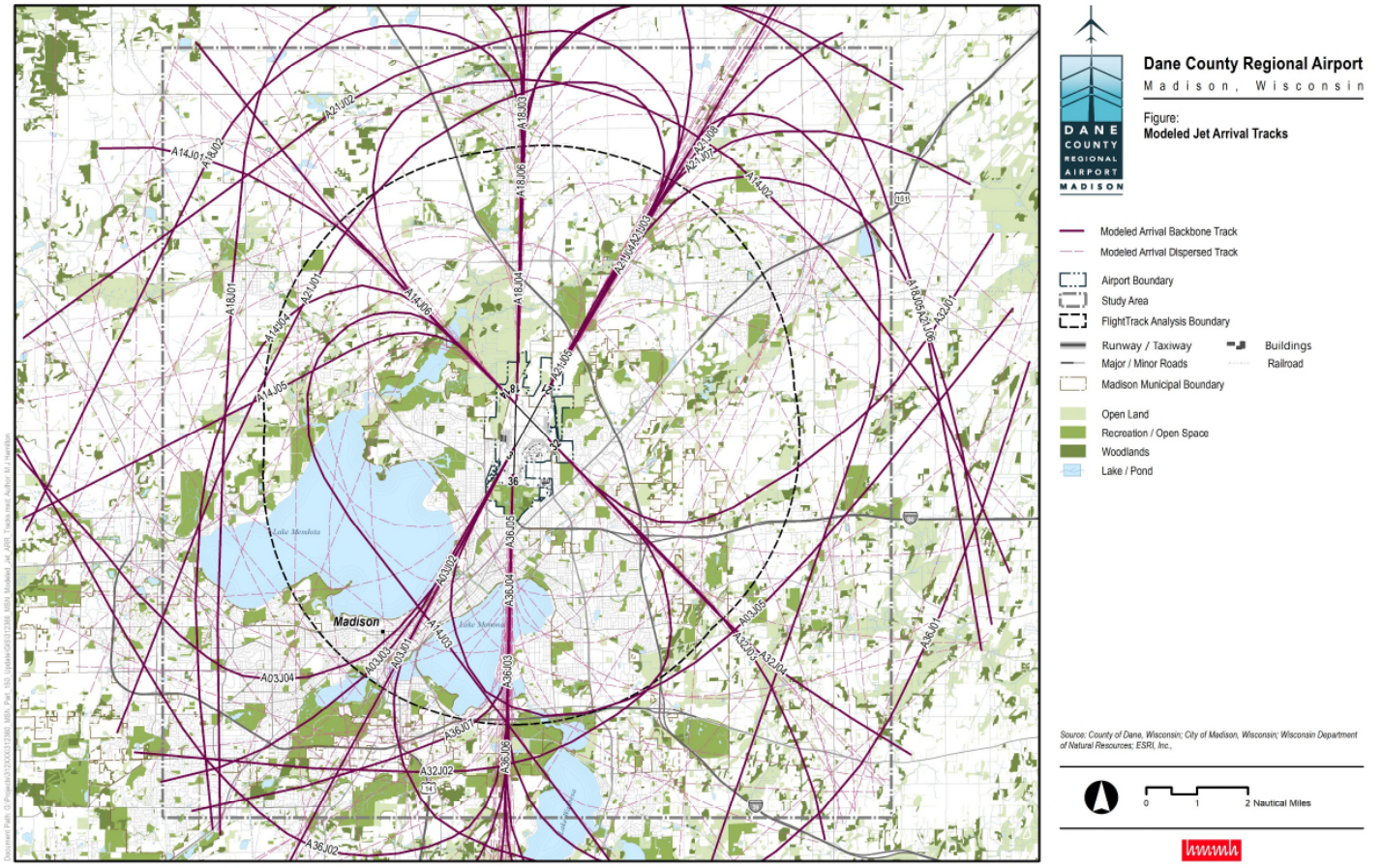
Jet Arrival Model Tracks



Dane County Regional Airport
Madison, Wisconsin

Figure:
Modeled Jet Arrival Tracks

- Modeled Arrival Backbone Track
- Modeled Arrival Dispersed Track
- Airport Boundary
- Study Area
- FlightTrack Analysis Boundary
- Runway / Taxiway
- Major / Minor Roads
- Madison Municipal Boundary
- Buildings
- Railroad
- Open Land
- Recreation / Open Space
- Woodlands
- Lake / Pond

Source: County of Dane, Wisconsin; City of Madison, Wisconsin; Wisconsin Department of Natural Resources; ESRI, Inc.,

0 1 2 Nautical Miles

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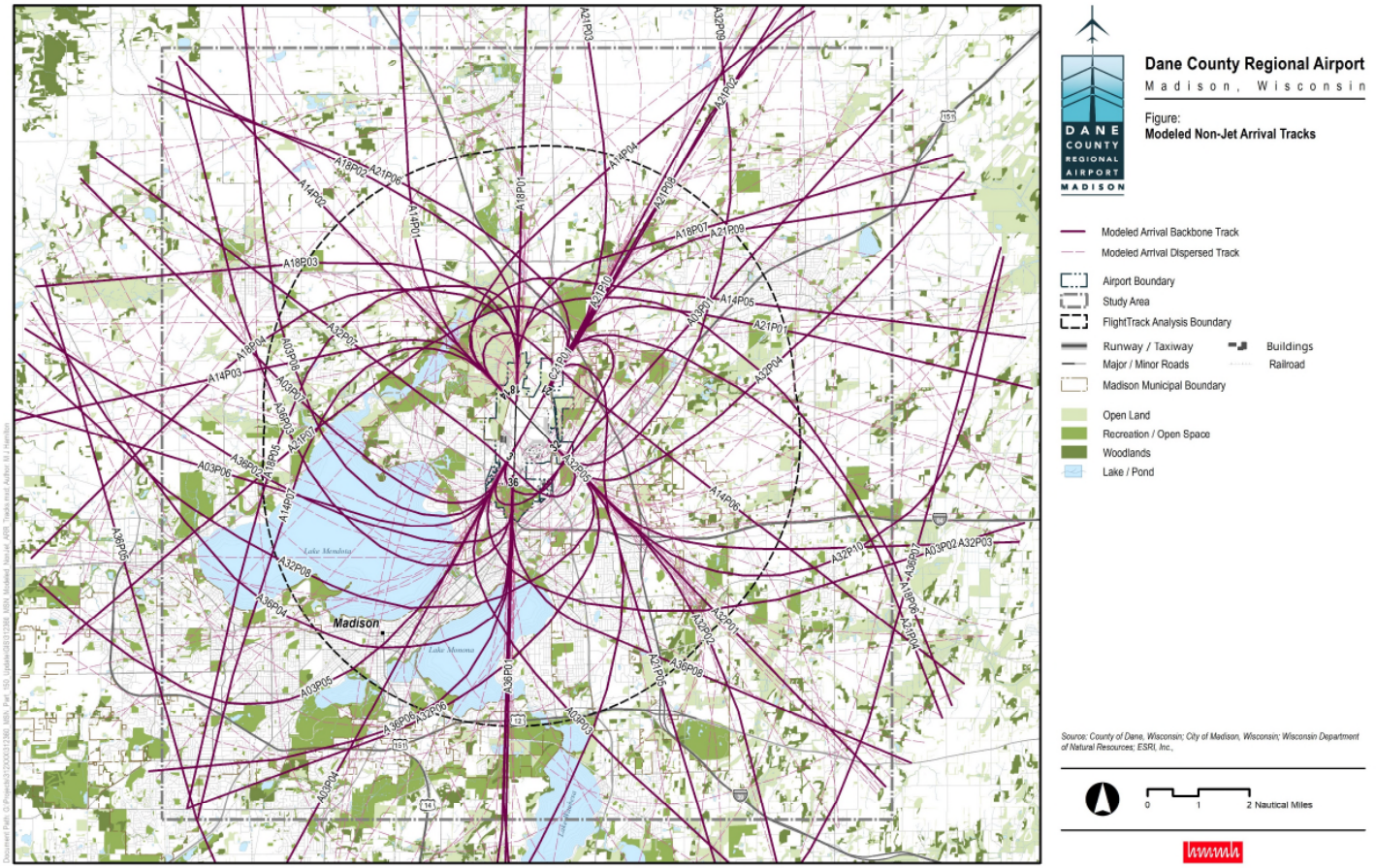
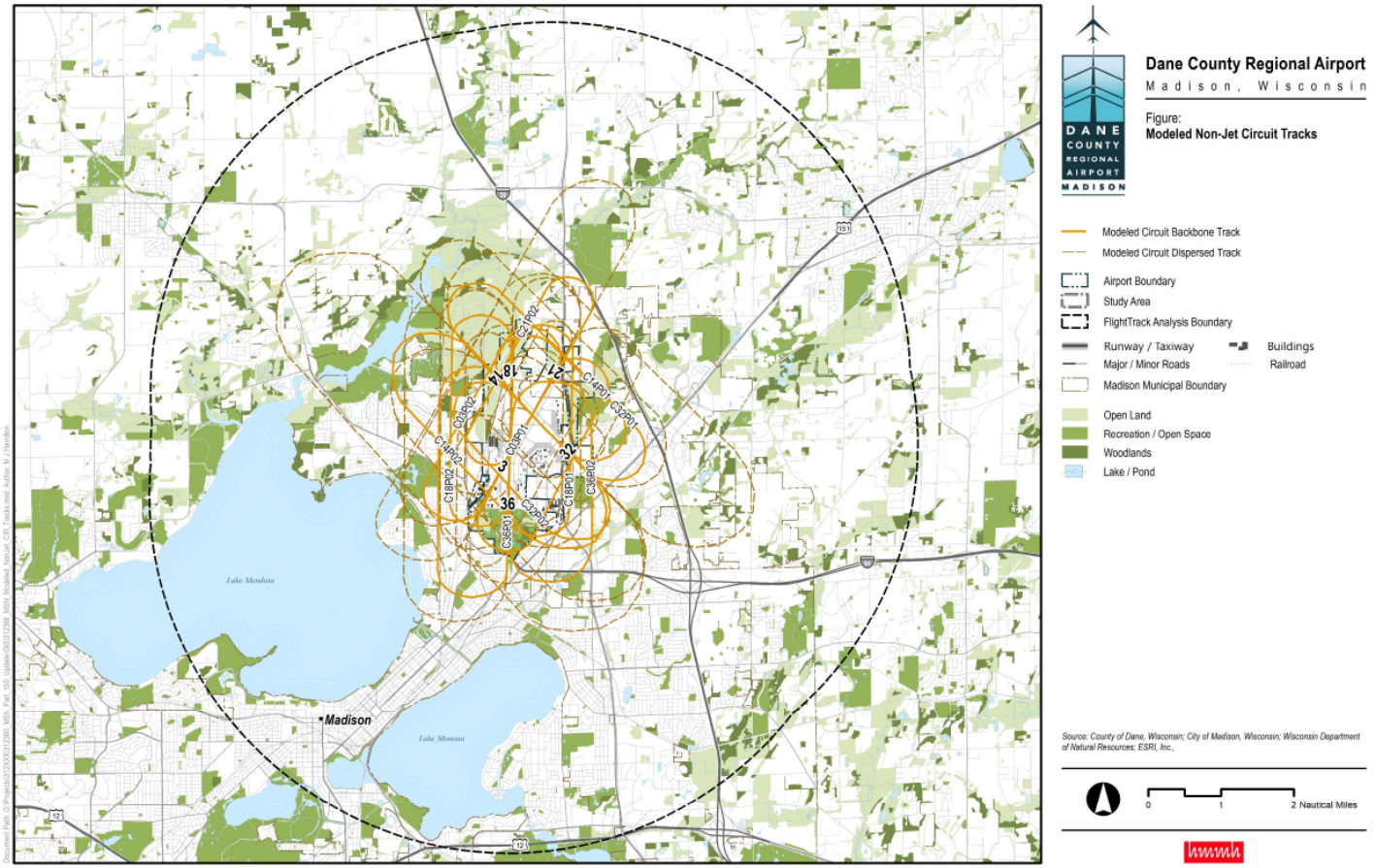
Non-jet Arrival Tracks



Non-Jet Circuit Tracks



Model Track Development Summary

- Process is repeated for arrivals and departures for each runway, aircraft type, direction, and track group
  - 724 tracks have been developed: 198 backbone and 526 sub-tracks

Runway	Arrival Tracks		Departure Tracks		Circuit Tracks	
	Back-bone	Sub-tracks	Back-bone	Sub-tracks	Back-bone	Sub-tracks
03	13	26	14	30	2	4
21	19	50	21	68	1	2
18	13	38	20	56	2	4
36	15	48	14	42	2	2
14	13	26	9	24	2	4
32	14	38	22	60	2	4
H1	1	0	1	0	0	0
Total	87	226	100	280	11	20

2022 Detailed Fleet Mix – Air Carrier

- *2022 Existing Year/Year of Submission Fleet Mix Assumptions*

Category	ANP ID	Aircraft Type	Total Operations
AC	A300-622R	Airbus widebody	771
AC	757PW	Boeing narrowbody	243
AC	757RR	Boeing narrowbody	233
AC	A320-271N	Airbus narrowbody	333
AC	A319-131	Airbus narrowbody	1,874
AC	A320-211	Airbus narrowbody	331
AC	717200	Boeing narrowbody	1,429
AC	737800	Boeing narrowbody	853
AC	CRJ9-ER	Canadair Regional Jet	10,293
AC	EMB170	Embraer Regional Jet	703
AC	EMB175	Embraer Regional Jet	2,638
TOTAL			19,702

Source: Mead & Hunt and HMMH

2022 Detailed Fleet Mix – Air Taxi

- *2022 Existing Year/Year of Submission Fleet Mix Assumptions*

Category	ANP ID	Aircraft Type	Total Operations
AT	EC130	C130 air taxi	17
AT	CNA182	Cessna piston	676
AT	CNA208	Cessna Piston	450
AT	FAL20	Business Jet	35
AT	BEC58P	Beechcraft piston	11
AT	CNA208	Cessna turboprop	434
AT	SD330	Short turboprop	501
AT	CNA680	Cessna Business Jet	917
AT	CL600	Canadair Regional Jet	553
AT	CNA55B	Cessna Business Jet	938
AT	CL600	Canadair Regional Jet	1,310
AT	EMB14L	Embraer Regional Jet	1,387
TOTAL			7,231

Source: Mead & Hunt and HMMH

2022 Detailed Fleet Mix – General Aviation

- *2022 Existing Year/Year of Submission Fleet Mix Assumptions*

Category	ANP ID	Aircraft Type	Total Operations
GA	A109	Helicopter	465
GA	MU3001	Mitsubishi Business Jet	401
GA	CNA525C	Cessna Business Jet	1,815
GA	CNA55B	Cessna Business Jet	618
GA	CNA560U	Cessna Business Jet	794
GA	CNA560XL	Cessna Business Jet	566
GA	CNA680	Cessna Business Jet	799
GA	CL600	Canadair Business Jet	652
GA	CL601	Canadair Business Jet	416
GA	EMB145	Embraer Business Jet	595
GA	CNA750	Cessna Business Jet	656
GA	FAL900EX	Falcon Business Jet	514
GA	GIV	Gulfstream Business Jet	547
GA	LEAR35	Lear Business Jet	1,684
GA	GASEPV	Single engine piston	4,851
GA	GASEPF	Single engine piston	5,569
GA	CNA172	Cessna piston	9,410
GA	CNA182	Cessna Piston	1,607
GA	BEC58P	Beechcraft piston	2,611
GA	PA28	Piper piston	7,738
GA	COMSEP	Single engine piston	1,237
GA	DHC6	DeHaviland turboprop	1,710
GA	CNA441	Cessna turboprop	680
GA	CNA208	Cessna turboprop	982
TOTAL			**46,917**

Source: Mead & Hunt and HMMH

Military Noise Modeling

Modeling 115 FW Operations

- Develop NoiseMap inputs
- Review EIS modeling files
- Current plan for operations/differences from EIS

Source: United States Air Force F-35A Operational Beddown - Air National Guard Environmental Impact Statement, Final – February 2020

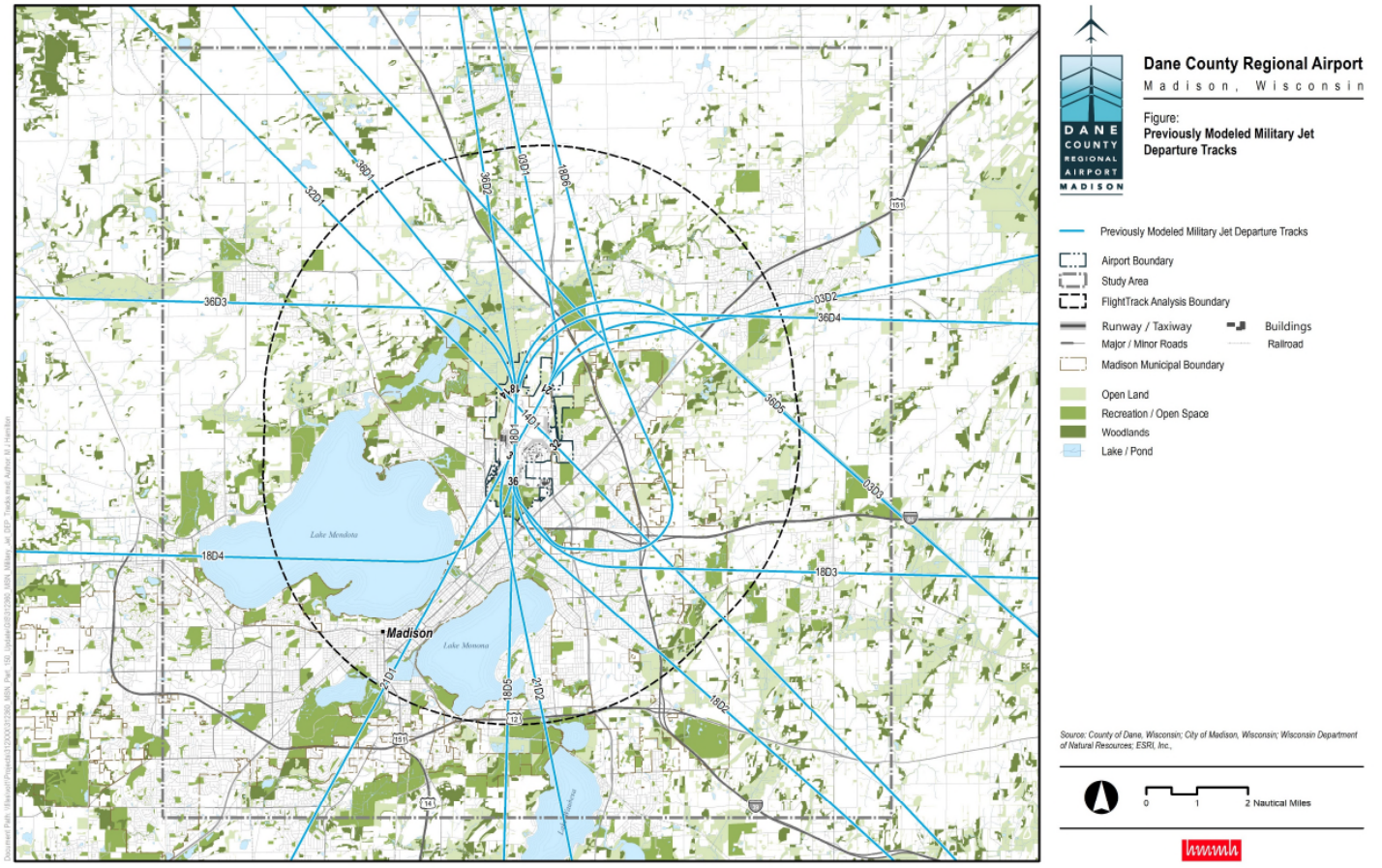
115 FW and Transient Military Data Needs

- **Who** is involved with the flights/ops:
  - Specified flying units
  - Maintenance
  - Transient aircraft
- **What** flights occur:
  - By aircraft/engine type
  - By operation type (departure, arrival, closed pattern, etc.)
  - Runup operations
- **When** flights occur:
  - Day (0700-2200), night (2200-0700)
- **Where** flights occur:
  - Flight tracks and track utilization
  - Runways/pads and utilization
- **How** flights operate:
  - Flight profiles – engine power, altitude, airspeed
  - Distribution (e.g., AB vs Mil)
  - Noise abatement procedures

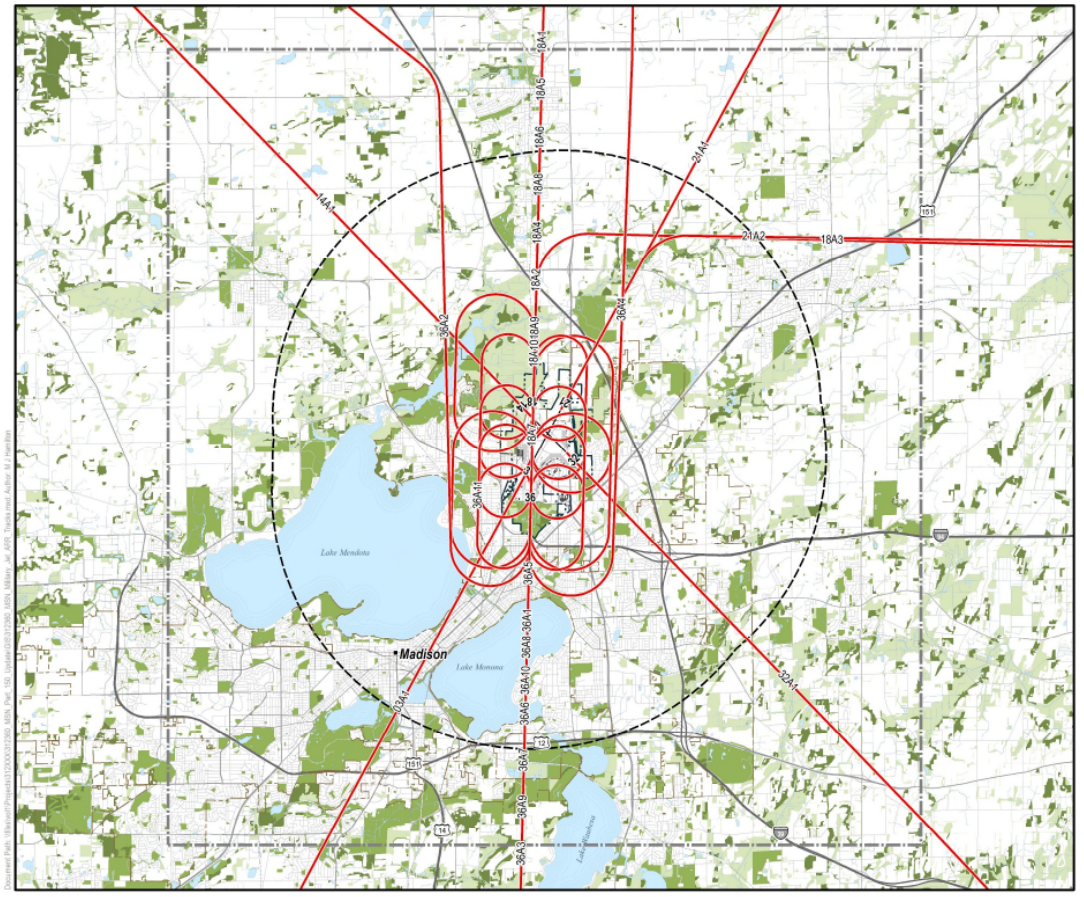
Detailed Fleet Mix – Military

EIS Alt	Based/ Transient	Aircraft
EIS Existing Condition / No Action	Based	F-16C (F110-GE-100)
		C-26
		RC-26
		UH60A
	Transient	TransFtr (F-16C, F110-GE-100)
		TransHvyCargo (C-17)
		TransHvyProp (C-130)
		TransTanker (KC-135)
EIS Proposed Action	Based	F-35A
		F-16C (F110-GE-100)
		C-26
		RC-26
		UH60A
	Transient	TransFtr (F-16C, F110-GE-100)
		TransHvyCargo (C-17)
		TransHvyProp (C-130)
		TransTanker (KC-135)
NEM Existing 2022	Based	F-35A
		F-16C (F110-GE-100) - CY22 Actual
		F-16C (F110-GE-100) - Pre-Drawdown
		C-26
		RC-26
		UH60A
	Transient	TransFtr (F-16C, F110-GE-100)
		TransHvyCargo (C-17)
		TransHvyProp (C-130)
		TransTanker (KC-135)
NEM Forecast 2027	Based	F-35A
		F-16C (F110-GE-100)
		C-26
		RC-26
		UH60A
	Transient	TransFtr (F-16C, F110-GE-100)
		TransHvyCargo (C-17)
		TransHvyProp (C-130)
		TransTanker (KC-135)

