
CHAPTER 1: AIRPORT, COMMUNITY & AVIATION

ACTIVITY

Purpose and Scope

The information presented in this report represents the study findings for the 2025 Airport Master Plan study prepared for the City of Madison, the airport owner. Airport Master Plans are prepared in accordance with Federal Aviation Administration (FAA) [Advisory Circular \(AC\) 150/5070-6B, Airport Master Plans](#). This project was funded in part by the FAA under grant number AIG 3-46-0029-2026 and AIP 3-46-0030-030-2026.

This study for the Madison Municipal Airport will serve as an updated guide identifying future development necessary to accommodate existing and future aviation demands. The airport's current and forecasted safety, capacity and compatibility needs are addressed in this study. Many projects have been completed and new planning considerations have surfaced and the airport has not had a comprehensive master plan. The last Airport Layout Plan (ALP) was completed in 2008.

The airport sponsor and Kadrmas, Lee & Jackson (KLJ) developed the scope for the project in cooperation with FAA Airports District Office and South Dakota Department of Transportation (SDDOT) Office of Aeronautics officials to identify the specific needs and objectives of the airport owner. The scope includes work tasks with the purpose of documenting existing conditions, forecasting future aviation activity levels, identifying future facility requirements, formulating, and evaluating development alternatives, preparing implementation plans and engaging the public and other government agencies. Recommendations will be made for improvements that are triggered by safety requirements or demand thresholds.

The project received notice to proceed in 2025 from the airport sponsor. The baseline year for the planning study is 2025. Airport information was compiled from inventory efforts completed in 2025, while data from the most recent calendar year 2024 was utilized when complete annual data was required.

Planning Objectives

Planning considerations for an airport master plan are features, elements or events that should be evaluated because they have the potential to affect the airport facility over the long term.

Previous Planning Studies

The previous planning study and ALP for Madison Municipal Airport was completed and approved in 2008. The study evaluated the need to extend the primary runway as well as paving the crosswind runway. Aircraft parking areas were inadequate at the time so additional apron area was also considered. Since that time, the south apron has been expanded, and a full-length parallel taxiway has been constructed.

Planning Objectives

Based on the background and planning considerations, the planning objectives for this study identify the methods used to meet the airport development goals outlined by the airport owner. The key project objectives are identified as follows:

- Examine future extension of crosswind runway
- Examine future locations for aircraft runup operations
- Examine apron expansion and layout to accommodate additional aircraft parking
- Identify areas for future hangar development

FAA Aeronautical Survey

The FAA has implemented Aeronautical Survey requirements per [FAA AC 150/5300-18B: General Guidance and Specifications for Submission of Aeronautical Data to NGS: Field Data Collection and Geographic Information System \(GIS\) Standards](#). FAA airport survey requirements require obstruction data to be collected using assembled aerial imagery for the airport. This data is used in aeronautical publications and to develop instrument approach procedures.

An aeronautical survey was completed with this planning effort as required by FAA. Imagery was acquired in July 2025. When safety-critical data is needed to update runway end data or enhance an instrument approach then a new aeronautical survey will be required.

Master Plan Process

Guidelines for completing a Master Plan are set forth in [FAA AC 150/5070-6B](#). Each master plan study scope and level of effort is customized to