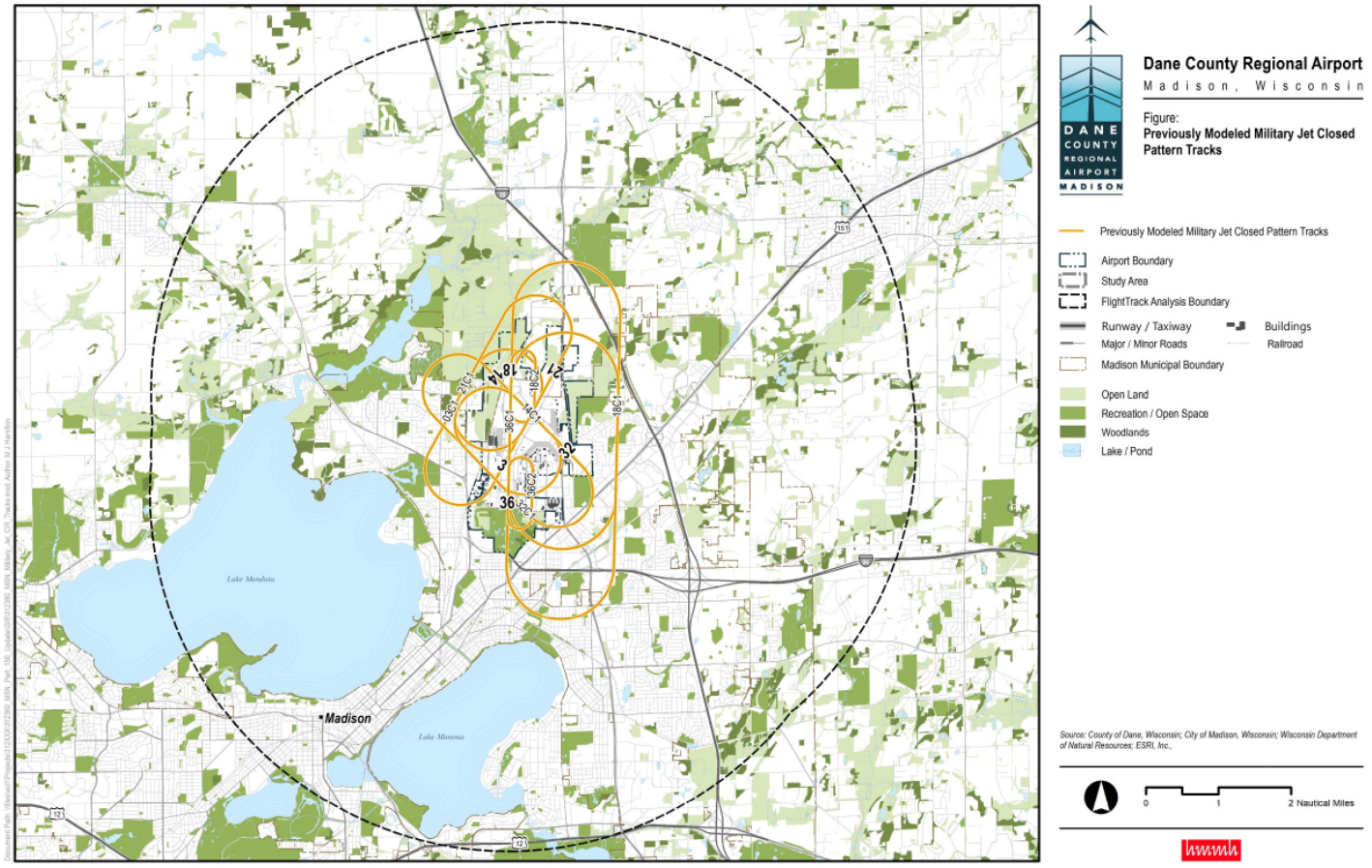
Military Jet Departure Tracks



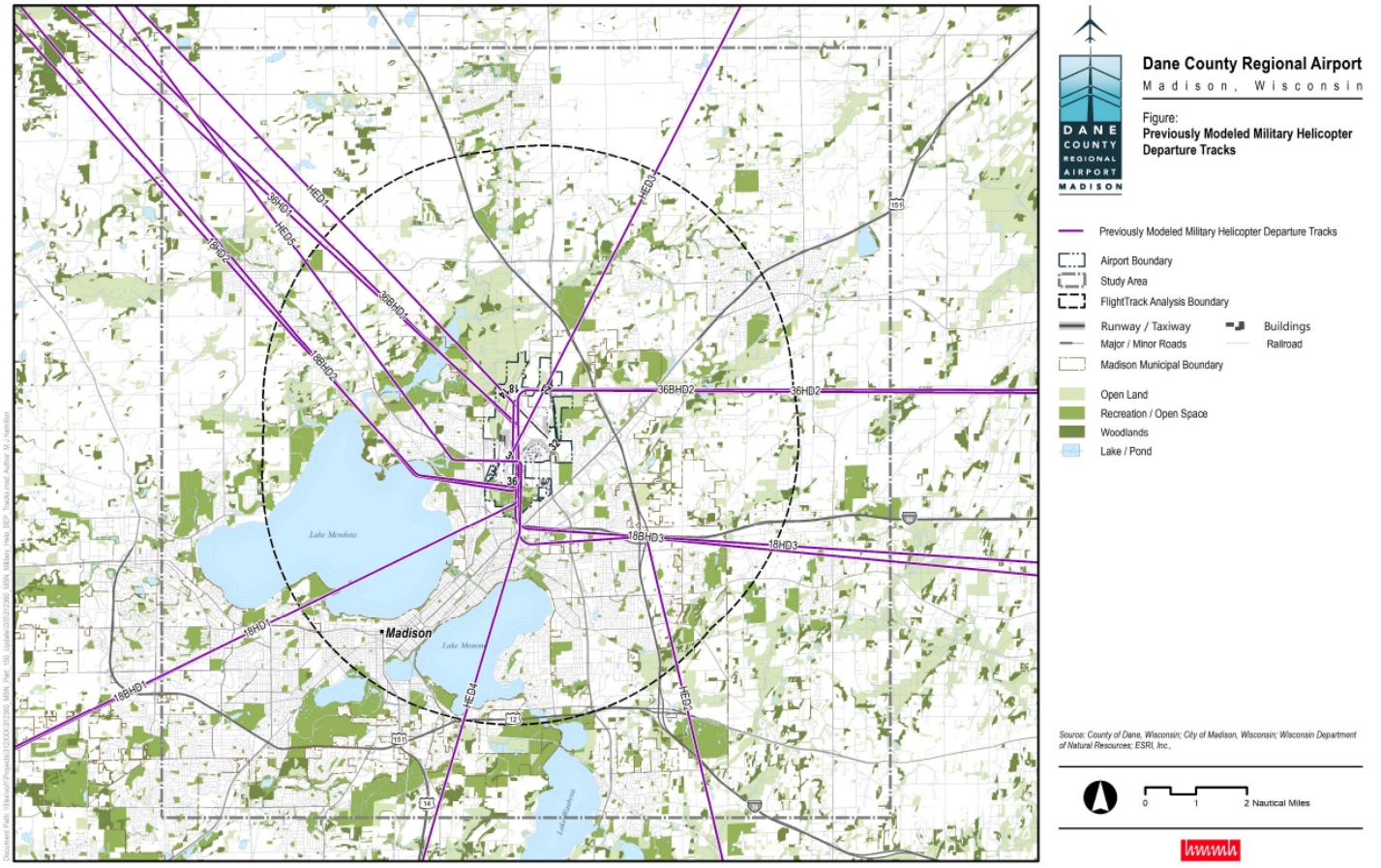
Military Jet Arrival Tracks



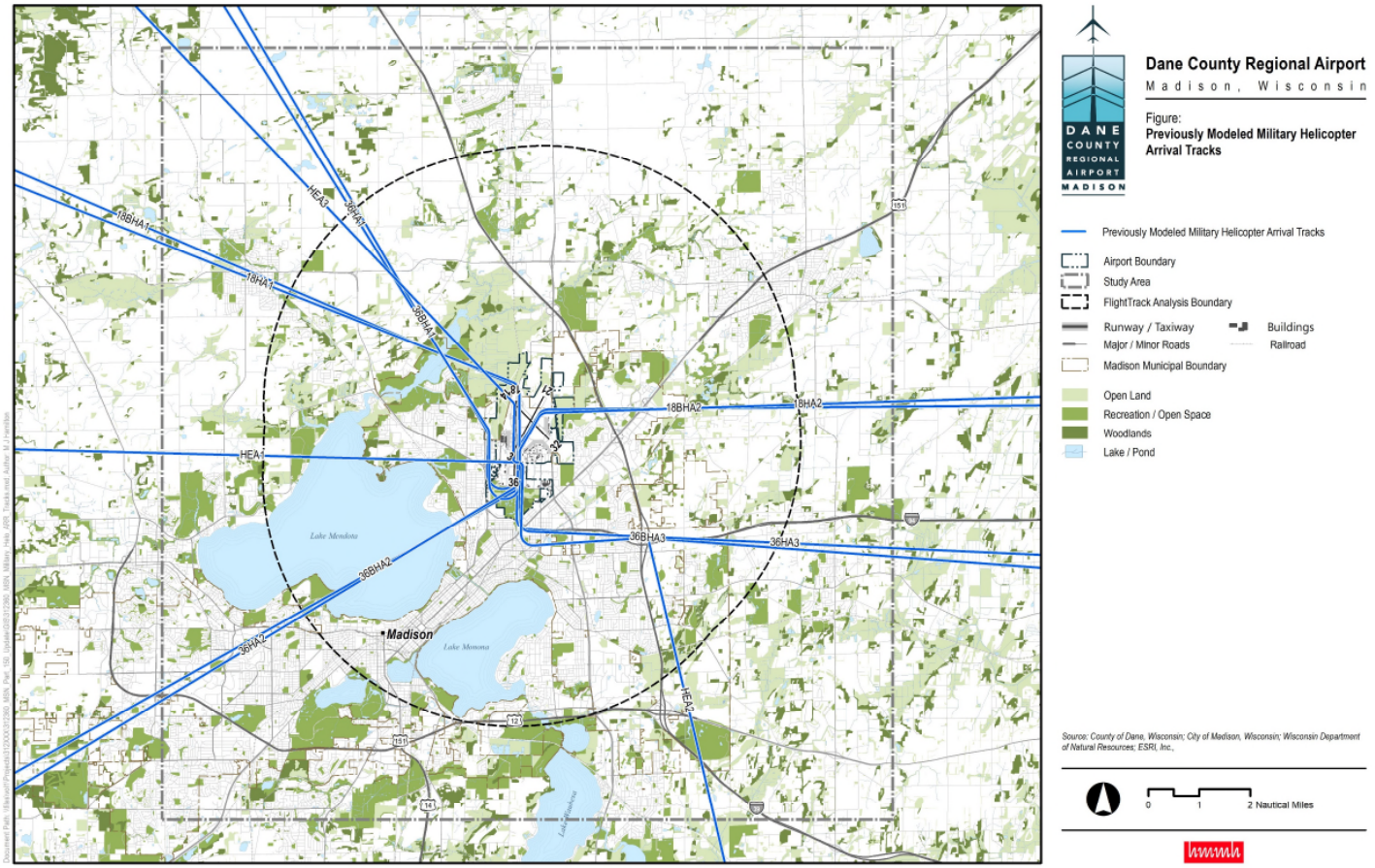
Military Jet Pattern Tracks



Military Helicopter Departure Tracks

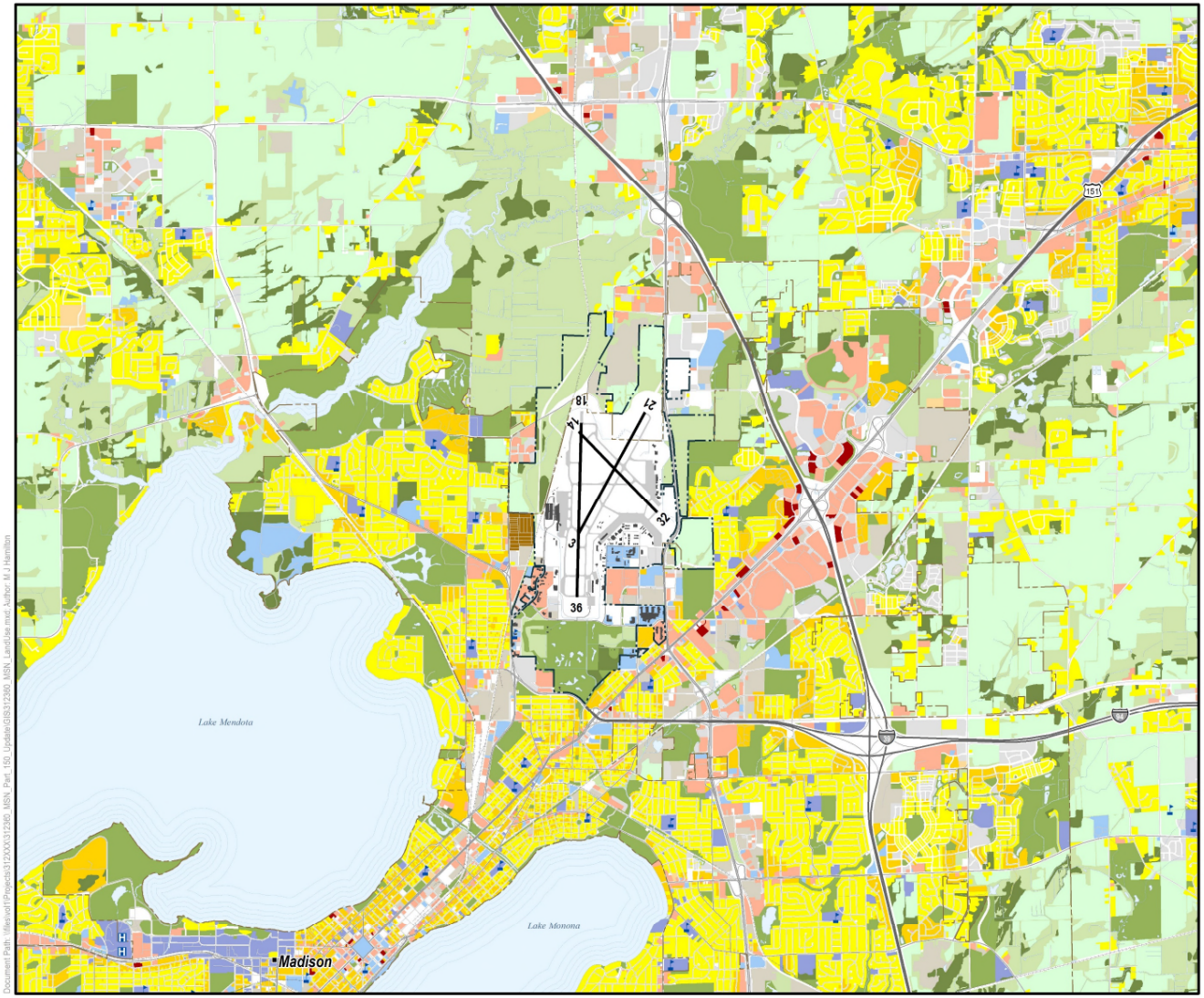


Military Helicopter Arrival Tracks



Land Use

- Primary data collection steps include:
  - Assemble and review land use, zoning, and population data
  - Identify any local land use policies that address airport operations
  - Create existing land use maps
- Locations of noise-sensitive sites (churches and schools) are noted
- Local jurisdictions to review maps and advise of necessary corrections
  - Assess any deficiencies of land use data and corrective approaches
- After DNL contours have been generated, the Study Team will survey and confirm land use within the 65 DNL contours



Dane County Regional Airport

Madison, Wisconsin

Figure:
Existing Land Use

- Airport Boundary
- Runway / Taxiway
- Major / Minor Roads
- Madison Municipal Boundary
- Buildings
- Railroad

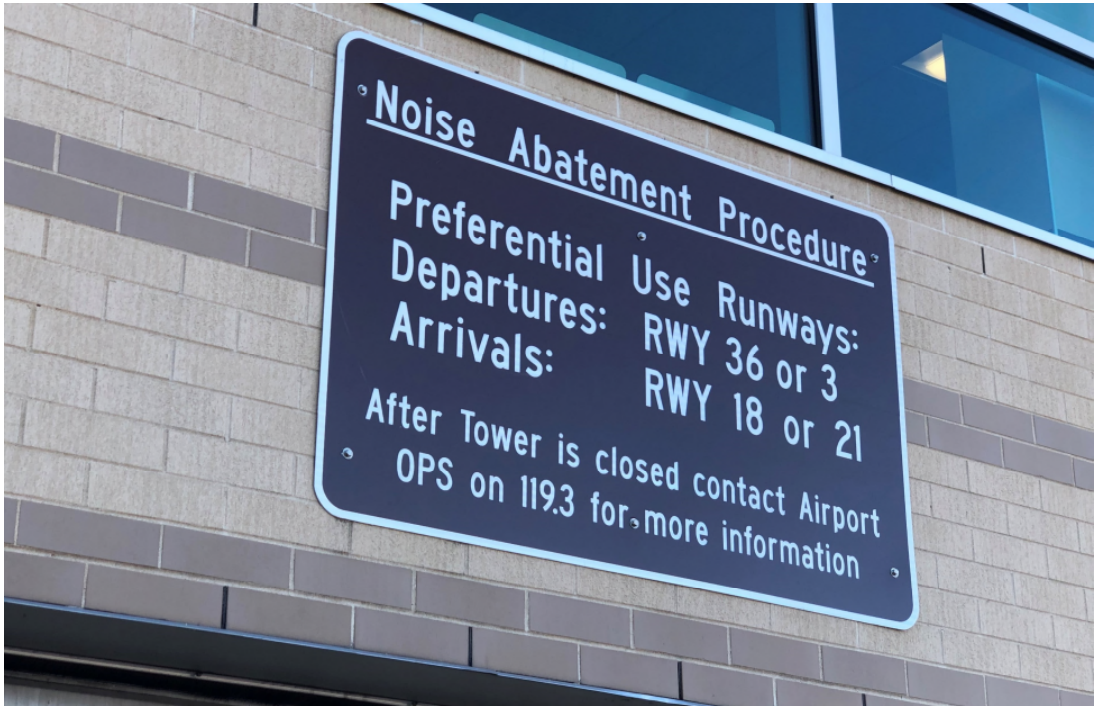
- Single Family Residential
- Multi-Family Residential
- Mobile Home
- Transient Lodging
- Mixed Use
- Public Use 1 (Non-Compatible)
- Public Use 2 (Compatible)
- Commercial Use
- Manufacturing and Production
- Agriculture
- Open Land
- Open Space / Recreation
- Woodlands
- Under Construction
- Vacant / Undefined
- Lake / Pond
- School
- Hospital

Source: County of Dane, Wisconsin; City of Madison, Wisconsin; Wisconsin Department of Natural Resources; ESRI, Inc.,

0 5,000 10,000 Feet

NCP Review

- 1991 MSN NCP included:
  - Noise abatement measures (9)
  - Land use measures (11)
  - Programmatic measures (3)



Noise Abatement Measures (NA)

	Name	Approval Status
NA-1	Continue the existing informal runway use program.	Approved as a voluntary measure, in part
NA-2	Maintain internal tower directive requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet AGL) before turning left.	Approved in part
NA-3	Establish visual approach and departure corridors for helicopters.	Approved in part
NA-4	Encourage use of noise abatement departure procedures by operators of jet aircraft.	Approved as a voluntary measure
NA-5	Encourage Air National Guard to follow through with its plans to construct a hush house for A-16 engine maintenance runups prior to converting its fleet.	Approved as a voluntary measure
NA-6	Construct new 6,500-foot Runway 3-21.	Approved
NA-7	Adopt an informal preferential runway use system which encourages departures on Runways 3, 31, and 36 while preferring arrivals on Runways 13, 18, and 21.	Approved as a voluntary measure, in part
NA-8	Adopt procedures requiring east and southbound aircraft exceeding 12,500 pounds and departing Runway 3 to climb on runway heading through 2,500 feel MSL before turning right.	Approved in part
NA-9	Adopt procedures requiting all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable.	Approved in part

Land Use Measures(LU)

	Name	Approval Status
LU-1	City of Madison, Dane County – Maintain Exiting Compatible Zoning in the Airport Vicinity.	Approved
LU-2	Dane County, City of Madison, Town of Burke – Define "Airport Affect Area" for Purposes of Implementing Wisconsin Act 136.	Approved
LU-3	Dane County, City of Madison – Adopt Airport Noise Overlay Zoning.	Approved
LU-4	Dane County, City of Madison – Amend Subdivision Regulations to Require Dedication of Noise and Avigation Easements or Plat Notes on Final Plat.	Approved
LU-5	Dane County – Consider Amending Subdivision Regulations to Prevent Subdivision of Land Zoned A-1 Agriculture	Approved
LU-6	Dane County, City of Madison – Amend Building Codes to Provide Soundproofing Standards for Noise-Sensitive Development in Airport Noise Overlay Zones.	Approved
LU-7	Dane County, City of Madison, Town of Burke – Amend Local Land Use Plans to Reflect Noise Compatibility Plan Recommendations and Establish Airport Compatibility Criteria for Project Review.	Approved
LU-8	Dane County – Follow through with Planned Land Acquisition in Cherokee Marsh and Token Creek Park Areas.	Approved
LU-9	Dane County – Consider Expanding Land Acquisition Boundaries in Cherokee Marsh and Token Creek Park Areas.	Approved
LU-10	Dane County – Establish Sales Assistance or Purchase Assurance Program for Homes Impacted by Noise Above DNL 70 dB.	Approved
LU-11	Dane County – Install Sound Insulation for Schools Impacted by Noise Above DNL 65 dB	Approved

Program Management Measures (PM)

- 1991 MSN NCP titled PM measures as “Continuing Program” measures

	Name	Approval Status
CP-1	Program Monitoring and Contour Updating	Approved
CP-2	Evaluation and Update of the Plan	Approved
CP-3	Complaint Response	Approved

Next Steps

- Finalize noise model inputs after FAA forecast approval
- Generate noise contours with AEDT and NoiseMAP
- Assess land use and population within contours
- Develop draft Noise Exposure Maps and report
- Review existing noise abatement measures
- Review existing land use measures
- Review existing programmatic measures
- Develop NCP Update

Proposed Schedule: Phase 1

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
Kick-Off Meeting with MSN and the Part 150 Team	Define organizational and procedural matters and public outreach, review and refine scope and schedule details.	January 20, 2022
1st Technical Advisory Committee Meeting	Introduction to Part 150, discuss stakeholder roles, identify issues of concern	April 26, 2022
1st Public Open House	Introduction to Part 150, set expectations, discuss stakeholder roles, identify issues of concern	April 26, 2022
2nd Technical Advisory Committee Meeting	Discussion on Aviation forecasts, F35 Operations, and noise modeling inputs	July 2022
3rd Technical Advisory Committee Meeting	Noise modeling results and presentation of the draft NEM Update	October 2022
NEM Public Comment Period and 2nd Public Open House	NEM thirty-day public comment period and second Public Open House	Oct/Nov 2022
MSN to Submit Final NEM to FAA	MSN submits final updated NEM to FAA for review and approval. Respond to FAA questions as needed.	December 2022

Note: Schedule is subject to change

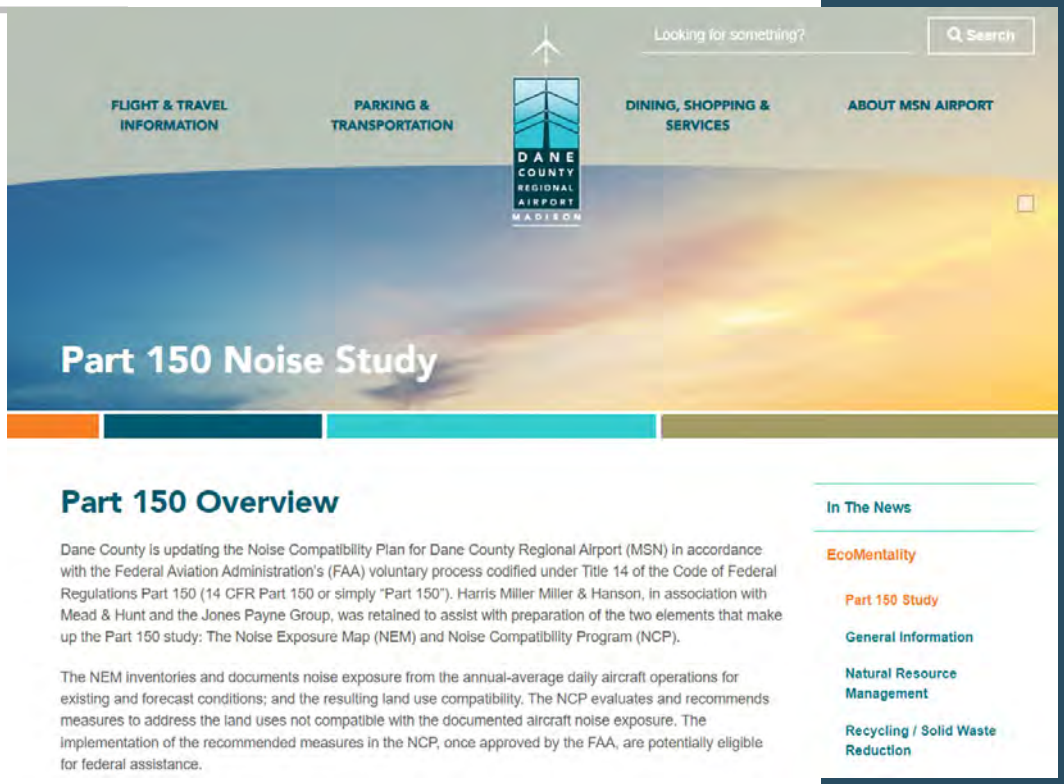
Proposed Schedule: Phase 2

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
4th Technical Advisory Committee Meeting	Review of the existing Noise Compatibility Program (NCP) and discussion of Potential changes to the Noise Compatibility Program	1st Quarter 2023
5th Technical Advisory Committee Meeting	Evaluation results of the proposed Noise Compatibility Program measures	2nd Quarter 2023
6th Technical Advisory Committee Meeting	Presentation of the draft Noise Compatibility Program Update	3rd Quarter 2023
NCP Public Comment Period, 3rd Public Open House, and NCP hearing	NCP thirty-day public comment period and third Public Open House and NCP Hearing.	4th Quarter 2023
MSN to Submit Final NCP to FAA	MSN submits final updated NCP to FAA for review and approval. Respond to FAA questions as needed.	1st Quarter 2024

Note: Schedule is subject to change

MSN Part 150 Study Website and Project Contacts

- Website: https://www.msnairport.com/about/ecomentality/Part-150-Study
- Project email address: part150study@msnairport.com
- Tim Middleton – HMMH Project Manager, Contact: tmiddleton@hmmh.com 339.234.2816
- Michael Kirchner – MSN Engineering Director, Contact: kirchner@msnairport.com 608.279.0449



Wrap Up

- Next TAC meeting:
  - October/November 2022
  - Location: Dane County Regional Airport
  - Primary topic – Presentation of the existing and five-year condition Noise Exposure Maps (NEMs) and brainstorming of NCP measures (followed by the NEM workshop)
- TAC questions, comments, and discussion
- Public Comments

TAC Member Discussion

HMMH
700 District Avenue, Suite 800
Burlington, MA 01803
781.229.0707

MEMORANDUM

Subject: Dane County Regional Airport
Part 150 Study
TAC Meeting 2 Summary

Meeting Date: Tuesday July 26th, 2022

Reference: HMMH Project Number 312360

TAC Member Attendance:

Organization	TAC Member	Attendance
MSN staff	Michael Kirchner	Yes
WBOA staff	Matt Messina	Yes
WBOA staff	Kelly Halada	Yes
WBOA staff	Mallory Palmer	Yes
Federal Aviation Administration (FAA) Airport District Office (ADO)	Bobb Beauchamp	Yes, virtually
FAA Air Traffic Control Tower (ATCT)	John Vagedes	Yes, virtually
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Dan Statz	Yes
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Ben Gerds	Yes
Army Guard	Major Lucas Sivertson	Yes
Delta Airlines	Jason Pace	No
Wisconsin Aviation	Brian Olson	No
City of Madison Planning Division	Dan McAuliffe	No
Dane County Department of Planning and Development	Todd Violante	Yes

Study Team Members Attendance:

Organization	TAC Member	Attendance
MSN staff	Michael Riechers	Yes
MSN staff	Tomasz Pajor	No
Jones Payne Group	Diane Carter	Yes
Jones Payne Group	Brianna Whiteman	Yes
HMMH	Tim Middleton	Yes
HMMH	Gene Reindel	Yes
HMMH	Julia Nagy	No

Mead & Hunt	Chris Reis	Yes
Mead & Hunt	Ryan Hayes	Yes
Mead & Hunt	Kate Andrus	No
Mead & Hunt	Levi Ney	No
Mead & Hunt	Ryk Dunkelberg	No

Meeting summary notes:

Tim Middleton (HMMH) provided opening remarks, after which the TAC and study team members introduced themselves. Middleton then began the presentation by reviewing the overall Part 150 study process and the roles & responsibilities of the TAC members. He provided some background details on Dane County Regional Airport (MSN) and reiterated that the assignment of F-35s to the 115th Fighter Wing was the reason the airport decided to move forward with an NEM and NCP update.

Ryan Hayes (Mead & Hunt) then discussed the operations forecast for the NEM existing year (2022) and forecast year (2027). He explained that the Terminal Area Forecast (TAF) is the FAA's official operations forecast, and that per Mead & Hunt's analysis, the TAF is a valid forecast for MSN. He went on to explain that while the TAF is valid, it does not account for nighttime airport operations when the ATCT is closed (11:00 pm to 6:00 am), which is about 2% of operations.

Action: As nighttime operations (between 10:00pm and 7:00am) receive a 10 dB penalty in DNL metrics, it is particularly important nighttime operations are included in the NEM. Hayes confirmed nighttime operations will be included.

Hayes continued on to explain the process of the TAF verification and provided details to the TAC regarding forecasted passenger enplanements, operations, and economic growth. He confirmed the TAF information was compared to MSN records and aviation trends forecasts. He also confirmed that the while the military numbers are based on TAF data, those numbers will be refined based on conversations with the ATCT and 115th Fighter Wing as part of the NEM update.

Lt Col Dan Statz inquired as to how the impact of COVID-19 is reflected in the TAF, and how it will be reflected in the NEM update. Hayes confirmed the FAA revised the TAF to account for pandemic affects.

Action: Gene Reindel and Middleton verified that the study team will request the FAA consider the impacts of COVID in similar fashion as they do with a runway closure and recommend to the FAA that the NEM show operations reflective of when the 115th Fighter Wing was operating at full capacity, and not associated with the draw-down of the F-16 as well.

Michael Riechers asked if newly added gates and additional capacity will be included in the forecast. Hayes confirmed both will be included.

Middleton then gave a noise modeling overview. He explained that the use of FAA's Aviation Environmental Design Tool (AEDT) noise modeling software is required for civilian modeling. Per Reindel, the Air Force NoiseMap software will be used to model military operations.

A discussion was held regarding the anticipated differences between the EIS projections and the NEM forecasts. Lt Col Statz inquired as how the study will show the different software used for each study isn't responsible for variance. Middleton confirmed the software used for the EIS will not be used by the study team for comparison's sake, and that the reasons for variance will need to be clearly explained to the public.

Reindel confirmed that ground noise sources such as run ups will be included in the modeling; F-35s have a longer run up time of 20-30 minutes. Middleton confirmed helicopters will also be included in the noise modeling.

Middleton then reviewed the modeling process, explaining how AEDT creates a grid with points, and that the software operates by connecting the points to create the noise contours. He further reviewed the AEDT physical input and operational requirements. While reviewing runway use, he explained that modeling begins and ends 30,000 feet in flight track length from each end of a runway, and that civilian runway use modeling is developed from National Offload Program (NOP) data and System Wide Information Management (SWIM) data. The TAC confirmed preferential north flow is a current noise abatement procedure, and that Runway 18/36 was closed for part of this year; as inputs are developed from 2021 operation levels, this Runway closure does not impact the modeling process.

The TAC confirmed MSN has an airport field elevation (AFE) of 880 ft. The 115th Fighter Wing confirmed there is a hush house, but asserted less maintenance is needed for the F-35s versus the F-16s.

Riechers asked how a new airline joining MSN might affect the study, and if it would throw off the modeling. Per Middleton it would not, because the TAF generally includes industry trends and the model is focused on aircraft types rather than specific airlines that may fly such aircraft. Per Hayes, the commercial operations forecast takes such changes into account. Reindel added that such changes are also the basis of the FAA's recommendation that the NEM be updated every 5 years, or when significant changes to operations occur.

Middleton then reviewed preliminary flight track modeling. Lt Col Statz asked how these flight tracks compare with those in the EIS. Middleton replied that the tracks shown are only civilian, not military.

Action: HMMH comparison of EIS tracks is forthcoming. Per Reindel, this level of detail isn't FAA-required but is provided to address community concerns and provide transparency.

Middleton continued through a review of the different types of tracks developed and the fleet mix that was analyzed.

Following a short break, Middleton resumed the meeting with an overview of the modeling efforts for the 115th Fighter Wing as well as transient military operations. The modeling is based on known operations; Middleton asserted that any additional information and input from the 115th allows for the development of potentially better noise abatement measures.

Reindel requested the 115th's percentage use of afterburners.

Action: Lt Col Ben Gerds stated the 158th Fighter Wing (based at BTV) has only used afterburners once. For the 115th Fighter Wing a 5% afterburner usage was included in the EIS, but it could be reduced to 1%, and only those aircraft departing Runway 3.

Riechers asked how transient military afterburner usage would be detailed, given that F-18s use afterburners.

Action: HMMH to review internally and report back to TAC.

Middleton concluded the modeling discussion with a review of tracks based off the EIS and conversations with the 115th Fighter Wing. Major Lucas Sivertson confirmed the use of helicopter noise abatement points, used for both arrivals and departures.

The meeting then moved to a discussion of the NCP update. Tim Middleton described the NCP review and update process and confirmed a windshield survey will be performed to verify the land uses as shown in the forecast NEM contour.

Riechers shared that the City of Madison recently voted to rezone land south of MSN; it is anticipated there will be 60 low-income, multifamily units.

Action: MSN to provide article/link.

Michael Kirchner shared that the charter school on MSN property will be expanding. Per Reindel, the school is already considered compatible because it is on MSN property. He continued on to explain that it will be important to verify the noncompatible land uses so that they can be fully addressed in the upcoming NCP update.

Tim Middleton confirmed that NCP measure implementation status, potential changes, and recommendations will be addressed at the next TAC meeting.

Lt Col Gerds emphasized that the NEM contours will likely be significantly different from the EIS, and that there is a potential for the community to be upset. Reindel and Diane Carter agreed that there is a need for clear communication with the public, and a management of community expectations. Carter emphasized that the potentially long life span of MSN's noise mitigation program will need to be understood by the public, citing examples of other noise mitigation programs.

There was a discussion regarding the nature of a Part 150 study, which is focused on land use, not noise annoyance. Reindel confirmed that the NCP will discuss timing of implementation for program measures, as well as funding needs. The schedule of implementation is subject to change and is largely dependent on the availability of funding.

Action: Todd Violante (City of Madison) asked if ideas for land use measures can be sent to the team. It was confirmed ideas should be sent to HMMH for dissemination to the larger study team. New ideas will also be discussed at the next TAC meeting for consideration.

Riechers emphasized that noise monitoring is a big community concern, both politically and for the general public. Reindel asserted that noise monitoring data cannot be used to determine the noise contour. The FAA requires modeling as it is universal at all airports, and because it is impossible to monitor noise at every home or point on the map for an entire year. Middleton elaborated that you cannot measure noise levels of the future, and that modeling allows for only intentional input: no external influences, no non-flight noise, etc.

Middleton then reviewed the project schedule, anticipating the next TAC meeting to be in October and the next Public workshop to be in November, within the 30-day public review period. There was a discussion around how to address public questions & comments; they will be addressed in NEM documentation, but the website can be updated if FAQs need to be added.

Action: Matt Messina suggested, and it was agreed, that the noise study email autoreply should include direction to the project website.

Action: Gene Reindel requested the TAC review the meeting presentation and proposed data to be used in the NEM and provide feedback to the study team within two to three weeks.

Meeting adjourned.

MSN Part 150 Study

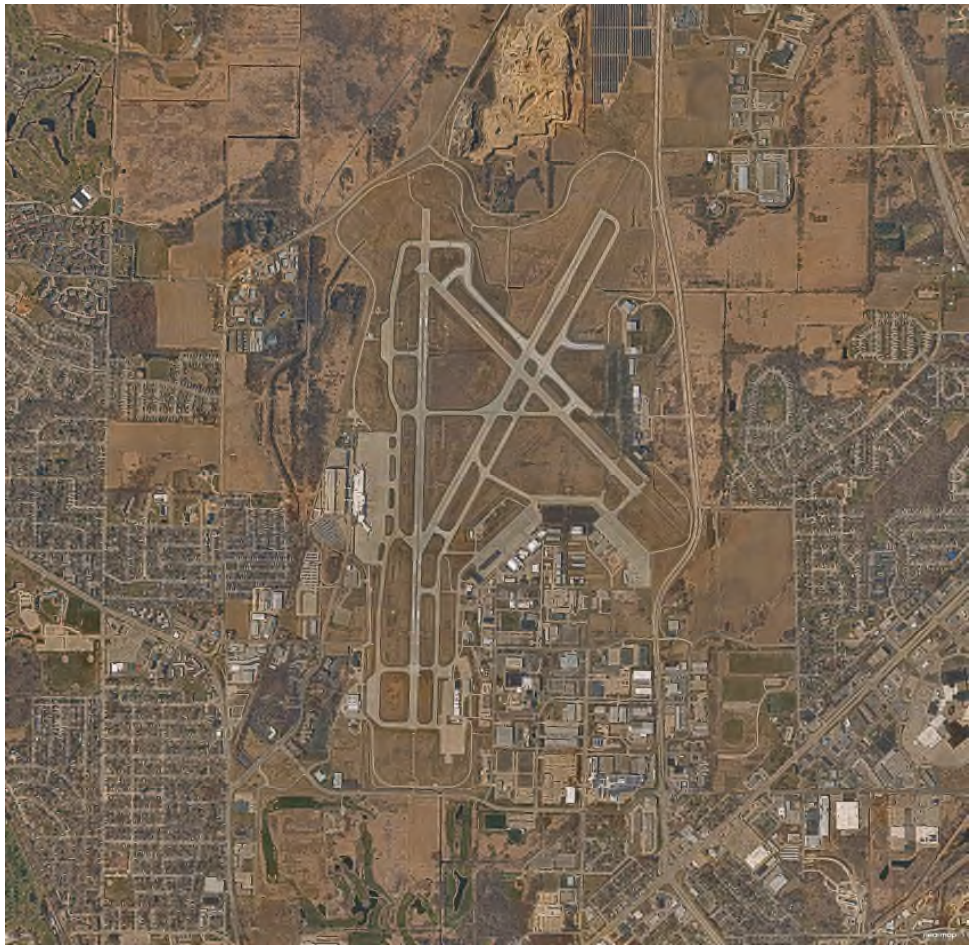
Dane County Regional Airport

Technical Advisory Committee Meeting #3

October 18, 2022

TAC #3 Agenda

- Introductions
- Roles & Responsibilities
- Part 150 Overview
- Land Use
- Implementation Status of NCP Measures
- Noise Model Inputs
- Preliminary Draft Noise Exposure Maps
- NEM Public Workshop #2
- Wrap up & Discussion
- Review Current NCP Measures (time permitting)



Source: NearMap USA, April 2021

Introductions – Study Team

Dane County Regional Airport Team

- Wisconsin Department of Transportation Bureau of Aeronautics
  - Matt Messina – Airport Development Engineer
- Airport (MSN)
  - Kim Jones – Airport Director
  - Michael Kirchner – Engineering Director
  - Lowell Wright – Airport Noise Abatement/ Environmental Officer

Project Team

- HMMH
  - Gene Reindel – Principal-in-Charge
  - Tim Middleton – Project Manager
  - Julia Nagy – Assistant Project Manager
- Mead & Hunt
  - Kate Andrus – Project Lead, Airport Planning and Forecasts
  - Ryan Hayes – Airport Planning and Forecasts
  - Chris Reis – Local Client Lead
  - Ryk Dunkelberg - Vice President
- The Jones Payne Group
  - Diane Carter – Project Lead, Principal-in-Charge
  - Brianna Whiteman – Assistant Project Manager, QA/QC

Introductions – TAC Members

Organization	TAC Member
MSN staff	Michael Kirchner
WBOA staff	Matt Messina
FAA Airport District Office (ADO)	Bobb Beauchamp
FAA Air Traffic Control Tower (ATCT)	John Vagedes
Wisconsin Air National Guard; 115th Fighter Wing Representative	Lt Col Daniel Statz
Army Guard	Major Lucas Sivertson
Delta Airlines	Abby McCoy and Rodney Dunkel
Wisconsin Aviation	Brian Olson
City of Madison Planning Division	Dan McAuliffe
Dane County Department of Planning and Development	Todd Violante
Town of Burke	

Roles and Responsibilities

Airport

- Project sponsor
- Certification that documentation is true and accurate
- Recommend measures to address incompatible land use

Consultant Team

- Overall project management, documentation, and outreach
- Aircraft noise analysis and abatement planning
- Noise compatibility analysis and planning
- Aviation forecast and airfield analysis

FAA

- Certification that the documentation meets federal regulations and guidelines
- Approval of Airport-recommended measures

Technical Advisory Committee

- Review study inputs, assumptions, analyses, documentation, etc.
- Input, advice, and guidance related to NEM and NCP development

Public

- Provide input on study during comment period
- Review public draft documents

Part 150 Overview: Study Process

We are here!

Develop Study Protocol

- Finalize methodology
- Establish Technical Advisory Committee
- Develop project schedule and milestones

Verification

- Existing Noise Exposure Maps, planning, and environmental documents
- Noise complaint data
- GIS and land use data
- Flight track, operations, and noise data
- FAA activity forecasts

Develop NEMs

- Develop noise contours for existing and 5-year forecast conditions
- Review land use data & policies
- Noise impact evaluation for DNL 65-75 dBa
- Identify incompatible land uses and review existing NCP
- Prepare maps in accordance with 14 CFR Part 150

Develop NCP

- Consider noise abatement strategies
- Consider land use strategies
- Consider programmatic strategies
- Update NCP in accordance with 14 CFR Part 150

Stakeholder Engagement and Public Outreach

Technical Advisory Committee • Public Meetings/Hearings • Public Website Materials and Newsletters

Part 150 Overview: Noise Exposure Map

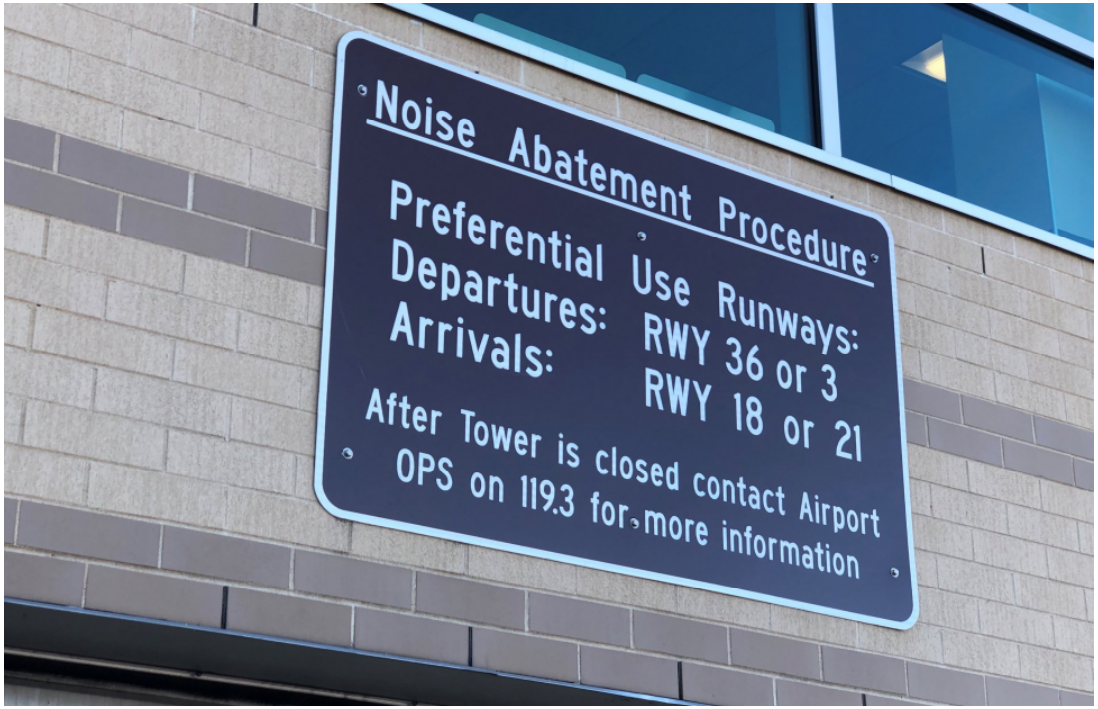
- FAA “accepts” NEM as compliant with Part 150 standards
- NEM must include detailed description of
  - Airport layout, aircraft operations, and other inputs to noise model
  - Aircraft noise exposure in terms of Day-Night Average Sound Level (DNL)
  - Land uses within DNL 65+ decibel (dB) contours
  - Noise / land use compatibility statistics within DNL 65+ dB contours
- NEM must address two calendar years
  - Year of submission (2022)
  - Forecast (at least five years from year of submission; 2027)
  - FAA reviews forecasts for consistency with Terminal Area Forecast (TAF)

Land Use

- Part 150 requires the review of existing land uses surrounding an airport to determine land use compatibility associated with aircraft activity at the airport.
- The FAA has published land use compatibility designations, as set forth in Part 150, Appendix A, Table 1.
- The FAA generally considers all land uses to be compatible with aircraft-related DNL below 65 dB, including residential, hotels, retirement homes, intermediate care facilities, hospitals, nursing homes, schools, preschools, and libraries.

NCP Review: Results

- 1991 MSN NCP included:
  - Noise abatement measures (9)
  - Land use measures (11)
  - Programmatic measures (3)
- NCP Review
  - Has the measure been implemented?
  - If so, compliance with the measure was determined (how well is the measure being adhered to?)



Noise Abatement Measures (NA)

	Name	Implementation Status
NA-1	Continue the existing informal runway use program.	N/A
NA-2	Maintain internal tower directive requiring aircraft departing on Runway 31 to pass through 2,500 feet MSL (1,600 feet AGL) before turning left.	Not implemented
NA-3	Establish visual approach and departure corridors for helicopters.	Not implemented
NA-4	Encourage use of noise abatement departure procedures by operators of jet aircraft.	Implemented
NA-5	Encourage Air National Guard to follow through with its plans to construct a hush house for A-16 engine maintenance runups prior to converting its fleet.	Implemented
NA-6	Construct new 6,500-foot Runway 3-21.	Implemented
NA-7	Adopt an informal preferential runway use system which encourages departures on Runways 3, 31, and 36 while preferring arrivals on Runways 13, 18, and 21.	Not implemented
NA-8	Adopt procedures requiring east and southbound aircraft exceeding 12,500 pounds and departing Runway 3 to climb on runway heading through 2,500 feel MSL before turning right.	Implemented
NA-9	Adopt procedures requiting all aircraft exceeding 12,500 pounds and departing Runway 21 to turn left 10 degrees as soon as safe and practicable.	Not implemented

Land Use Measures(LU)

	Name	Implementation Status
LU-1	City of Madison, Dane County – Maintain Exiting Compatible Zoning in the Airport Vicinity.	Implemented
LU-2	Dane County, City of Madison, Town of Burke – Define "Airport Affect Area" for Purposes of Implementing Wisconsin Act 136.	Implemented
LU-3	Dane County, City of Madison – Adopt Airport Noise Overlay Zoning.	Not implemented
LU-4	Dane County, City of Madison – Amend Subdivision Regulations to Require Dedication of Noise and Avigation Easements or Plat Notes on Final Plat.	Implemented
LU-5	Dane County – Consider Amending Subdivision Regulations to Prevent Subdivision of Land Zoned A-1 Agriculture	Not implemented
LU-6	Dane County, City of Madison – Amend Building Codes to Provide Soundproofing Standards for Noise-Sensitive Development in Airport Noise Overlay Zones.	Not implemented
LU-7	Dane County, City of Madison, Town of Burke – Amend Local Land Use Plans to Reflect Noise Compatibility Plan Recommendations and Establish Airport Compatibility Criteria for Project Review.	Implemented
LU-8	Dane County – Follow through with Planned Land Acquisition in Cherokee Marsh and Token Creek Park Areas.	Not implemented
LU-9	Dane County – Consider Expanding Land Acquisition Boundaries in Cherokee Marsh and Token Creek Park Areas.	Not implemented
LU-10	Dane County – Establish Sales Assistance or Purchase Assurance Program for Homes Impacted by Noise Above DNL 70 dB.	Implemented
LU-11	Dane County – Install Sound Insulation for Schools Impacted by Noise Above DNL 65 dB	Not implemented

Program Management Measures (PM)

- 1991 MSN NCP titled PM measures as “Continuing Program” measures

	Name	Implementation Status
PM-1	Program Monitoring and Contour Updating	Implemented
PM-2	Evaluation and Update of the Plan	Implemented
PM-3	Complaint Response	Implemented

Noise Model Inputs

Noise Modeling Inputs: AEDT & NoiseMap

FAA: AEDT (version 3d SP2)

AEDT requires data in three categories:

- Aircraft Noise & Performance
  - Aircraft performance profiles
  - Noise level vs. distance curves
- Airport Physical Inputs
  - Runway coordinates (lat/long)
  - Weather data
  - Terrain shapefiles
- Aircraft Operational Inputs
  - Number of aircraft operations
  - Aircraft fleet mix
  - Day-night split of operations
  - Runway utilization
  - Flight track geometry and utilization

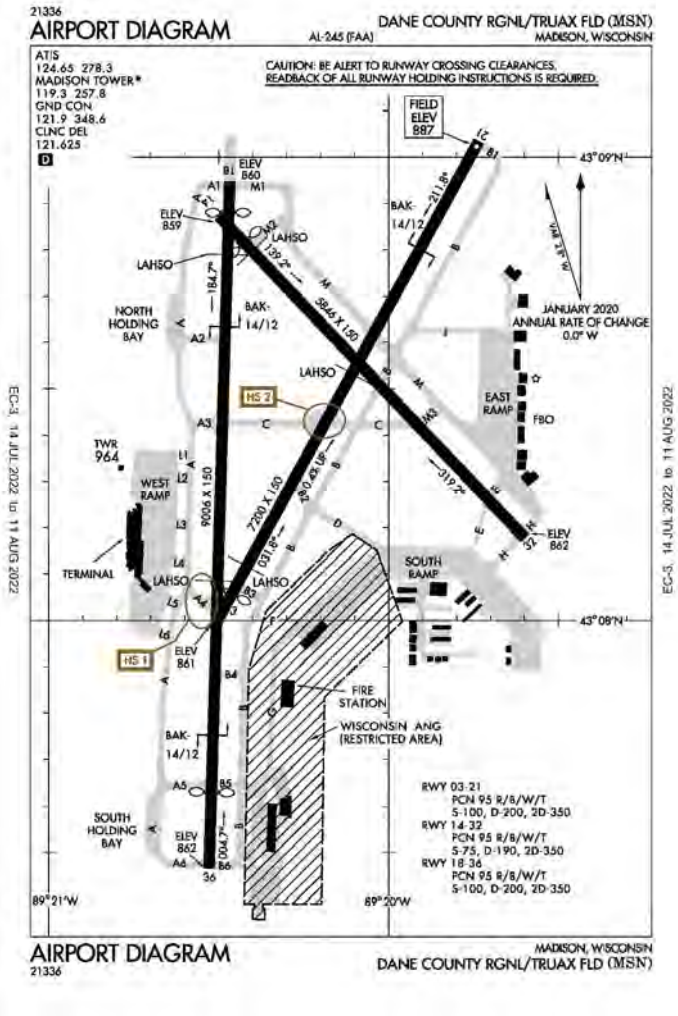
DoD: NoiseMap

NoiseMap requires the following data:

- *Who* is involved with flights/ops
  - Specified flying units, maintenance, transient aircraft
- *What* flights occur
  - By aircraft/engine type, operation type, or runup operations
- *When* flights occur
  - Day (0700-2200), Night (2200-0700)
- *Where* flights occur
  - Flight tracks and track utlization
  - Runway/Pads and utilization
- *How* flights operate
  - Flight profiles – engine power, altitude, airspeed
  - Distribution (e.g., AB vs. Mil)
  - Noise abatement procedures

Physical Input Requirements

- Airport layout
  - Runway configuration (including displaced landing or takeoff thresholds)
- Flight tracks
- Airport elevation
  - Terrain data were obtained from the United States Geological Survey National Elevation Dataset
- Airport weather
  - The AEDT database includes 30-year average weather for each airport.
    - Temperature
    - Station pressure
    - Relative humidity
    - Dew point
    - Wind speed
- Related requirements:
  - Runway use rates
  - Flight track use rates



Operational Input Requirements

- Annual-Average Day Operations
  - Existing year 2022
  - Forecast year 2027
- Aircraft Type
  - Jet, Turboprop, Helicopter, Prop
- AEDT Equipment Type (~4,600 airframe/engine combinations)
  - 737800, A320-200, CRJ800, etc.
- Day-Night Split
  - Day 7:00AM-10:00PM
  - Night 10:00PM-7:00AM
- Stage length
  - Surrogate for aircraft weight; determined by distance from departure to destination airport
- Runway utilization rates by aircraft categories
- Flight track geometry and use by aircraft categories

Additional Operational Inputs

Helicopter Operations

- Civilian operations on the East Ramp, near Wisconsin Aviation
- Military operations based on operational discussions with Army Guard

Runups

- Military run-ups on ANG (restricted area)

Noise Modeling Process
For Commercial and General Aviation Operations

- Base Year – 2021
  - Obtained, processed and analyzed 12 months of flight track and aircraft identification data
  - Developed modeled flight tracks
  - Determined day-night aircraft operations, fleet mix and runway use
- Existing and Forecast Conditions – 2022 & 2027
  - Confirmation of the FAA's Terminal Area Forecast (TAF)
  - Scaled base year operations and updated aircraft fleet to 2022 and 2027 TAF
  - No changes to flight tracks, runway use

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AEDT Aircraft Operations Data

- Arrivals
  - AEDT noise and performance database has standard arrival profiles
- Departures
  - AEDT noise and performance database has departure profiles by stage length; all small aircraft are assumed to fly less than 500 nm
  - Stage lengths for modeling will be determined based on analysis of base year operations data that includes city pair information
- Touch-and-go pattern (circuit) profiles

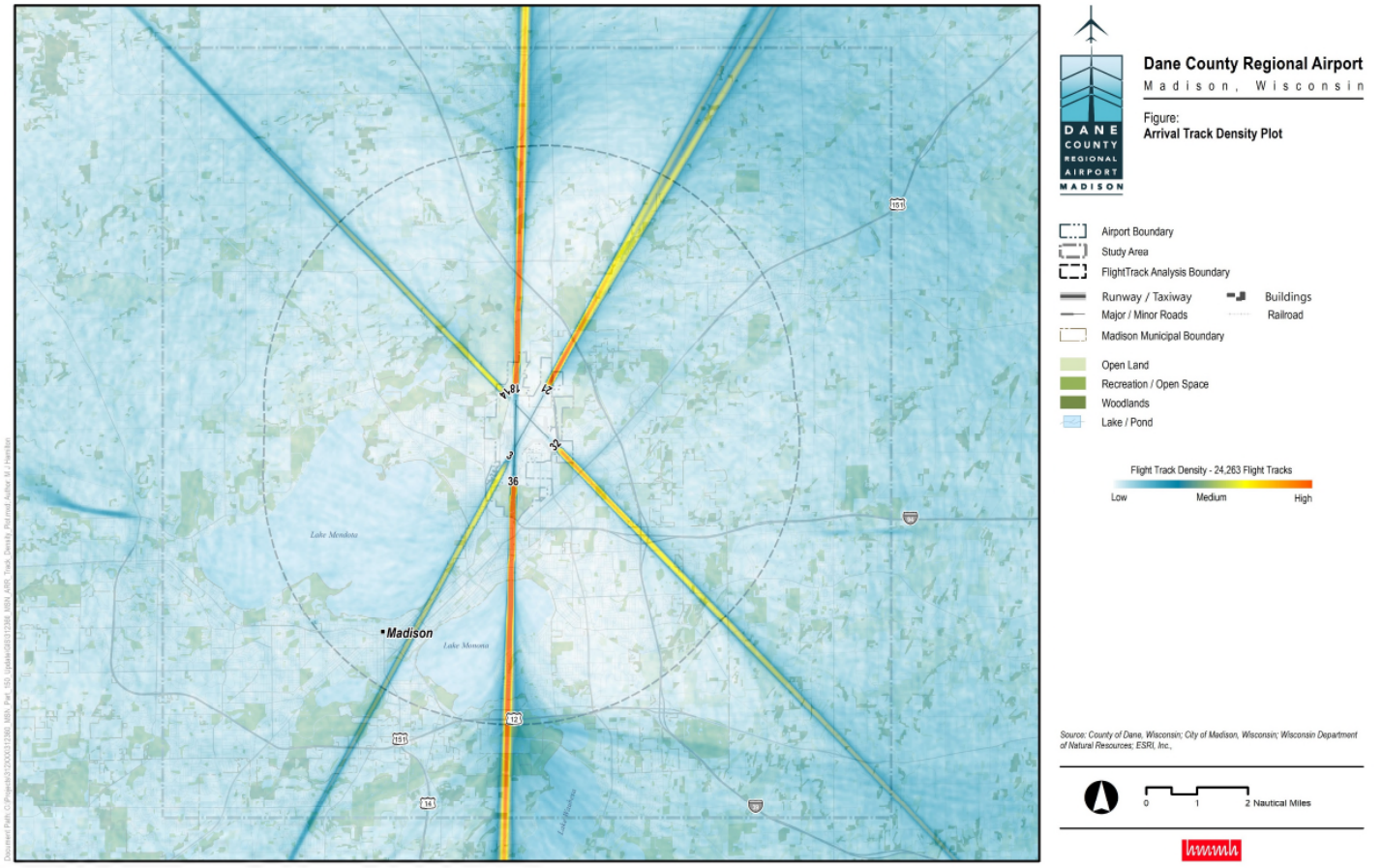
Development of AEDT Modeled Flight Tracks

- Model flight tracks have been developed for arrivals, departures and circuits
- "Backbone" tracks were developed for major origin/destination directions (198)
- Sub-tracks are developed to address flight track dispersion of the predominant paths (526)

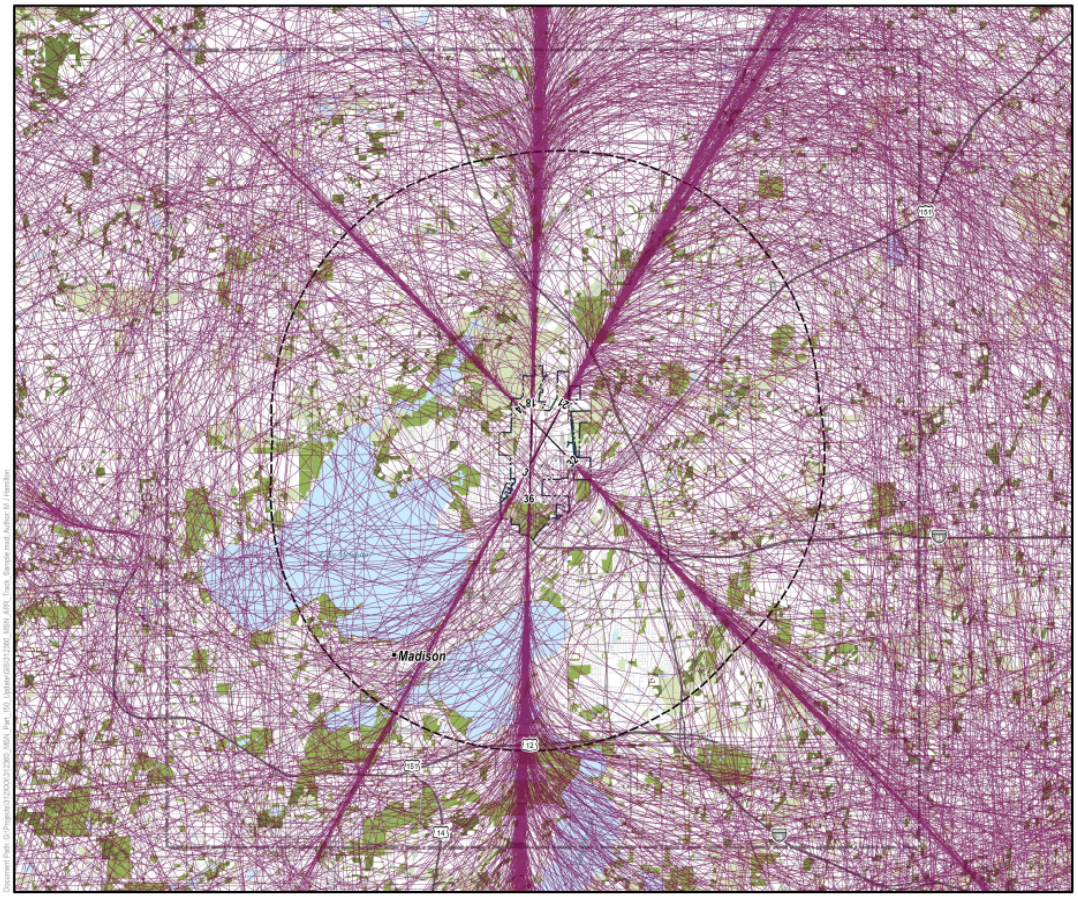
Subsequent slides illustrate the results of the development of model tracks

Runway	Arrival Tracks		Departure Tracks		Circuit Tracks	
	Back-bone	Sub-tracks	Back-bone	Sub-tracks	Back-bone	Sub-tracks
03	13	26	14	30	2	4
21	19	50	21	68	1	2
18	13	38	20	56	2	4
36	15	48	14	42	2	2
14	13	26	9	24	2	4
32	14	38	22	60	2	4
H1	1	0	1	0	0	0
Total	87	226	100	280	11	20

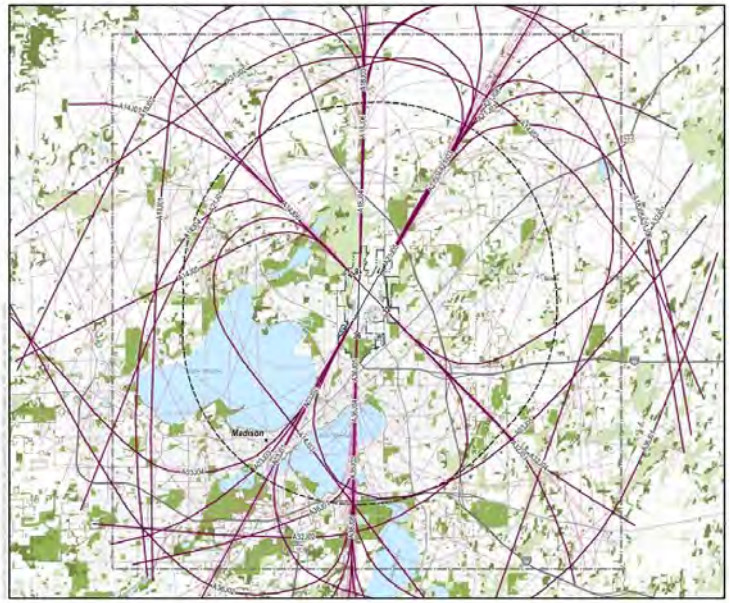
Arrival Track Density



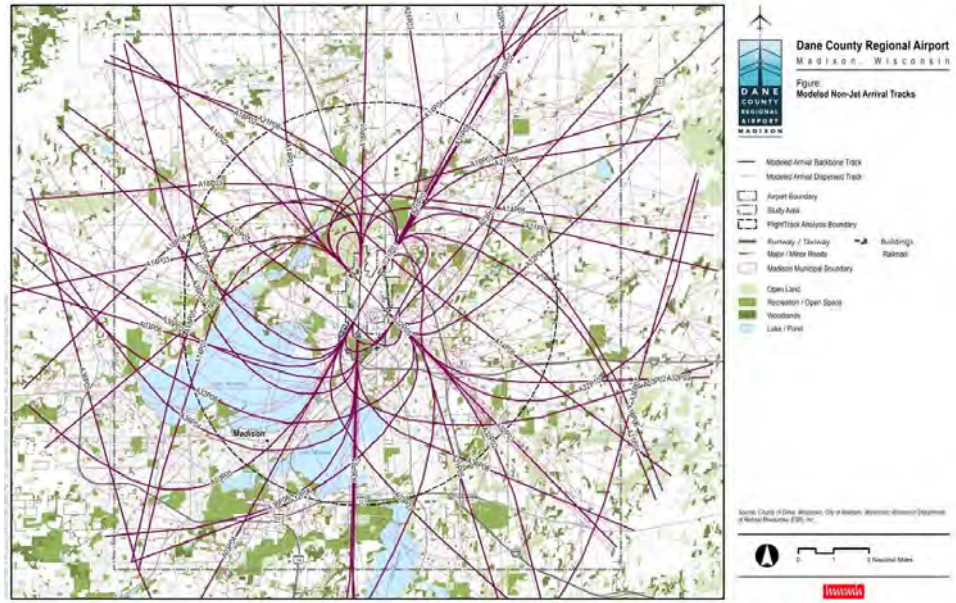
Arrival Tracks Sample



Model Arrival Tracks: Jets & Non-Jets

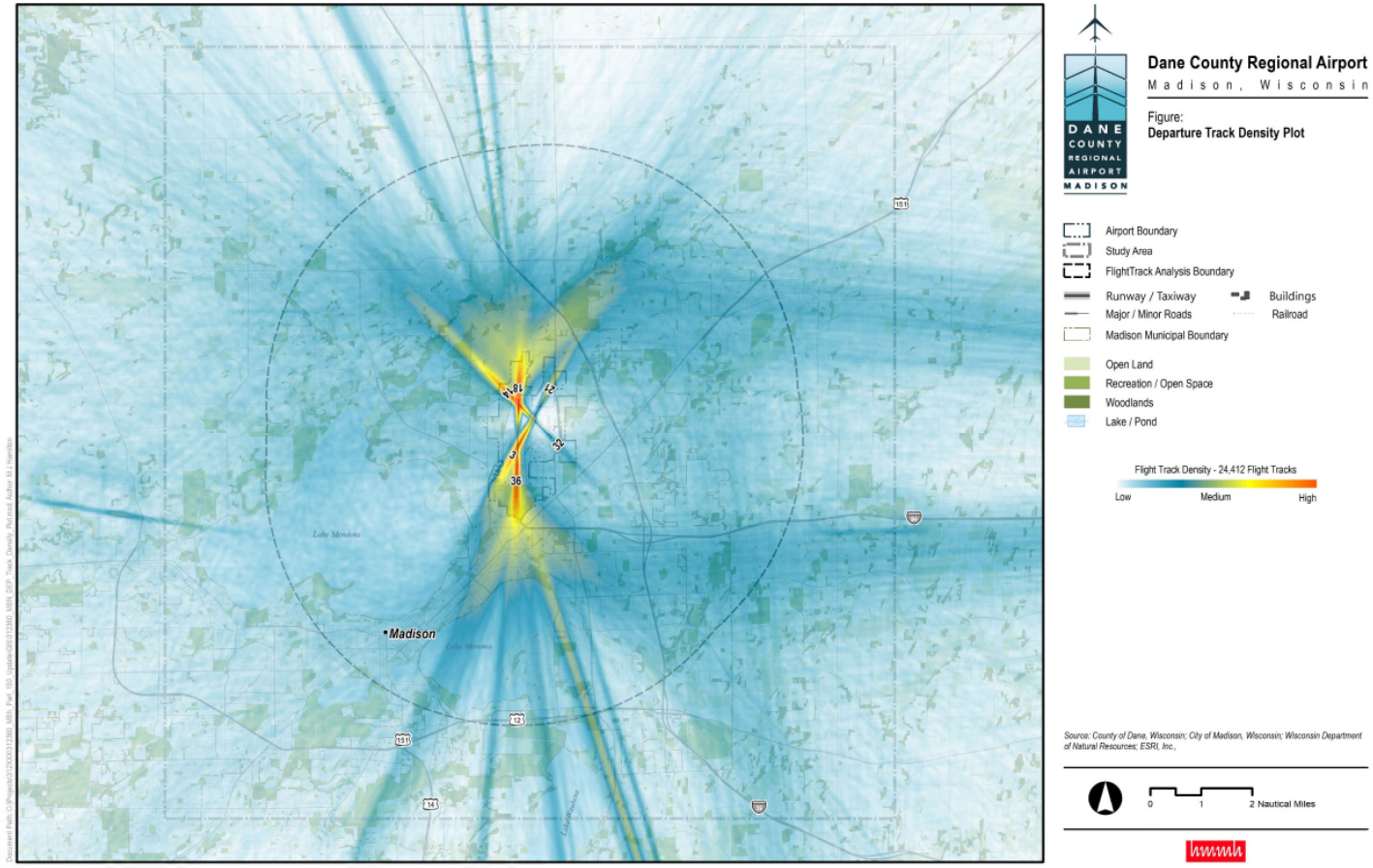


Model Jet Tracks

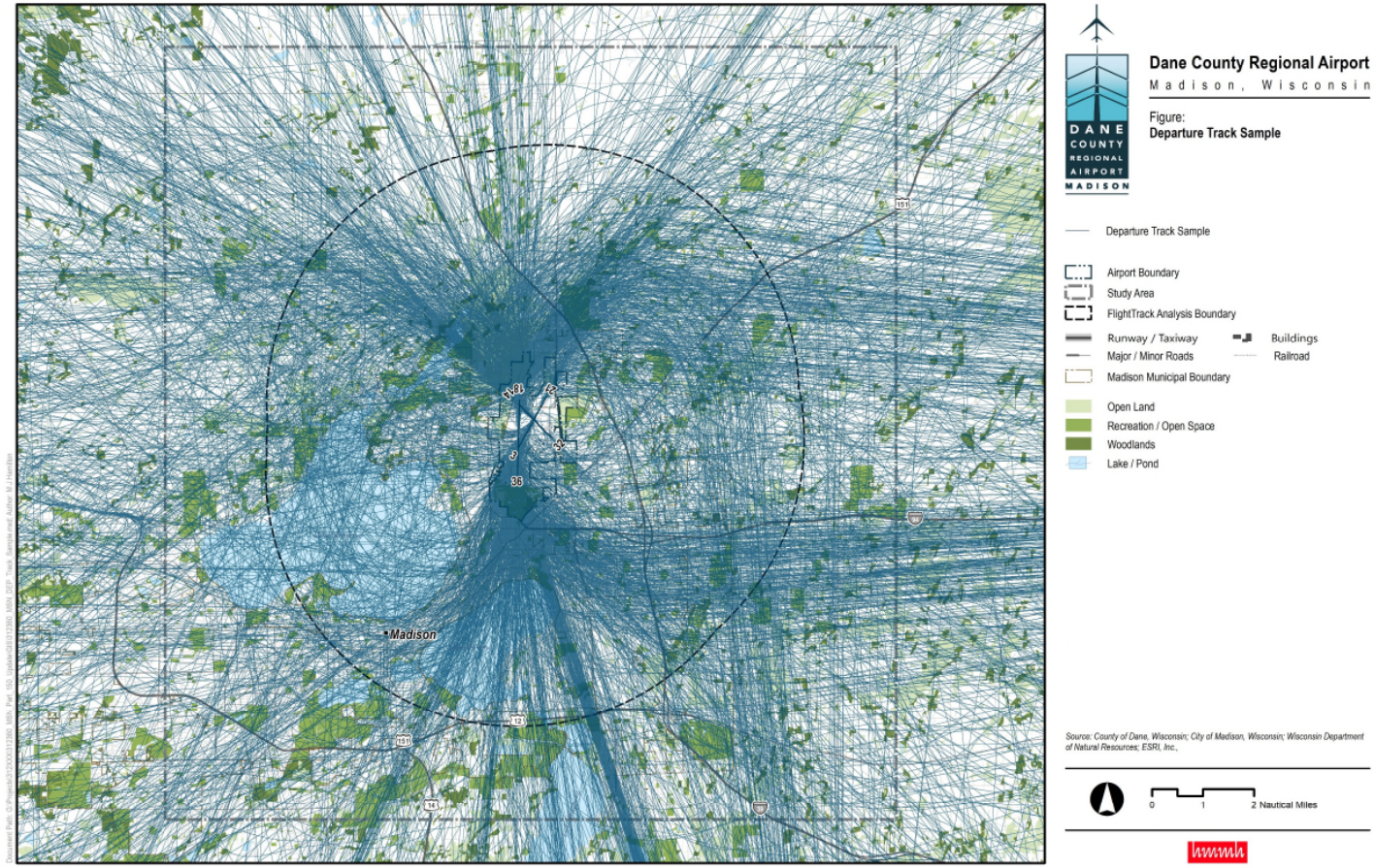


Model Non-Jet Tracks

Departure Track Density

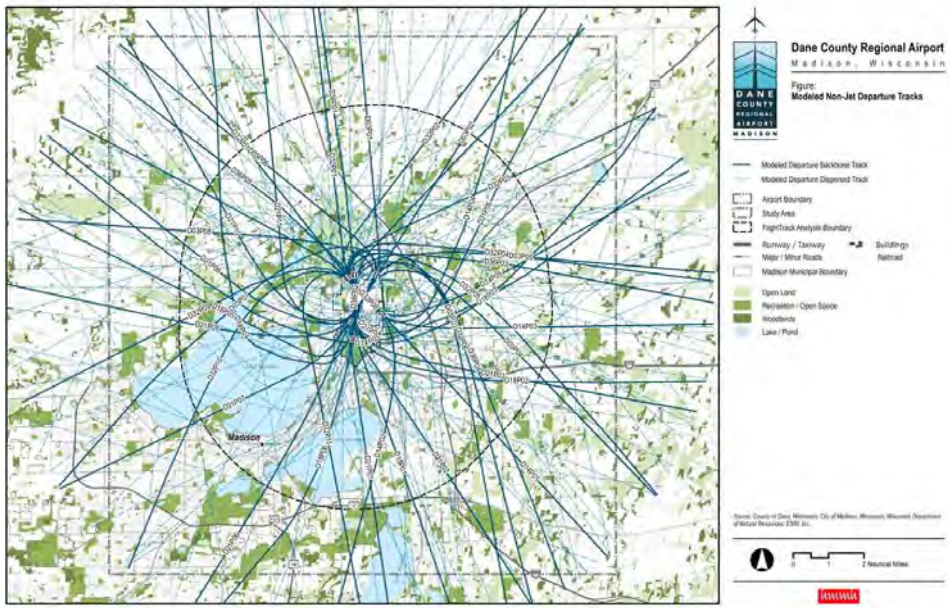


Departure Tracks Sample



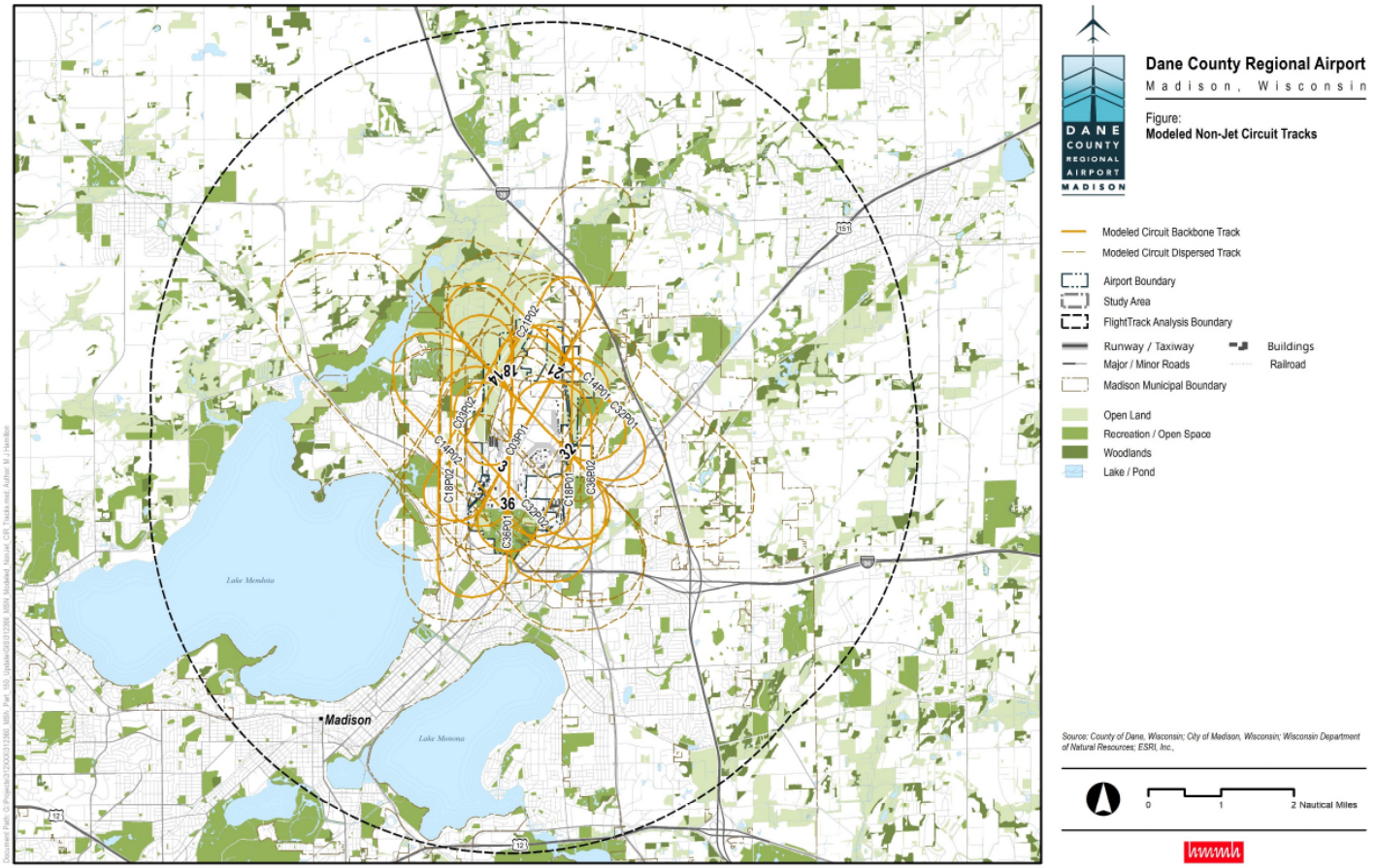
Model Departure Tracks: Jets & Non-Jets

Model Jet Tracks



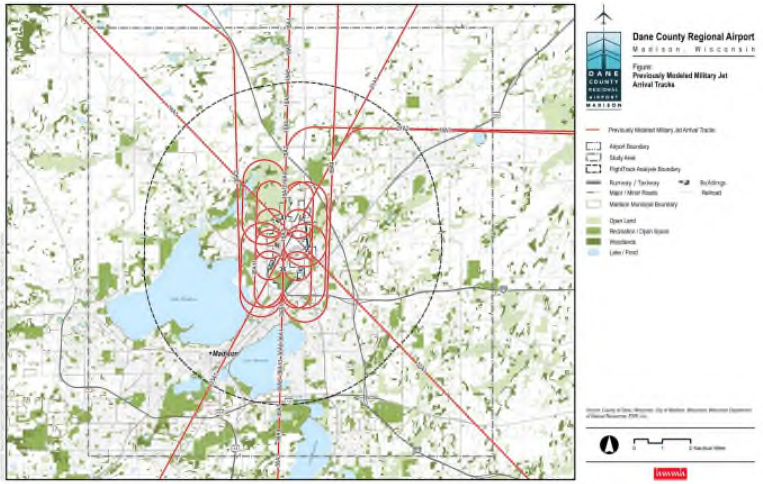
Model Non-Jet Tracks

Non-Jet Circuit Tracks

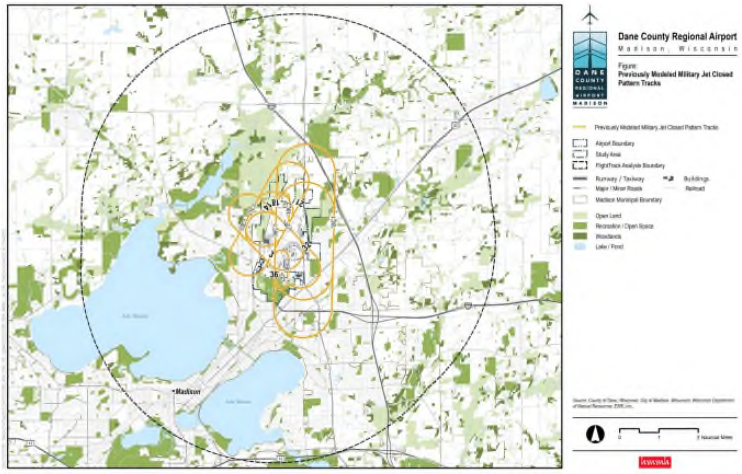


Model Tracks: NoiseMap Inputs

Military Jet Departures



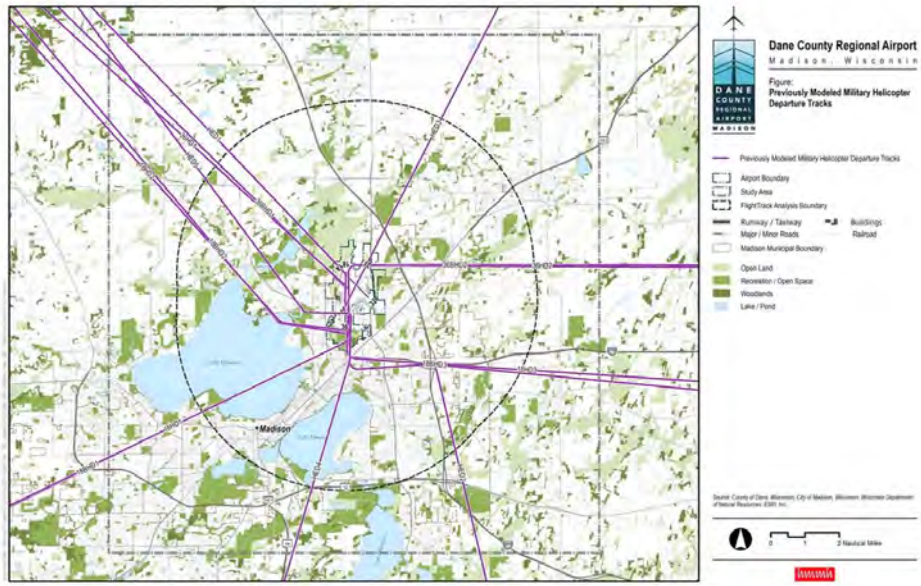
Military Jet Arrivals



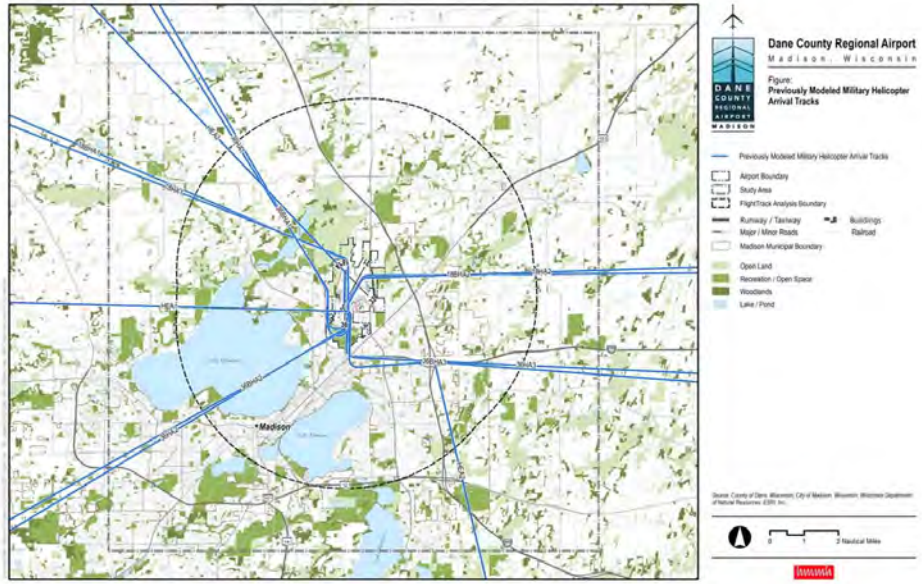
Military Jet Circuits

29

Model Tracks: NoiseMap Inputs



Military Helicopter Departures



Military Helicopter Arrivals

30

ERO

Operations: Annual Aircraft Inputs

Year	Air Carrier	Air Taxi	General Aviation	Military	Total
2022	20,306	7,395	47,735	6,047	81,483
2027	35,714	6,757	48,852	7,470	98,793

Note: Totals may not match exactly due to rounding.

Runway Use: AEDT Inputs

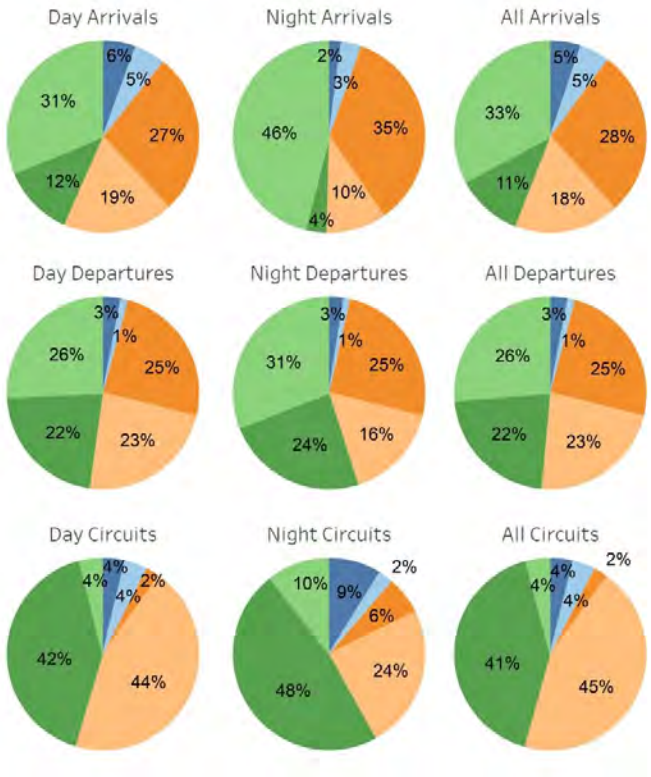
Runway Usage is separated by:

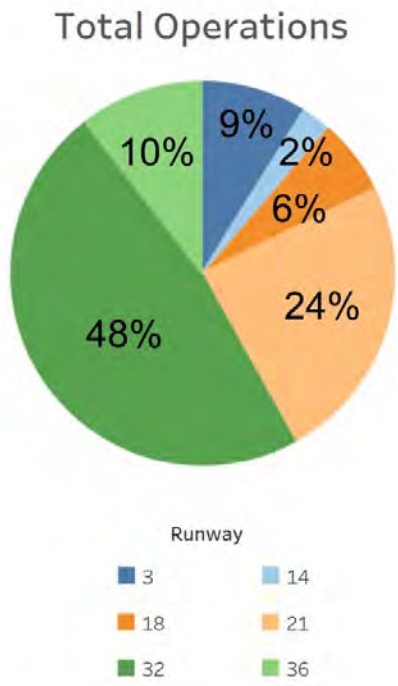
- Runway End
- Type of Operation
- Time of Day

Pie Charts give a reference point to other runways in comparison.

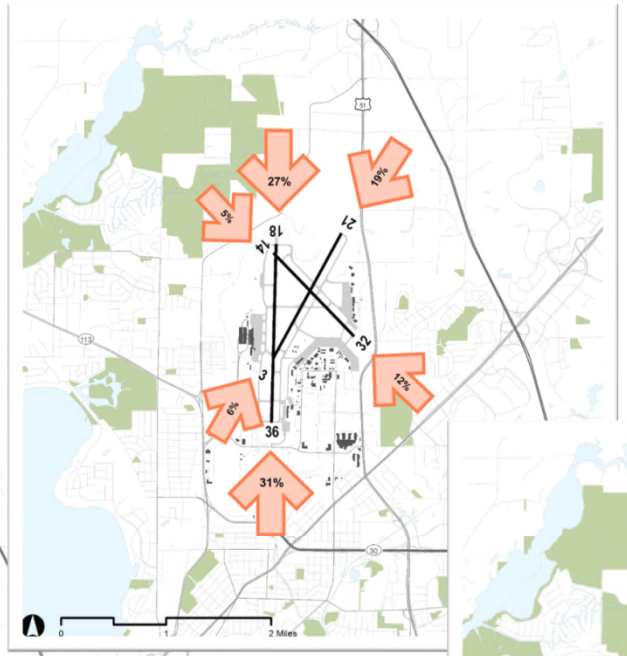
Developed from 2021 FAA NOP Data and SWIM data:

- NOP: National Offload Program
- SWIM: System Wide Information Management System

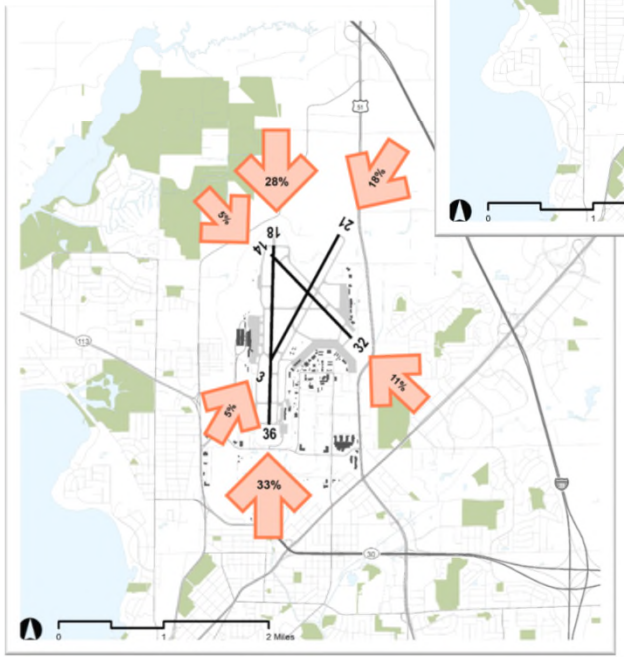




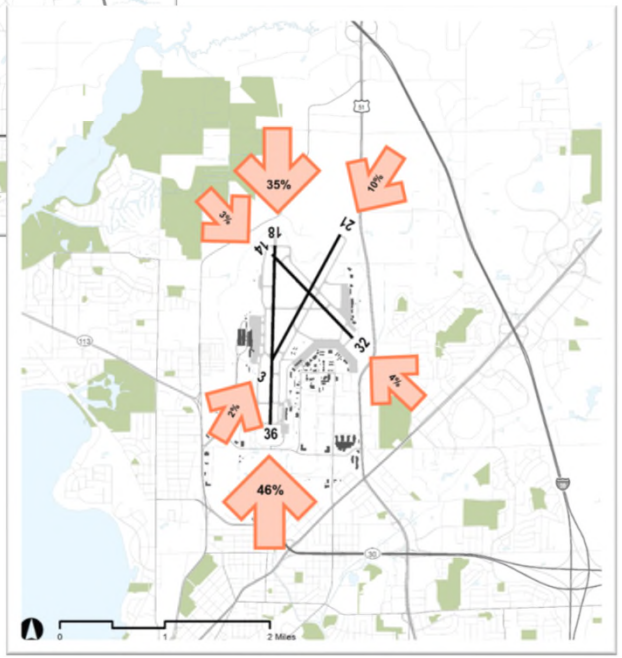
Arrival Runway Use



Day Arrivals

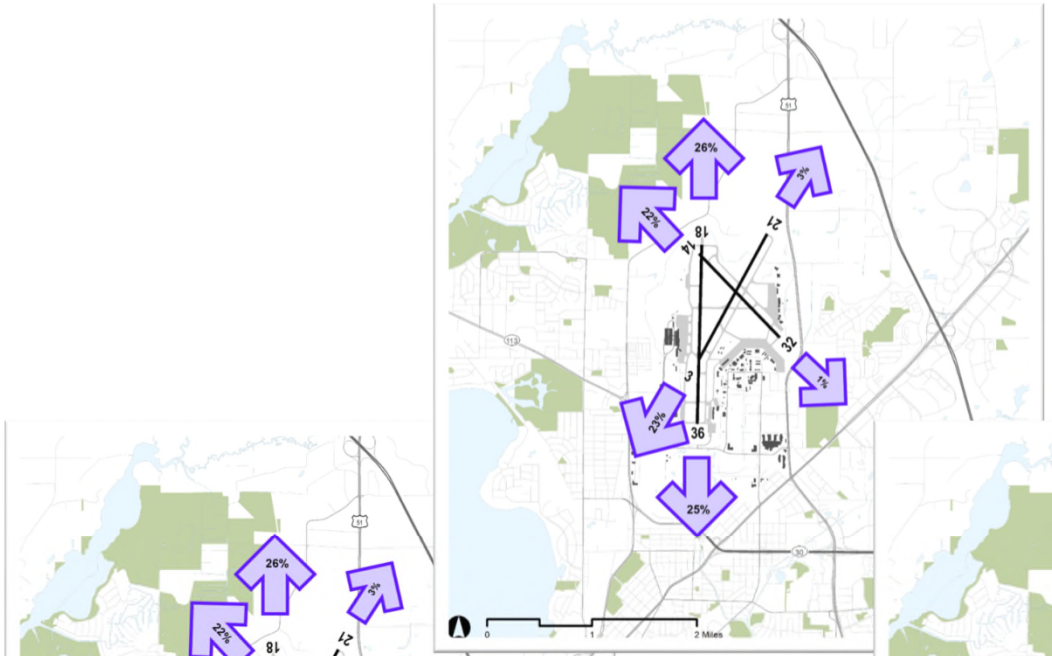


All Arrivals

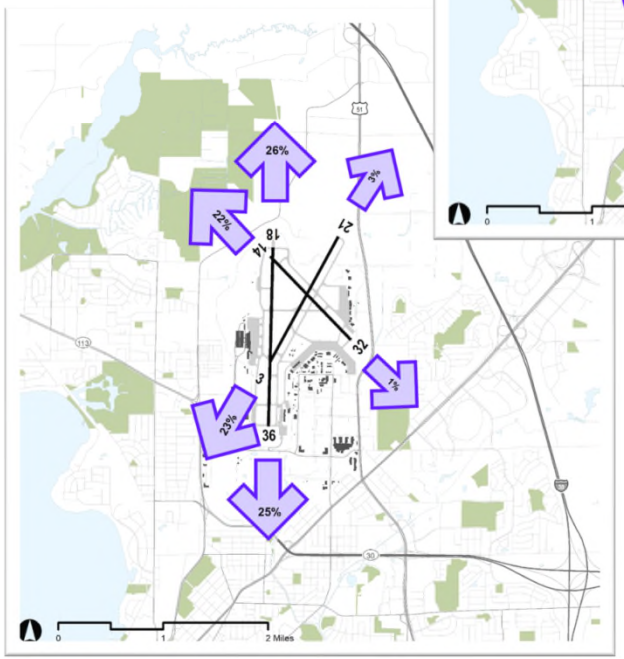


Night Arrivals

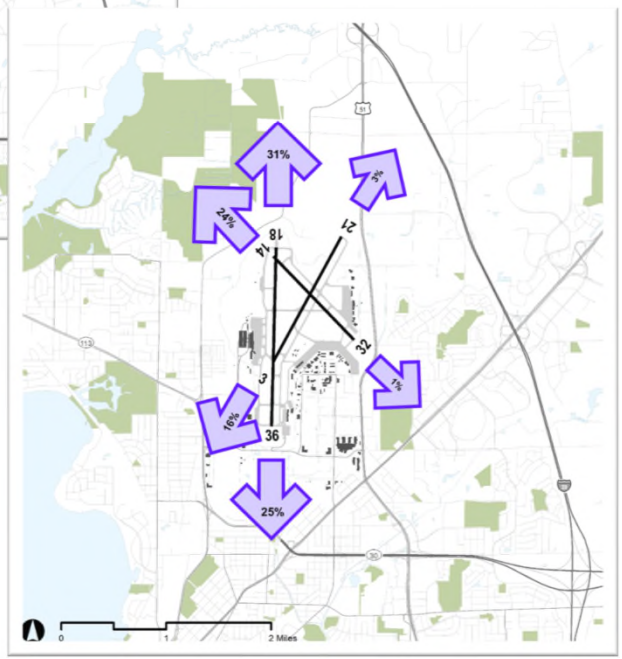
Departure Runway Use



Day Departures



All Departures



Night Departures

NEM Public Workshop #2

- Presentation of draft NEM document
- Request and receive public comments on the draft NEM document

Proposed Schedule: Technical Advisory Committee

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
4th Technical Advisory Committee Meeting	Review of the existing Noise Compatibility Program (NCP) and discussion of Potential changes to the Noise Compatibility Program	1st Quarter 2023
5th Technical Advisory Committee Meeting	Evaluation results of the proposed Noise Compatibility Program measures	2nd Quarter 2023
6th Technical Advisory Committee Meeting	Presentation of the draft Noise Compatibility Program Update	3rd Quarter 2023
NCP Public Comment Period, 3rd Public Open House, and NCP hearing	NCP thirty-day public comment period and third Public Open House and NCP Hearing.	4th Quarter 2023
MSN to Submit Final NCP to FAA	MSN submits final updated NCP to FAA for review and approval. Respond to FAA questions as needed.	1st Quarter 2024

Note: Schedule is subject to change

Proposed Schedule: Public Outreach and Submittals

Meeting / Activity	Anticipated Purpose	Time Frame
Kick-Off Meeting with MSN and the Part 150 Team	Define organizational and procedural matters and public outreach, review and refine scope and schedule details.	Completed: January 20, 2022
1st Public Open House	Introduction to Part 150, set expectations, discuss stakeholder roles, identify issues of concern	Completed: April 26, 2022
NEM Public Comment Period, 2nd Public Open House	NEM thirty-day public comment period and second Public Open House	Upcoming: November 2022
MSN to Submit Final NEM to FAA	MSN submits final updated NEM to FAA for review and approval. Respond to FAA questions as needed.	December 2022
NCP Public Comment Period, 3rd Public Open House and NCP Hearing	NCP thirty-day public comment period and third Public Open House and NCP Hearing.	4th Quarter 2023
MSN to Submit Final NCP to FAA	MSN submits final updated NCP to FAA for review and approval. Respond to FAA questions as needed.	1st Quarter 2024

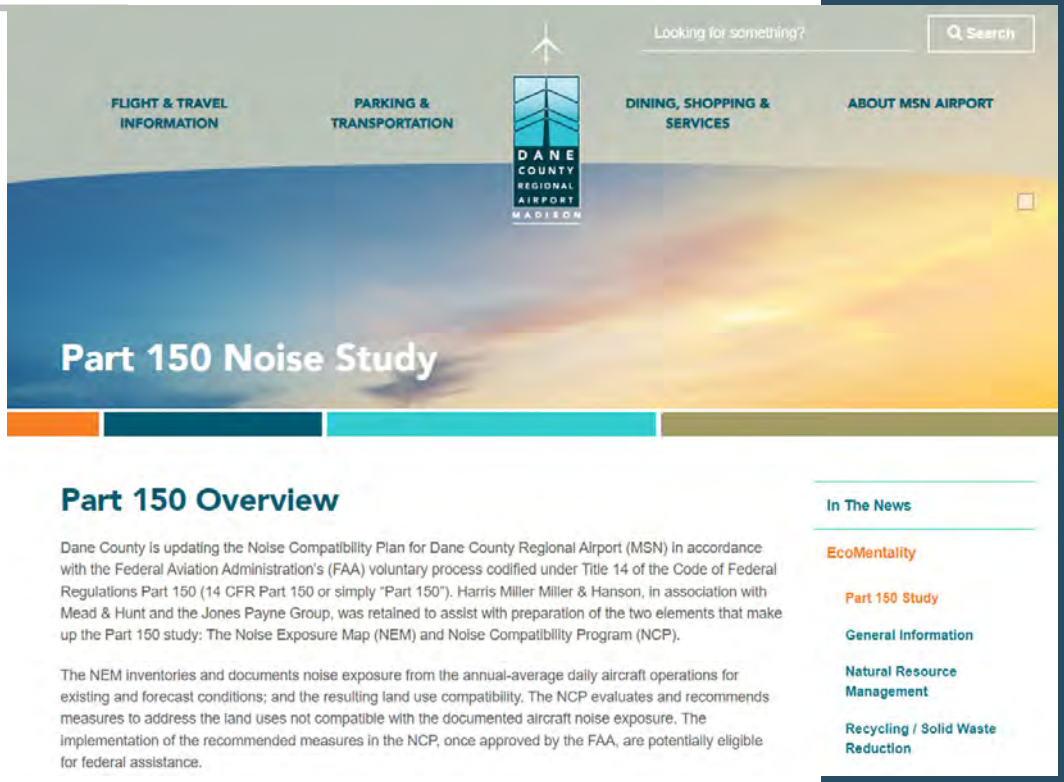
Note: Schedule is subject to change

Wrap-Up and Discussion

- TAC questions, comments, and discussion
- Next Public Meeting: November 15, 2022
  - Can we set?
- Set TAC meeting #4?
  - Proposed date and time in February or March
- Public Comments

MSN Part 150 Study Website and Project Contacts

- Website: https://www.msnairport.com/about/ecomentality/Part-150-Study
- Project email address: part150study@msnairport.com
- Tim Middleton – HMMH Project Manager, Contact: tmiddleton@hmmh.com 339.234.2816
- Michael Kirchner – MSN Engineering Director, Contact: kirchner@msnairport.com 608.279.0449



Implementation/Compliance Status of Current NCP Measures

NA-1: Continue the existing runway system

Superseded by NA-7 which includes Runway 03-21

See NA-7 for more details

- Arrivals to Runway 14 or 18 and Departures to Runway 32 or 36
- Only for aircraft >12,500 lbs

Implementation Status:
N/A

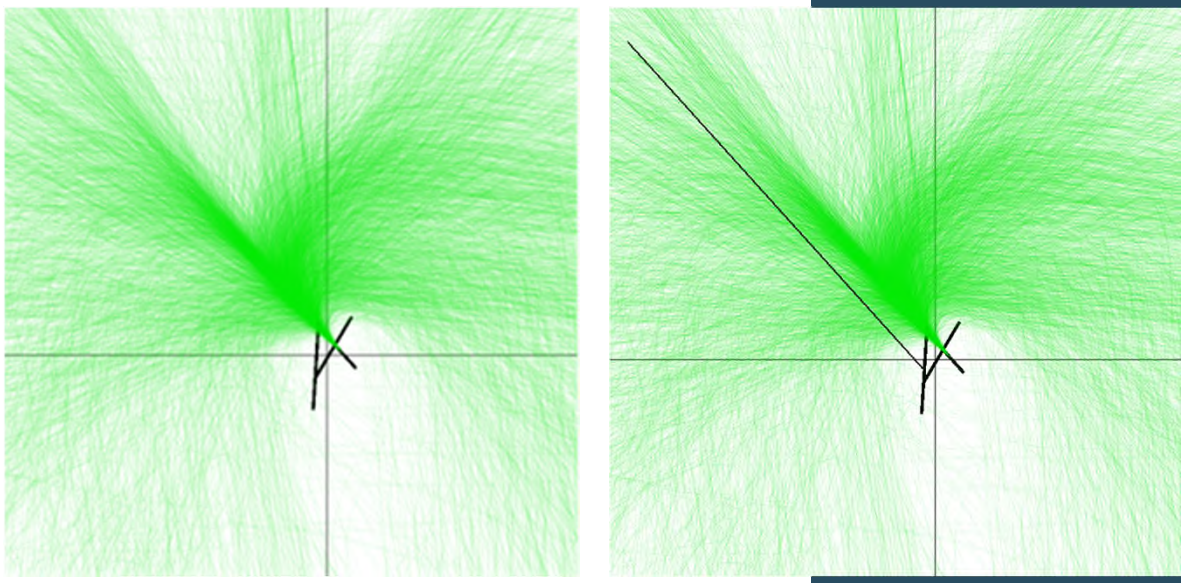
Compliance:
N/A

NA-2: Departures on Runway 31 to pass through 2,500 ft MSL before turning left

- Departures from Runway 32 in 2021 were analyzed using a gate
- Of tracks turning left, 54% were at or above 2,500 ft MSL when passing through the gate

Implementation Status:
Not Implemented

Compliance:
N/A



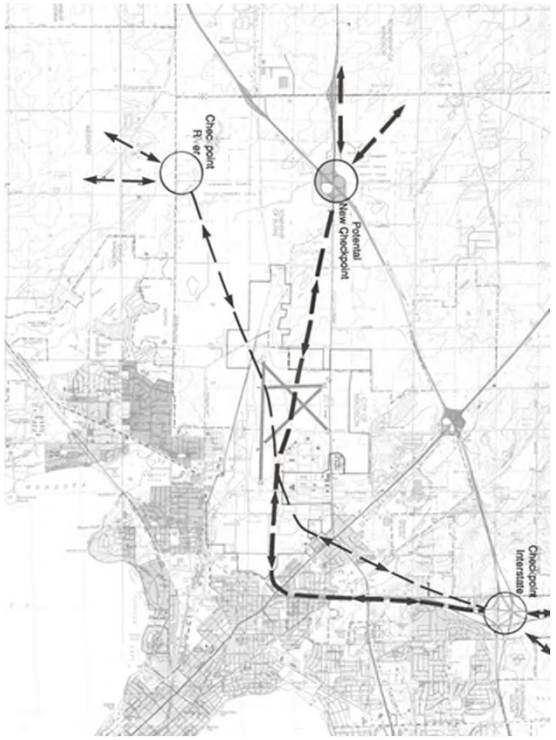
Departure Flight Tracks on Runway 32 with (right) and without (left) the Analysis Gate
Source: HMMH

NA-3: Establish Visual Approach Corridors for Helicopters

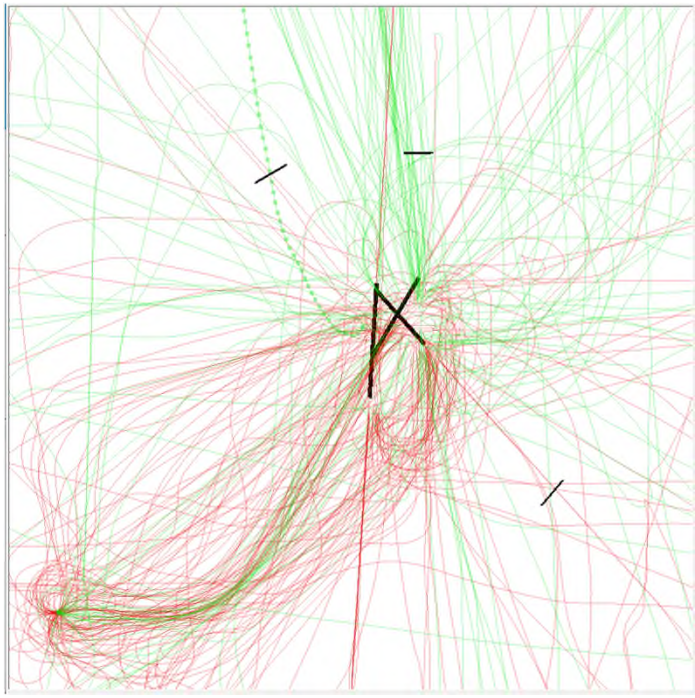
- Three corridors were gated for compliance in helicopter operations
- Compliance is below 5% of helicopter operations

Implementation Status:
Not Implemented

Compliance:
N/A



1991 NA-3 Diagram of Suggested Helicopter Corridors
Source: MSN Part 150 Noise Compatibility Program Summary, February 1991



Helicopter Operations, with Gates corresponding to NA-3 Checkpoints
Source: HMMH, 2022

NA-4: Encourage operators of jet aircraft to follow noise abatement procedures.

- MSN has implemented signage around the airport/runways
- Used whenever possible

Implementation Status:
Implemented

Compliance:
Compliant with signage

NA-5: Air National Guard to construct F-16 hush house for maintenance runups

- Hush House was constructed specifically for F-16 aircraft
- Set to be phased out with the conversion of F-16 aircraft to F-35A
- Upon phaseout of F-16 aircraft, this measure will no longer be applicable

Implementation Status:
Implemented

Compliance:
Compliant

NA-6: Build new 6,500 ft Runway 3-21

- Runway was constructed as planned

Implementation Status:
Implemented

Compliance:
Runway built, but relatively low use of Runway 3-21 (see next slide) for noise purposes except by the ANG

NA-7: Adopt new runway use system

- Prefers Runways 3, 32, 36 for departures and Runways 14, 18, 21 for arrivals
- Among aircraft > 12,500 lbs, compliant runway usage is about 50%

Implementation Status:
Not Implemented

Compliance:
N/A

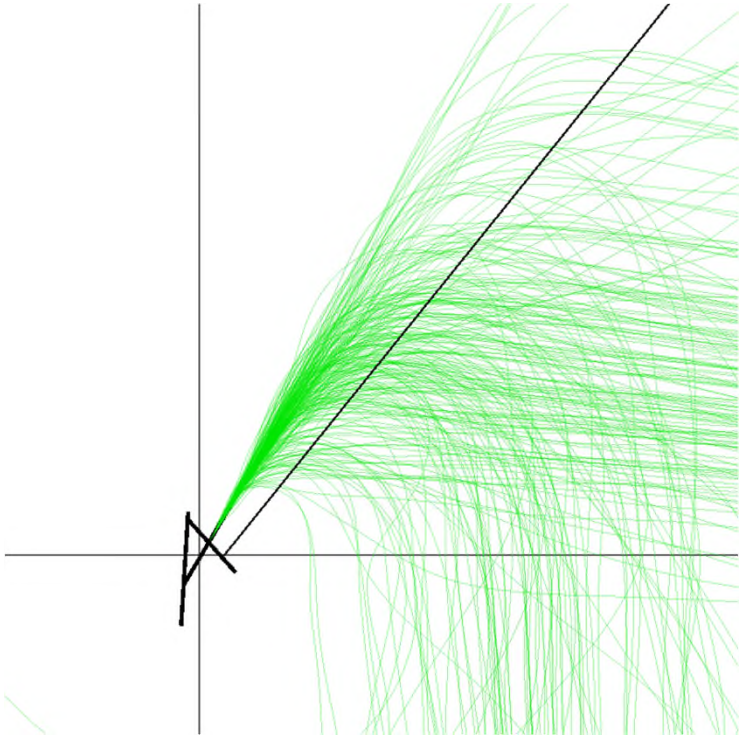
Runway	Number of Departures	Departure Percentage	Number of Arrivals	Arrival Percentage
3	363	2%	450	3%
14	52	0%	346	2%
18	5,570	35%	5,791	37%
21	2,182	14%	1,658	11%
32	1,913	12%	517	3%
36	5,738	36%	6,897	44%
Total	15,818	100%	15,659	100%

NA-8: Require east and southbound aircraft >12,500 lbs. to pass 2,500 ft. MSL before turning right off Runway 3

- Analyzed Runway 3 departures for aircraft above 12,500 lbs which turned right
- Gate returned elevation of flights as they turned right
- 88% of flights that turned right did so after 2,500 ft MSL

Implementation Status:
Implemented

Compliance:
88% Compliant



Departures above 12,500 lbs. turning right on Runway 3
Source: HMMH

NA-9: Require all aircraft >12,500 lbs. departing runway 21 to turn left 10 degrees

- Intended to avoid noise exposure to neighborhoods southwest of the airport
- Departures off of Runway 21 showed no 10-degree turns

Implementation Status:
Not Implemented

Compliance:
N/A

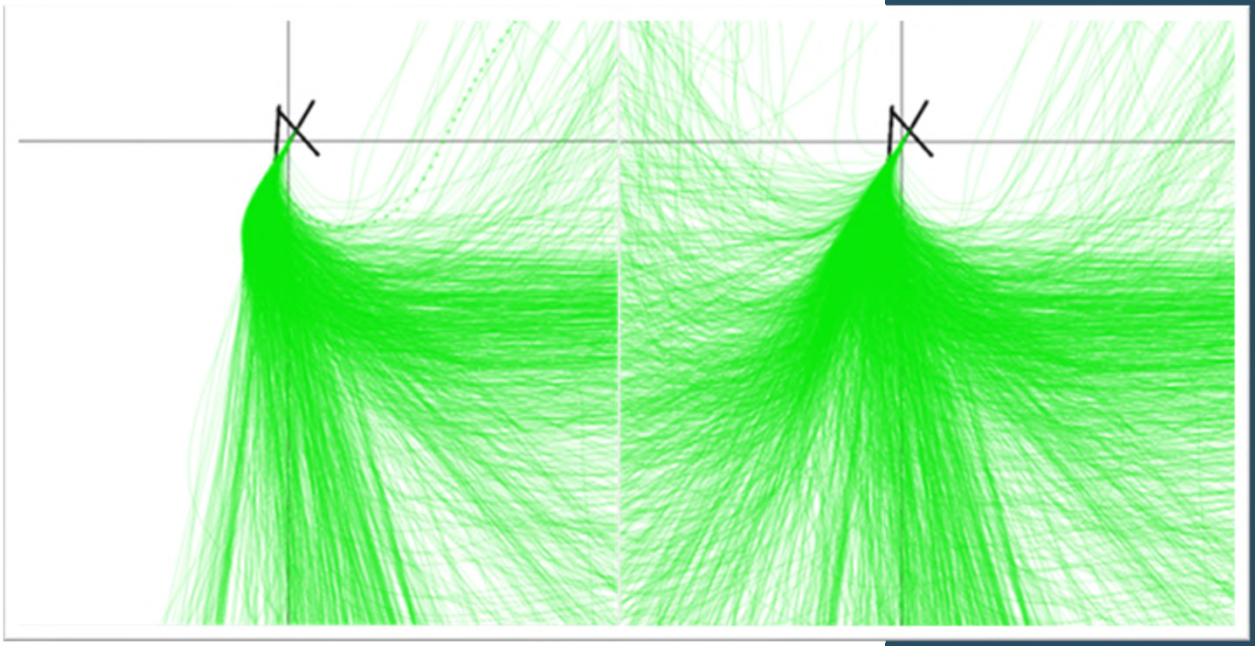
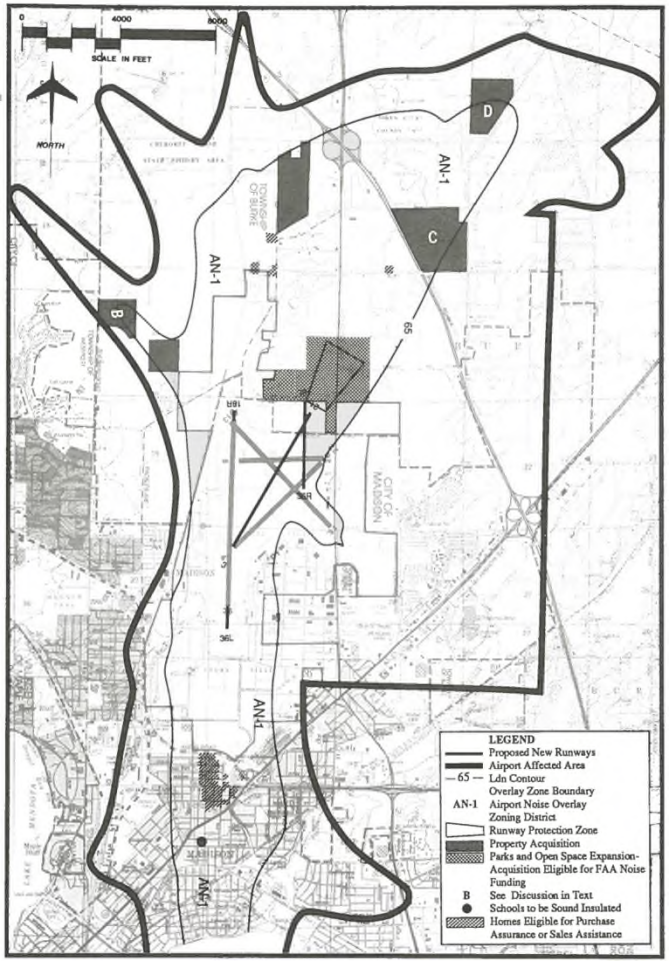


Figure: Departures above 12,500 lbs. on Runway 21
Left: Compliant aircraft which completed the 10-degree turn.
Right: All departures above 12,500 lbs.
Source: HMMH

LU-1: Maintain existing compatible zoning in airport vicinity

Implemented

- Measure implemented through Dane County Ordinance, Chapter 78.
- Best available map of "airport affected area" as defined in the ordinance is shown at right.



Approximate Airport Affected Area as of 1991
Source: 1991 MSN Part 150 Noise Compatibility Study

LU-2: Define "airport affected area" for purposes of implementing Wisconsin Act 136

Implemented

- Measure was implemented through Dane County Ordinance Chapter 78
- Further review will be completed during the Part 150 process

LU-3: Adopt airport noise overlay zoning

Not Implemented

- Measure recommends Dane County and the City of Madison adopt an Airport Noise Overlay Zone
- Zone recommended to encompass projected 1995 65 dB DNL contour
- While there is no specific mention of a Airport Noise Overlay Zone in Chapter 78, the Dane County Ordinance requires any change in land use to be from one compatible use to another

LU-4: Amend subdivision regulations to require dedication of noise and avigation easements

Implemented

- Implemented by Dane County Ordinance, Chapter 75.
- Requires the notification at right to be placed on the plat or survey map for any approved subdivision within the airport affected area

"Lands covered by this [plat/certified study map] are located within an area subject to heightened noise levels emanating from the operation of aircraft and equipment from a nearby airport".

LU-5: Consider amending County Subdivision regulations

Not Implemented

- LU-5 recommends amending zoning regulations to prevent the subdivision of land zoned A-1 (agriculture)
- Goal of the amendment would be to protect farmland, manage growth of urban areas, and ensure land use compatibility
- No such regulation was found within county ordinances

LU-6: Amend building codes to provide soundproofing standards

Not Implemented

- Measure LU-6 assumed establishment of an Airport Noise Overlay Zone, which did not occur
- Recommends including soundproofing standards for new developments in the overlay zone

LU-7: Amend local land use plans to reflect noise compatibility plan recommendations

Implemented

- Measure would additionally establish airport compatibility criteria for project review
- Ongoing support for the airport's promotion of compatible land uses is noted in the Dane County Use Plan
- Dane County Use Plan specifically notes the participation of local municipalities

LU-8: Follow through with planned land acquisition in Cherokee Marsh and Token Creek Park areas

Not Implemented

- Measure notes planned acquisition of land to the north of the airport
- Exhibit 5f of the NCP highlights the proposed acquisition areas
- 3 of the listed areas were eligible for purchase with FAA-funding at the time of the NCP, due to their existence within the 65 dB DNL contour
- Further review will be completed during the Part 150 process – detailed acquisition history will be confirmed by the airport

LU-9: Consider expanding land acquisition boundaries

Not Implemented

- LU-9 is a continuation of measure LU-8, recommending the expansion of the planned land acquisition to the north of the Airport
- More investigation is needed to determine implementation status of this measure
- Land acquisition is noted on the airport website but detailed acquisition history should be confirmed with the airport - Further review will be completed during the Part 150 process

LU-10: Establish sales assistance or purchase assurance program for homes above 70 Ldn

Implemented

- Goal is to provide financial assistance to homeowners wishing to move from the most heavily noise impacted areas
- LU-10 recommends a sales assistance program for single family homes within the 70 dB DNL contour
- Recommended areas shown on NCP Exhibit 5G
- Programs are voluntary and an avigation easement would be conveyed in exchange for Airport's assistance in selling the properties
- Home Sales Assistance program was instituted per the Airport's website

Of 300 eligible parcels, 185 chose avigation easement, while 13 chose sales assistance. 102 parcels did not participate.

LU-11: Install sound insulation for schools impacted by noise above 65 Ldn

Not Implemented

- Measure pinpoints two schools within the contour: Lowell School and Holy Cross School.
- $500,000 and $300,000 was estimated at the time of the NCP to treat Lowell School and Holy Cross School, respectively
- Measure has not been implemented - will be reassessed during the NCP process

PM-1: Program Monitoring and Contour Updating

Implemented

- Airport management maintains continued contact with the City of Madison, Dane County, and the FAA Air Traffic Control Tower
- Noise abatement procedures continue to be an item of importance to all parties
- This Part 150 update results in updated contours

PM-2: Evaluation and Update of the plan

Implemented

- Airport has periodically reviewed the NCP since 1991
- Part 150 Update was initiated due to the 115th Fighter Wing transitioning to model F-35A
- Dane County is currently in the process of updating the MSN Noise Compatibility Planning Study

PM-3: Noise Complaint Response

Implemented

- Airport management has implemented an online noise report form
- Airport determines patterns based on complaints and follows up as appropriate
- Dane County Website includes links to:
  - A "Noise FAQ" page providing answers to common questions
  - A "Noise Report Form" page for submitting noise complaints, questions, or comments

Noise Compatibility Planning Study

Dane County Regional Airport

Public Open House

DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Study Team

Dane County Regional Airport Team

- Wisconsin Department of Transportation Bureau of Aeronautics
  - Matt Messina – Airport Development Engineer
- Airport (MSN)
  - Kim Jones – Airport Director
  - Michael Kirchner – Engineering Director
  - Lowell Wright – Airport Noise Abatement/ Environmental Officer

Project Team

- HMMH
  - Gene Reindel – Principal-in-Charge
  - Tim Middleton – Project Manager
  - Julia Nagy – Assistant Project Manager
- Mead & Hunt
  - Kate Andrus – Project Lead, Airport Planning and Forecasts
  - Ryan Hayes – Airport Planning and Forecasts
  - Chris Reis – Local Client Lead
- The Jones Payne Group
  - Diane Carter – Project Lead, Principal-in-Charge
  - Brianna Whiteman – Assistant Project Manager, QA/QC

DANE COUNTY REGIONAL AIRPORT MADISON

Roles and Responsibilities
Part 150 Study

Airport

- Project sponsor
- Certification that documentation is true and accurate
- Recommend measures to address incompatible land use

Consultant Team

- Overall project management, documentation, and outreach
- Aircraft noise analysis and abatement planning
- Noise compatibility analysis and planning
- Aviation forecast and airfield analysis

FAA

- Certification that the documentation meets federal regulations and guidelines
- Approval of Airport-recommended measures

Technical Advisory Committee

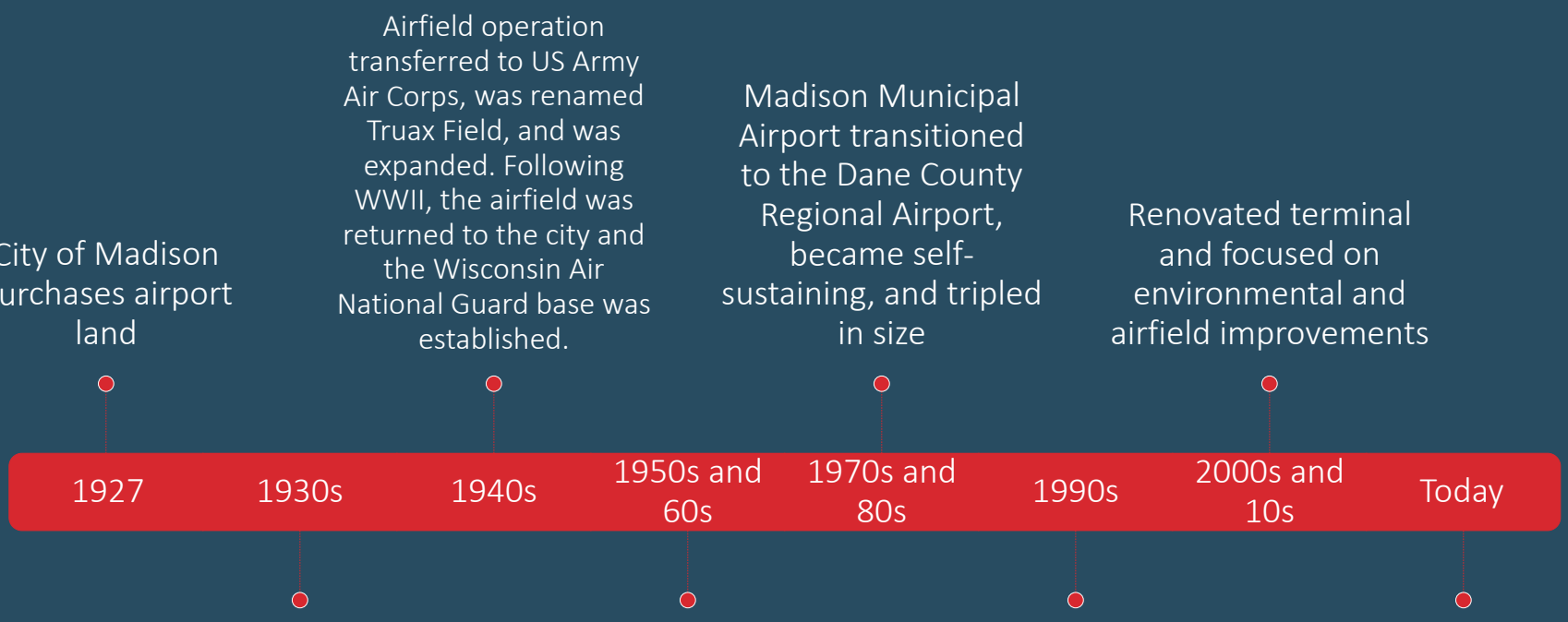
- Review study inputs, assumptions, analyses, documentation, etc.
- Input, advice, and guidance related to NEM and NCP development

Public

- Provide input on study during comment period
- Review public draft documents

DANE COUNTY REGIONAL AIRPORT MADISON

Airport History



Source: https://www.msnairport.com/about/facilities_maps/history

DANE COUNTY REGIONAL AIRPORT MADISON

Airport Facility Overview

MSN

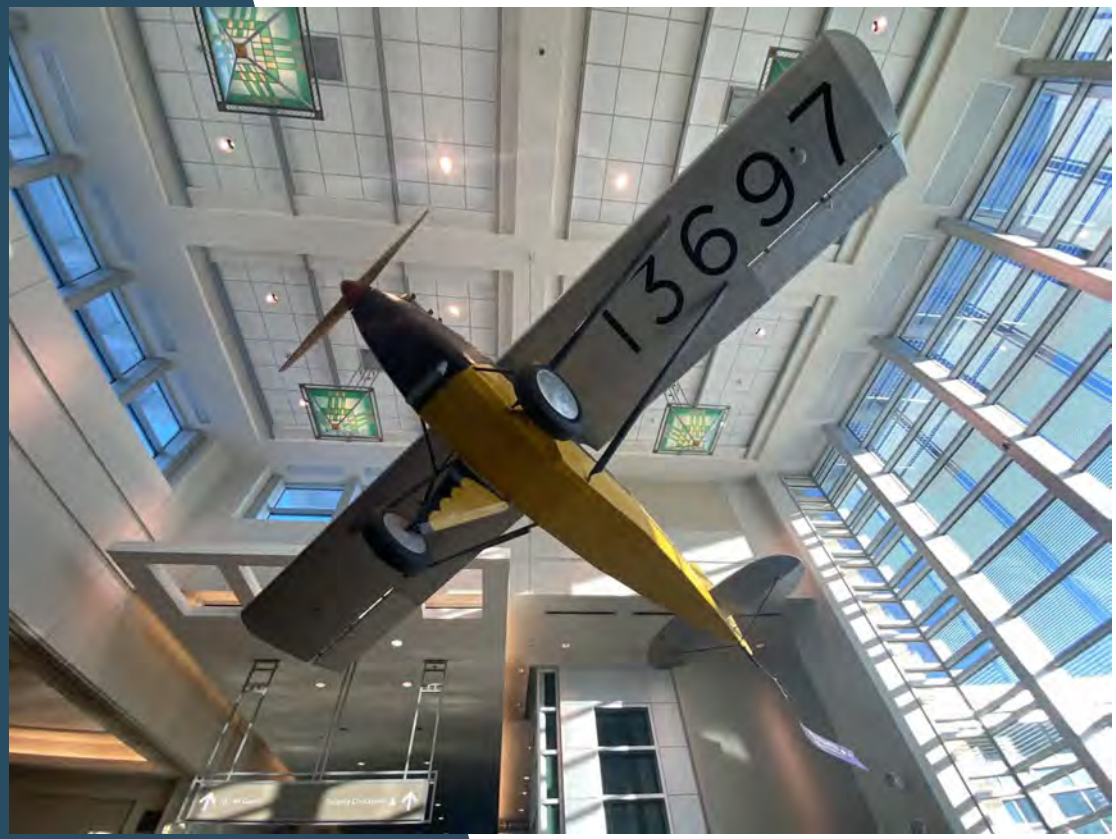
- Covers 3,500 acres and serves over 2.2 million commercial passengers each year
- Fixed-Base Operator Wisconsin Aviation is located on the east side of the airport

115th Fighter Wing of the Wisconsin Air National Guard (ANG)

- Chosen to host the F-35A mission and receive a new fleet of F-35A Lightning II aircraft beginning in Spring of 2023

Wisconsin Army National Guard (ARNG) 64th Troop Command

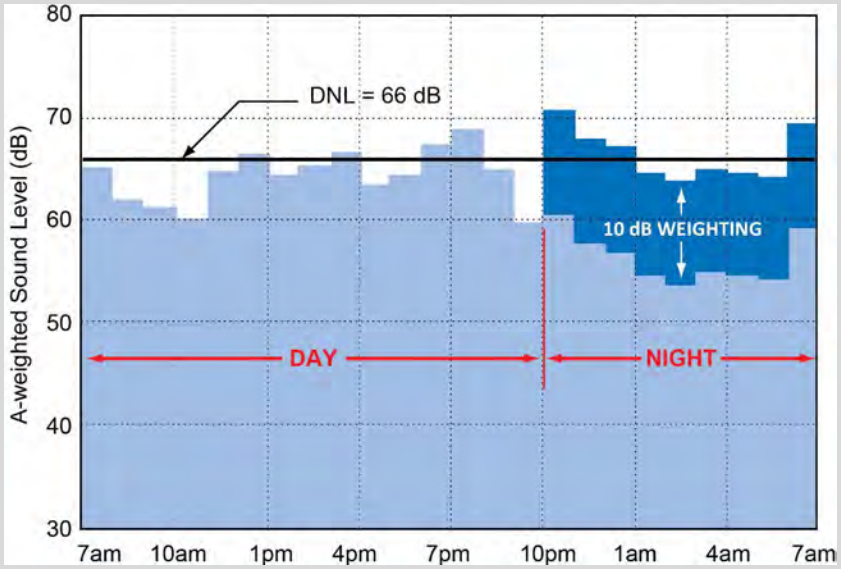
- Operates UH-60 Black Hawk helicopters at Truax Field

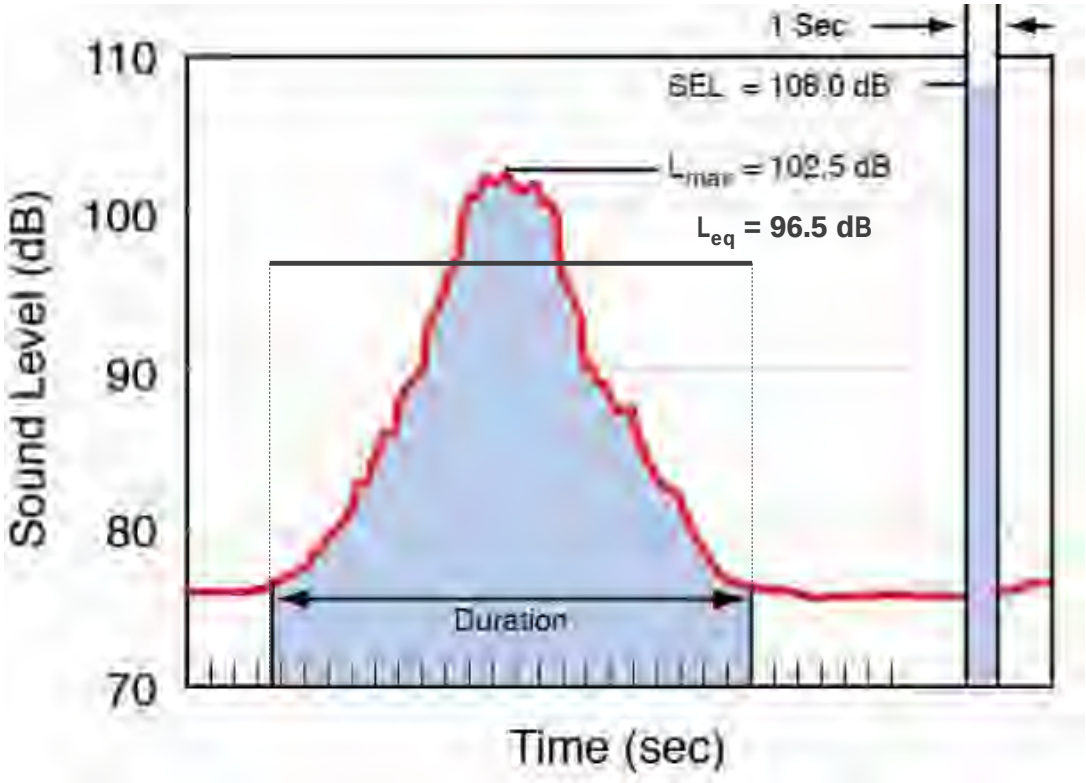


DANE COUNTY REGIONAL AIRPORT MADISON

Noise Terminology

- Maximum Noise Level (L_{max})
- Sound Exposure Level (SEL)
- Equivalent Sound Level (L_{eq})
- Day-Night Average Sound Level (DNL)





DANE COUNTY REGIONAL AIRPORT MADISON

Noise Terminology

- The decibel is a complex logarithmic quantity based on sound pressure
- A-weighted decibels correlate well with how we hear
- Noise levels can be expressed many ways depending on their purpose, including but not limited to:
  - Instantaneous maximum noise levels (Lmax)
  - Single event dose (SEL)
  - Long-duration exposure (DNL)
- FAA requires use of DNL in a Part 150 study
- FAA Part 150 land use compatibility guidelines:
  - All land use is compatible with aircraft noise less than DNL 65 dB
  - Land use compatibility assessments use 5-dB contour bands
    - 65 to 70 dB
    - 70 to 75 dB
    - Greater than 75 dB

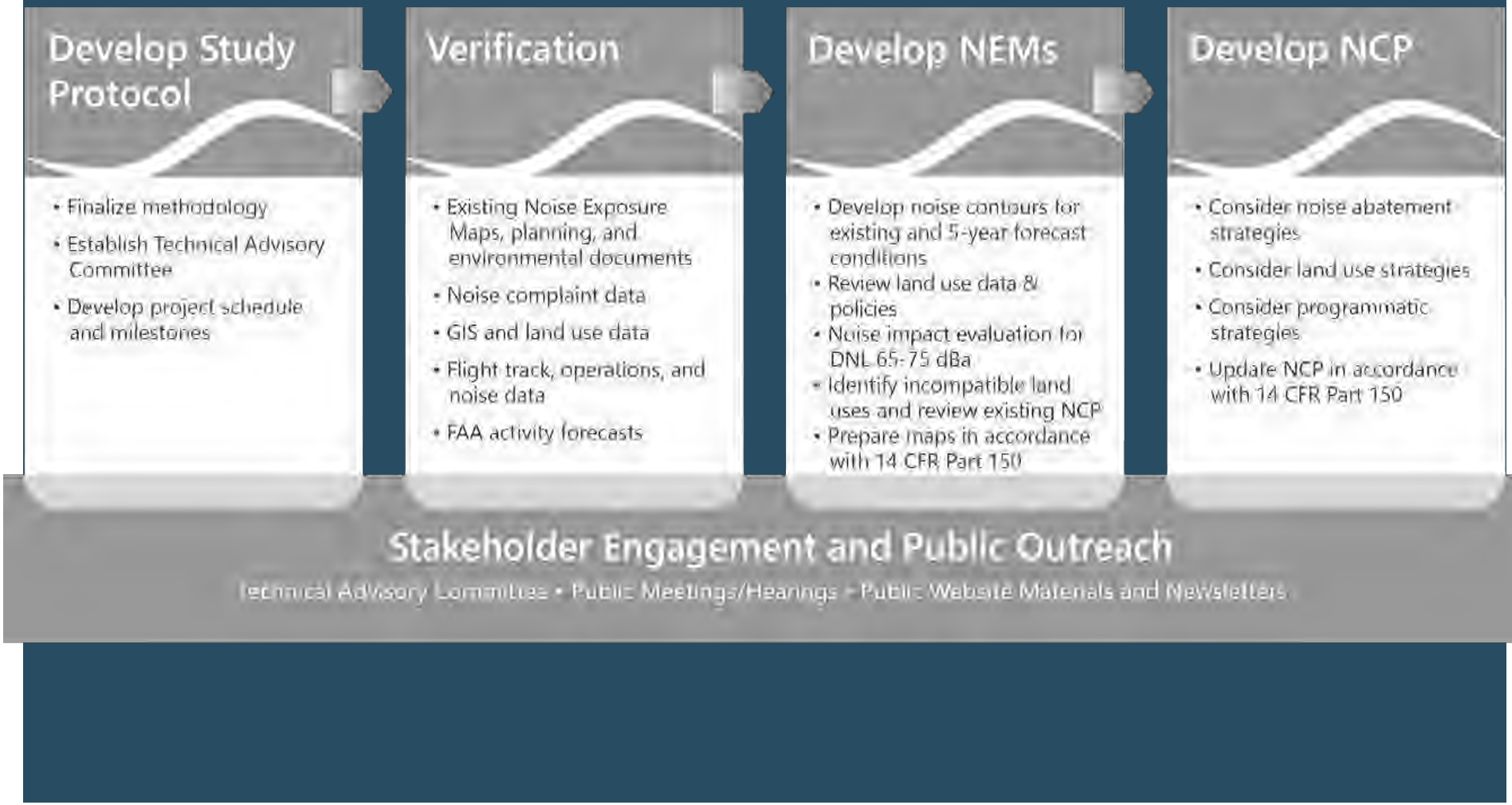
DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Overview: Major Elements

- FAA created in response to Federal Aviation Safety and Noise Abatement Act of 1979 (ASNA)
- Codified under Title 14 of the Code of Federal Regulations Part 150
  - Formal *citation* is "14 CFR Part 150," informal is "Part 150"
- Two primary elements
  - Noise Exposure Map (NEM)
  - Noise Compatibility Program (NCP)
  - Detailed FAA guidance available at www.faa.gov/airports/environmental/airport_noise/
- Consultation required with:
  - All local, state, and federal entities with control over land use within DNL 65+ dB
  - FAA regional officials, regular aeronautical users of the airport
  - All parties interested in review of and comment on the draft
- Opportunity must be offered for a final public hearing on the NCP
- MSN will exceed all consultation requirements
  - Improved stakeholder relations is typically one of the most valuable study results

DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Overview: Study Process



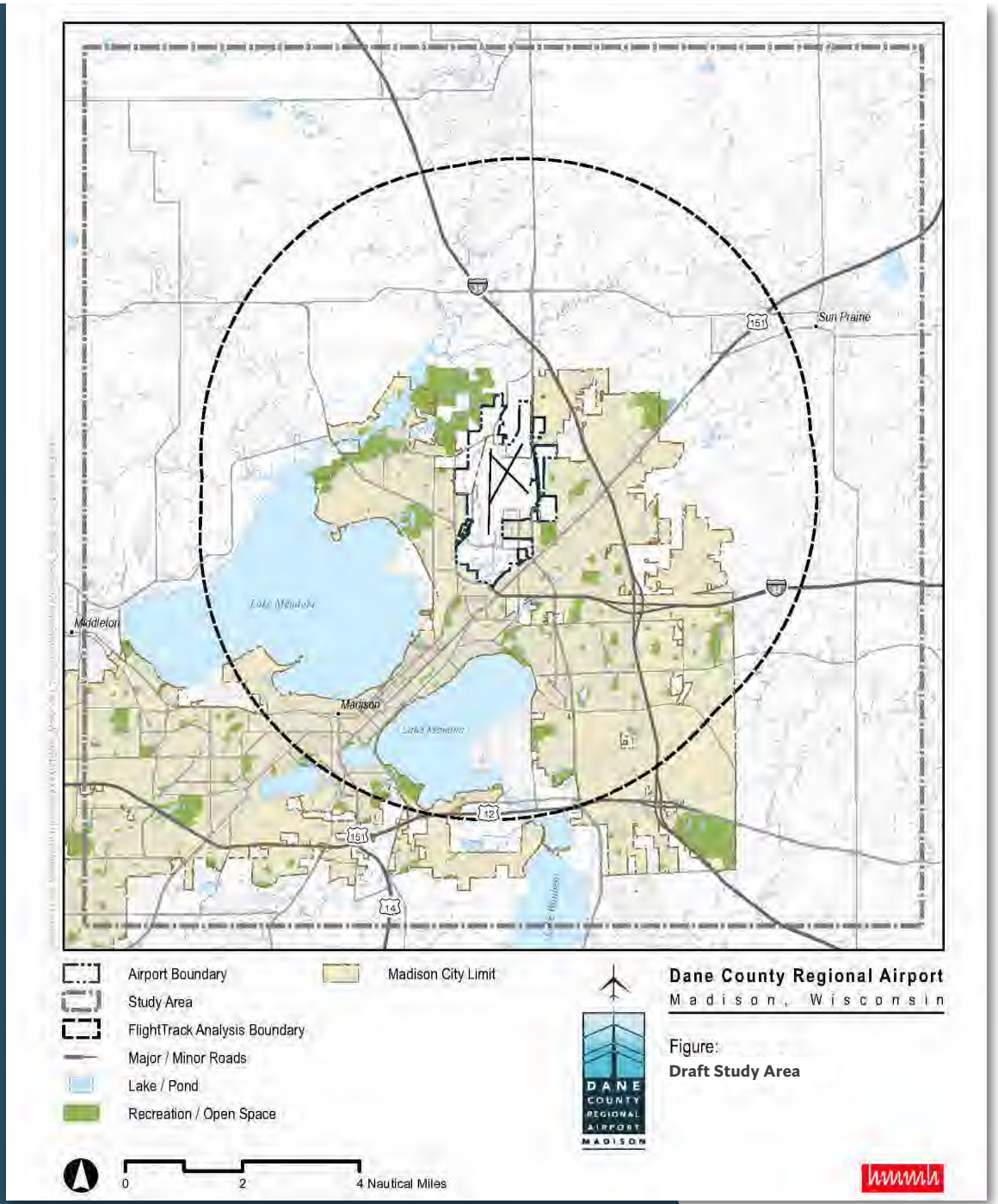
DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Overview: Noise Exposure Map

- FAA “accepts” NEM as compliant with Part 150 standards
- NEM must include detailed description of
  - Airport layout, aircraft operations, and other inputs to noise model
  - Aircraft noise exposure in terms of Day-Night Average Sound Level (DNL)
  - Land uses within DNL 65+ decibel (dB) contours
  - Noise / land use compatibility statistics within DNL 65+ dB contours
- NEM must address two calendar years
  - Year of submission (2022)
  - Forecast (at least five years from year of submission; 2027)
  - FAA reviews forecasts for consistency with Terminal Area Forecast (TAF)

DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Overview: Draft Study Area



Part 150 Overview: Noise Compatibility Program

- NCP must address three major categories of proposed actions
  1. Noise abatement measures
  2. Compatible land use measures
  3. Program management/administrative measures
- FAA *accepts* NCP as compliant with Part 150 standards
- FAA reviews and *approves* or *disapproves* proposals as compliant with Part 150 standards on a measure-by-measure basis

DANE COUNTY REGIONAL AIRPORT MADISON

Proposed Schedule

Meeting / Activity	Anticipated Purpose	Anticipated Time Frame
Kick-Off Meeting with MSN and the Part 150 Team	Define organizational and procedural matters and public outreach, review and refine scope and schedule details.	January 20, 2022
1st Public Open House	Introduction to Part 150, set expectations, discuss stakeholder roles, identify issues of concern	April 26, 2022
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Note: Schedule is subject to change

DANE COUNTY REGIONAL AIRPORT MADISON

MSN Part 150 Study Website and Project Contacts

- Website: https://www.msnairport.com/about/ecomentality/Part-150-Study
- Project email address: part150study@msnairport.com
- Tim Middleton – HMMH Project Manager, Contact: tmiddleton@hmmh.com
- Michael Riechers – MSN Director of Marketing and Communications, Contact: Riechers.Michael@msnairport.com

SCAN HERE
FOR MSN PART 150
WEBSITE

FLOWCODE PRIVACY.FLOWCODE.COM

DANE COUNTY REGIONAL AIRPORT MADISON

Part 150 Noise Study

Part 150 Overview

Dane County is updating the Noise Compatibility Plan for Dane County Regional Airport (MSN) in accordance with the Federal Aviation Administration's (FAA) voluntary process codified under Title 14 of the Code of Federal Regulations Part 150 (14 CFR Part 150 or simply "Part 150"). Harris Miller Miller & Hanson, in association with Mead & Hunt and the Jones Payne Group, was retained to assist with preparation of the two elements that make up the Part 150 study: The Noise Exposure Map (NEM) and Noise Compatibility Program (NCP).

The NEM inventories and documents noise exposure from the annual-average daily aircraft operations for existing and forecast conditions; and the resulting land use compatibility. The NCP evaluates and recommends measures to address the land uses not compatible with the documented aircraft noise exposure. The implementation of the recommended measures in the NCP, once approved by the FAA, are potentially eligible for federal assistance.

Part 150 regulation prescribes specific standards and systems for:

- Measuring noise
- Estimating cumulative noise exposure
- Describing noise exposure (including instantaneous, single event, and cumulative levels)
- Identifying noncompatible land uses
- Coordinating Noise Compatibility Program development with airport users, the FAA, land use officials and neighbors
- Documenting the analytical process and development of the Noise Exposure Maps and Noise Compatibility Program
- Submitting documentation to the FAA
- Public consultation
- FAA and public review processes
- FAA approval or disapproval of the submission

The MSN Part 150 update will provide multiple opportunities for community engagement. Upcoming public open house dates, locations and materials will be posted on this website throughout the project. Periodic Part 150 newsletters will be prepared to share critical information with the interested public.

Dane County Regional Airport Overview

Dane County, as the owner and operator of Dane County Regional Airport (MSN), is the sponsor of the Study. As representatives of Dane County, MSN staff have final decision-making authority regarding all aspects of the Study, including but not limited to the conduct of the Study; stakeholder engagement; the certification of the accuracy of the documentation submitted to the FAA; and the recommended measures included in the NCP.

The 115th Fighter Wing of the Wisconsin Air National Guard (ANG) is located at Truax Field within MSN. The unit currently has a fleet of F-16C Block 30 fighter aircraft and one RC-26B Metroliner. The Air Force selected the 115th Fighter Wing to host the F-35A mission and receive a new fleet of F-35A Lightning II aircraft beginning in Spring of 2023. The Wisconsin ANG is planning a phased replacement of the F-16 fleet with F-35A aircraft. The Study Team will consult with the Wisconsin ANG to understand their plans for operation of F-35A aircraft during the existing (2022) and forecast year (2027) for the NEM.

MSN Part 150 Resources

Public Open House 1 - 4/26/22

Informational Boards (PDF)

Summer 2022 Part 150 Newsletter

Click Here (PDF)

FAA Part 150 Homepage - https://www.faa.gov/airports/environmental/airport_noise/

In The News

EcoMentality

- Part 150 Study
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- Energy Conservation / Renewable Energy
- Water Conservation / Quality Improvements
- PFAS Information
- Noise Abatement
- Noise FAQ
- Noise Report Form

Facilities & Maps

Airport Operations

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About Us

Need information on Dane County Regional Airport? Click here to learn more about the people who keep things running along with our commitment to environmental sustainability and responsibility. Or need the latest news on airport routes, carriers and special events, you'll find it here.

Read More »

Noise Compatibility Planning Study

Dane County Regional Airport

Public Open House Sign-in Sheet

April 26, 2022

#	Name	Email Address	Address	Phone Number
1	Sherrie Johnson	sherrie.and.katie@gmail.com	906 Fairmont Ave Madison	—
2	Tom Boswell	tomboswell2002@yahoo.com	1945 Sachtjen St Madison, 53704	608 718-7312
3	Patricia Rourke	paddyrourke@gmail.com	2442 E. Mifflin St Madison, 53704	608 246-8084
4	David Bierman	dbierman@waco.com	514 Nova Way Madison WI 53704	608-370-5761
5	Rick Soletski	dpenguin@hotmail.com	3322 QUINCY AV	608-244-0330
6	Alder Charles Myadze	District 18@cityofmadison		608-669-6751
7	Supervisor Larry Palm	palm.larry@countyofdane.com		
8	Justin Williams	justin.d.williams1@gmail.com		608 577 8359

Noise Compatibility Planning Study

Dane County Regional Airport

Public Open House Sign-in Sheet

April 26, 2022

#	Name	Email Address	Address	Phone Number
9	Heidi Wegleitner	wegleitner.heidi@countyofdane.com	1941 E. Dayton St.	608-333-3676
10	Kathy + Bill Hutchison	hutch7314@gmail.com	65 Cherokee Ct #203	608-220-0697
11	Linda Hall	lhall34@gmail.com	1934 Ruthledge	608-692-1882
12	Steve Books	Books24U@AOL.com	625 Spruce St.	608-358-7906
13	DAN COX		MADISON	
14				
15				
16				

Noise Compatibility Planning Study

Dane County Regional Airport

Public Open House Sign-in Sheet

April 26, 2022

#	Name	Email Address	Address	Phone Number
1	JANE H KAVALOSKI	Jhkavaloski @gmail.com	57 LANSING ST	608 709-1170
2	Steve Klafka	steven.klafka @gmail.com	508 Elmside Blvd 53704	
3	Peter & Marsha Cannon	APCANNON @ gmail.com	5 Cherokee Cir H202 53704	608-251 1276
4	Melissa Agard	sen.agarde legis.wi.gov	126 South State Capitol	608 - 266-9060
5	Hannah Lee	casaelmilagro @gmail.com	3834 whitman ln. #312 Madison 53704	608- 588- 7365
6	Beth Sluys	sluysbo aol.com	514 NOVA WAY Madison 53704	812 322 5065
7	Jaime Cordova	Cordova.a.jaime @ gmail.com	324 Norris Ct Madison 53703	562 659-4270
8	Joyce Wells	jhould@charter.net	carpenter Ave Madison 53704	—

Noise Compatibility Planning Study

Dane County Regional Airport

Public Open House Sign-in Sheet

April 26, 2022

#	Name	Email Address	Address	Phone Number
9	Steve Verburg	steverburg@gmail	1614 Wendy 53716	608 212 9726
10	Dan Statz	dstatz@wisalumni.com	1707 Blue Ridge Dr.	608-245-4386
11	Scott Pigg	scottkpigg@gmail.com	414 Russell St 53704	608-438-4904
12	Tyson Vitale	tyvitale@gmail.com	518 McCormick Ave	608-571 6885
13	Ron Schutz	goschut@gmail.com	133 Division St	608 692- 2238 38
14	Kelly Kearns	KEARNS@UWALUMNI.COM	1329 Crowley Ave	608-345-7144
15	Martha Pings	wi218@ameritech.net	218 Oak St 53704	
16	Jodi Wortsman	wortsmanjodi@gmail.com	2610 E. Dayton St. Madison WI 53704	608-358-4331

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MSN Airport (@MSN_Airport) / T

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MSN Airport @MSN_Airport · Apr 21

The Part 150 Noise Study Informational Open House at Dane County Regional Airport will take place Tuesday, April 26th between 5-8 P.M. in Conference Room 1. This event will cover the two-year noise study at the airport. Read more: ow.ly/XIve50IO8JQ

MSN Airport @MSN_Airport · Apr 19

The federal mask mandate at airports has been lifted. MSN Airport will continue our cleaning and sanitizing practices. If you have questions about the new rules, please see @TSA's full statement, or contact your airline. TSA statement: ow.ly/NiFm50IMI3J

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Dane County Regional Airport

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About

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4000 International Ln
Madison, WI 53704

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Dane County Regional Airport (MSN) is the gateway to the Madison area's vibrant economy and legendary natural beauty. More than 85 commercial flights ... See more

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Dane County Regional Airport
4 hrs ·

Happy Earth Day from Dana and all her friends! Let's celebrate! We're giving away eco-friendly reusable straws and airplane shaped seed packets. Set your profile to public and tag a friend in the comments for a chance to win! We'll message the winners on Monday 4/25.

#MSNAirport #MSN #EarthDay #Contest #Giveaway

3

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Dane County Regional Airport
Yesterday at 10:00 AM ·

The Part 150 Noise Study Informational Open House at Dane County Regional Airport will take place Tuesday, April 26th between 5-8 P.M. in Conference Room 1, adjacent to the baggage claim. This event is open to the public and will cover the two-year noise study at the airport. Read more: http://ow.ly/yB6Y50IO8JS

MSNAIRPORT.COM
Part 150 Noise Study

1

DANE COUNTY REGIONAL AIRPORT
NOISE COMPATIBILITY PLANNING STUDY

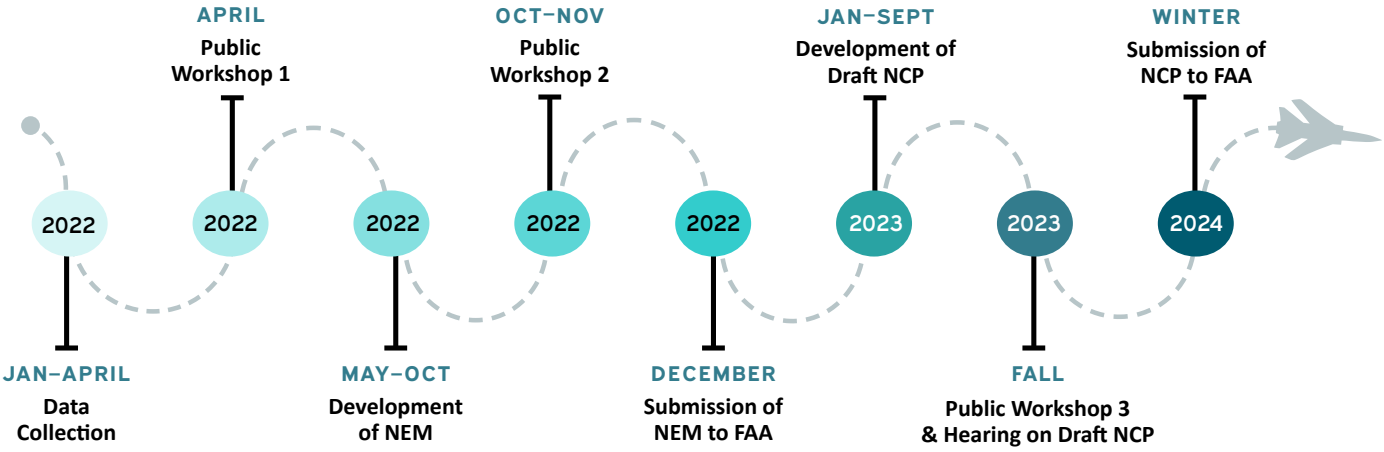
Summer 2022 Newsletter

Study Overview

Dane County Regional Airport (MSN) is undertaking a Noise Compatibility Planning Study in accordance with Title 14 of the Code of Federal Regulation Part 150 (14 CFR Part 150 or "Part 150"). The purpose of the Study is to develop an accurate Noise Exposure Map (NEM) that reflects current and future airport operations; communicate noise levels to the surrounding communities; and collaboratively develop noise abatement, mitigation, and management measures through a Noise Compatibility Program (NCP). The NEM and NCP prepared under this Study will be subject to Federal Aviation Administration (FAA) acceptance and approval, respectively.

Part 150 describes a formal process for airport operators to address airport noise in terms of land use compatibility. The regulation establishes thresholds for aircraft noise exposure for specific land use categories. Part 150 studies are voluntary and allow airports to apply for federal funding for implementation of their noise program including FAA-approved measures recommended to reduce or eliminate incompatible land use. The study is expected to be completed in 2024.

Study Phases Timeline



Public Outreach and Stakeholder Engagement

Stakeholders and those interested in aircraft noise compatibility planning will be afforded an ongoing opportunity to learn about the Study and provide feedback. This will occur through various mechanisms, including a Technical Advisory Committee (TAC), a project website, project newsletters, public draft documents, public open houses, public comment periods, and a public hearing.

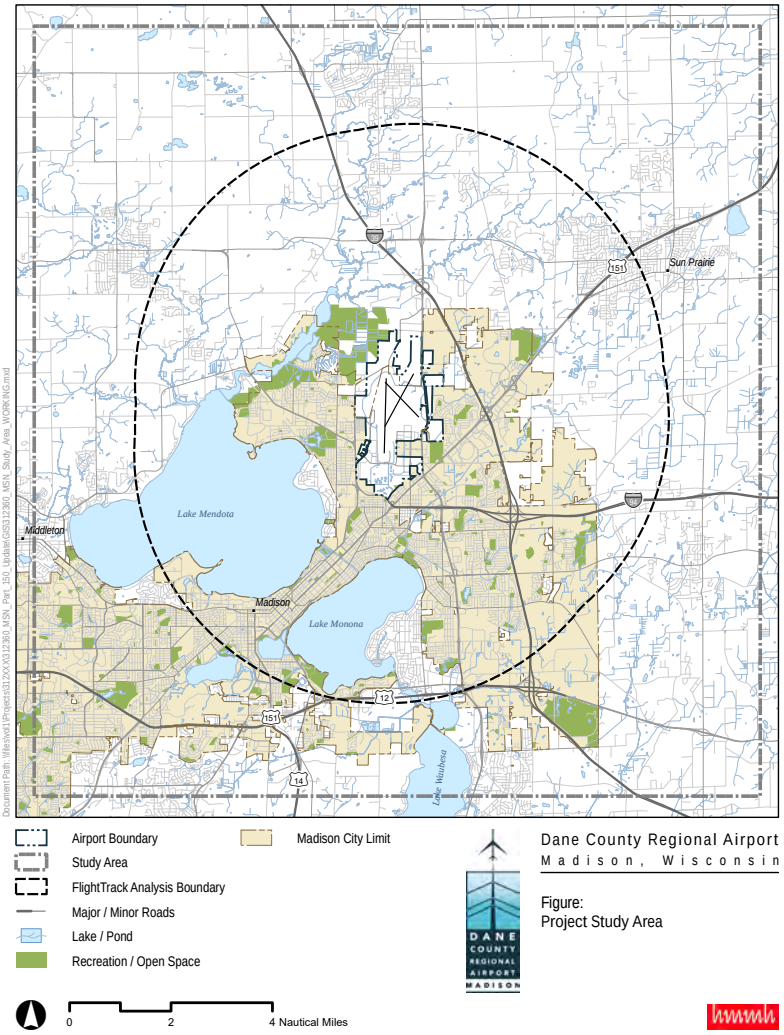
First Open House Recap

Thank you to everyone who attended the first open house held on April 26, 2022! The presentation boards are available at this link: https://www.msnairport.com/documents/pdf/MSN-20220426-Public-Mtg1-Boards-Final.pdf.

Noise Exposure Map and Noise Compatibility Plan

The NEM documentation describes the airport layout and operation, aircraft-related noise exposure, land uses in the airport environs, and the resulting noise/land use compatibility. The NEM documentation must address two time frames: (1) data representing the year of submission (the "existing conditions") and (2) a forecast year that is at least five years following the year of submission (the "forecast conditions"). Part 150 requires more than simple "maps" to provide all the necessary information in an NEM. In addition to graphics, the NEM documentation presents tabulated data and describes the data collection and analysis undertaken in its development. MSN is working with the Wisconsin Air National Guard (ANG) 115th Fighter Wing concerning the anticipated replacement of the aging F-16 fleet with newer generation F-35 aircraft to ensure that accurate operations data are reflected in the noise modeling completed for the Study.

The NCP is a list of the actions the airport operator recommends to minimize existing and future noise/land use incompatibilities. The NCP documentation must recount the development of the program, including a description of all measures considered, the reasons that individual measures were recommended or not recommended by MSN, how measures will be implemented and funded, and the predicted effectiveness of individual measures and the overall program. Official FAA acceptance of the Part 150 submission and approval of the NCP measures does not eliminate requirements for formal environmental assessment of any proposed actions pursuant to requirements of the National Environmental Policy Act (NEPA). However, acceptance of the submission is a prerequisite to application for funding of implementation actions including NEPA.



Draft Study Area Map

Find Out More

www.msnairport.com/about/ecomentality/Part-150-Study

part150study@msnairport.com

Why is MSN undertaking a Part 150 Study?
MSN strives to be a good neighbor to the communities surrounding the airport. MSN is undertaking this study to develop an accurate NEM that reflects current and future airport operations including the impending F-35 operations, to communicate noise levels to the surrounding communities, and collaboratively develop noise abatement, mitigation, and management measures through an NCP.

How is noise exposure quanitified?
The FAA requires the use of the noise metric Day-Night Average Sound Level (DNL) to quantify noise exposure. DNL uses an average number of operations over a 24-hour period based on one year of aircraft operations data. The sound levels are then averaged (with nighttime noise weighted with an additional 10 decibels [dB]). Nighttime operations are weighted to represent the greater sensitivity for most people by nighttime sounds.

How will the noise contours be developed for the Part 150 Study?
The Noise Exposure Maps will be generated by a computer modeling program (Aviation Environmental Design Tool or "AEDT"), which is the modeling program prescribed by the FAA for noise studies. The input data for the AEDT includes a forecast of aircraft operations, on an annual average day, for each of the study years (broken down between day and night activity), runway utilization rates for aircraft types, flight track geometry for different aircraft types and other factors.

Why is DNL used to develop noise contours rather than the sound level I hear when planes are overhead?
The FAA requires the Noise Exposure Map noise contours to be based on DNL, and for DNL to be used to assess land use compatibility. The advantage of DNL is that it reflects an annual average of 24-hour noise exposure and not just the noise level at a specific moment in time. The noise when aircraft are overhead is averaged with the times during the day when there is less or no aircraft noise, so the DNL level for a particular location is considerably lower than the highest decibel levels that might be heard at that location, or measured on a noise meter, during aircraft overflights.

Does DNL take into account the time of day when noise occurs?
Yes. 10 decibels is added to the noise exposure from each nighttime flight (from 10 p.m. to 7 a.m.). This is mathematically equivalent to counting a single nighttime flight the same as 10 identical day-time flights.

Does DNL take into account weather and topography?
Yes. As required by the FAA, a 30-year average weather history is used to develop the noise exposure contours. Topographic data is also used to accurately account for the distance from the aircraft (noise source) to the receiver on the ground using actual elevations around MSN airport.

Will noise monitors be used in developing the updated noise exposure maps for the airport?
No. The FAA requires DNL contours to be developed through its computer modeling program rather than actual noise measurements. The input into the modeling program is far more comprehensive than could possibly be obtained from field measurements, and modeling is the only practical way of determining the noise that will be experienced at all of the geographic points that are represented in the noise contours. Noise modeling is also necessary to forecast the noise that is expected in the future, as required by Part 150. The FAA noise modeling program has been shown to accurately portray the results from measurements in the field.

Could the Part 150 Study determine that the F-35 aircraft is too loud to operate at MSN?
No. 14 CFR Part 150 is focused on addressing the land use compatibility conditions around an airport based on existing and future operations. The MSN Part 150 Study will include the projected F-35 operations in the forecast NEM to assess land use compatibility as a result of the projected F-35 operations; and then determine NCP measures to address incompatible land uses for that future condition NEM.

How is the study funded?
The FAA provided funding for the study from an Airport Improvement Program (AIP) grant. The AIP grants come from the Airport and Airway Trust Fund. The Trust

Fund was established by Congress in 1970 to provide a dedicated funding source for the U.S. aviation system, and it helps finance the FAA's investment in the nation's airports and airways. The Trust Fund receives funding from taxes on aviation fuel and on commercial airline tickets. The MSN Part 150 Study is not funded with local taxpayer dollars.

Does Part 150 consider health effects and impacts of noise on children's hearing?

No. Part 150 does not consider health effects and impacts of noise on children's hearing. MSN is committed to conducting the Noise Compatibility Planning Study in accordance with Title 14 of the Code of Federal Regulation Part 150 (14 CFR Part 150), following FAA requirements and guidelines limited to land use compatibility around airports. FAA acknowledges that noise or unwanted sound is known to have several adverse effects on humans, such as communication interference, sleep disturbance, physiological responses, and annoyance. The FAA continues to research these topics to inform their aircraft noise policy. A Federal Register noticed published in 2021 summarizes the latest research findings: https://www.federalregister.gov/documents/2021/01/13/2021-00564/overview-of-faa-aircraft-noise-policy-and-research-efforts-request-for-input-on-research-activities. Additional information is available on the FAA website, https://www.faa.gov/regulations_policies/policy_guidance/noise.

How is MSN considering environmental justice in the Part 150 Study?

14 CFR Part 150 does not specifically address environmental justice. As the "airport operator", MSN is responsible for preparing the NEM, recommending NCP measures, pursuing implementation of the adopted NCP measures and managing the consultant team. MSN may apply for grant funding for the implementation of FAA-approved Airport Improvement Program (AIP) eligible measures. A MSN-recommended and FAA-approved measure does not require the implementation of the measure, but merely demonstrates that the measure is in compliance with Part 150 and allows MSN to apply for federal Airport Improvement Program (AIP) grants for measures that are eligible. Additionally, if a measure requires subsequent FAA action, its implementation may require environmental study under the National Environmental Policy Act (NEPA). NEPA requires environmental justice to be analyzed as a resource category. Chapter 12.2 of the FAA 1050.1F Desk Reference (v2) discusses analysis of environmental justice for FAA actions subject to NEPA review: https://www.faa.gov/sites/faa.gov/files/about/office_org/headquarters_offices/apl/12-socioecon-enviro.pdf.

Photos from the first open house held on April 26, 2022

DANE COUNTY REGIONAL AIRPORT
NOISE COMPATIBILITY PLANNING STUDY

Fall 2022 Newsletter

Study Overview

Dane County Regional Airport (MSN) is undertaking a Noise Compatibility Planning Study in accordance with Title 14 of the Code of Federal Regulation Part 150 (14 CFR Part 150 or Part 150). The purpose of the Study is to develop an accurate Noise Exposure Map (NEM) that reflects current and future airport operations, to communicate noise levels to the surrounding communities, and to collaboratively develop noise abatement, mitigation, and/or management measures through a Noise Compatibility Program (NCP). The NEM and NCP prepared under this Study will be subject to Federal Aviation Administration (FAA) acceptance and approval, respectively.

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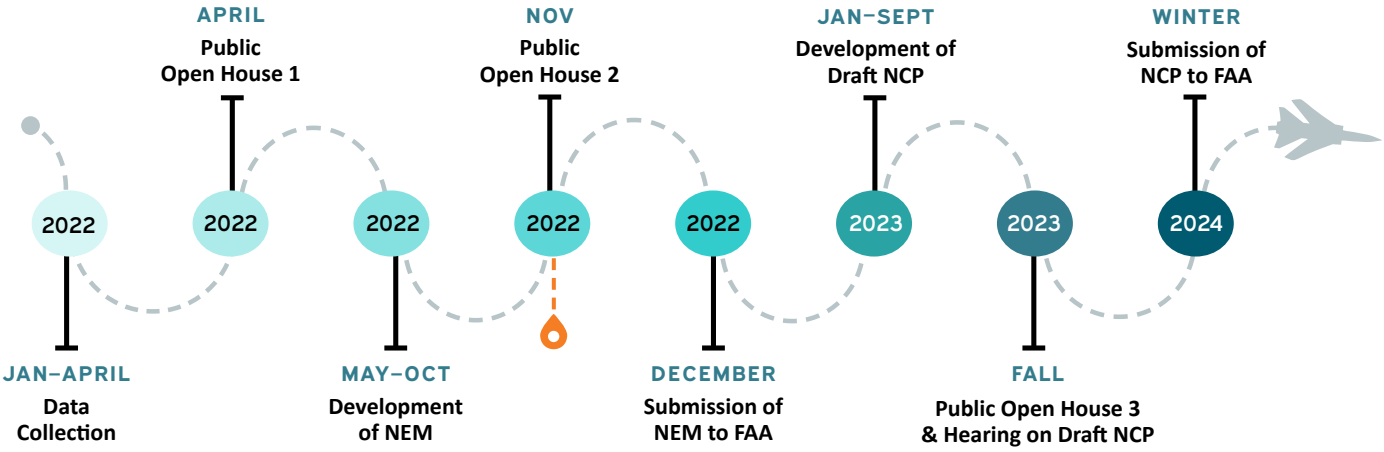
Study Phases Timeline



Public Outreach and Stakeholder Engagement

Stakeholders and those interested in land use compatibility planning have an ongoing opportunity to learn about the Study and provide feedback. This opportunity is occuring through various mechanisms, including a Technical Advisory Committee, a project website, project newsletters, public draft documents, public open houses, public comment periods, and a public hearing.

Public Open House 2

You're invited to receive updates on the Study's progress and provide feedback by attending the upcoming open house.

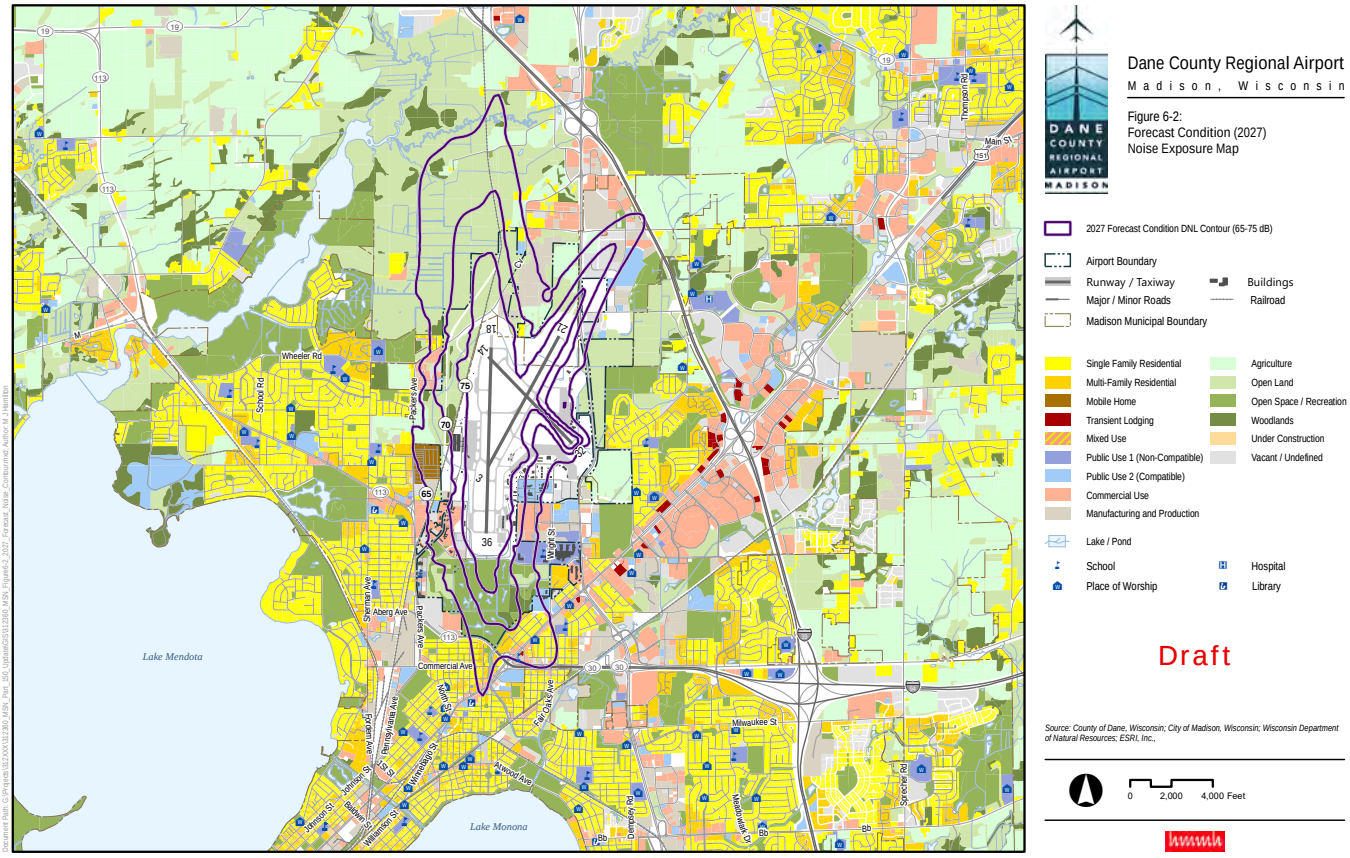
When: Monday, November 14, 6–8 pm

Where: Dane County Regional Airport lobby between Terminal Doors 1 & 2

Draft NEM Update

As part of the ongoing Part 150 Study, the noise exposure from MSN aircraft operations has been assessed following the FAA-prescribed Part 150 process, resulting in draft aircraft noise exposure contours depicting the existing condition (2022) and a five-year forecast condition (2027) overlaid on an updated land use map. The draft 2027 Future Condition NEM is provided below, which includes the 65, 70, and 75 decibel (dB) noise exposure contours using the FAA-required Day-Night Average Sound Level (DNL) metric. According to Part 150 regulations, all land uses outside of the 65 DNL contour are compatible.

The land use analysis of the draft 2027 NEM resulted in the identification of 1,250 residential units and three noise-sensitive parcels as potentially incompatible with noise from MSN aircraft operations. The noise-sensitive parcels identified include Madison Area Technical College, Claudi's Kids Inc Day Care Center, and Ridgeway Church.



Find Out More

www.msnairport.com/about/ecomentality/Part-150-Study

part150study@msnairport.com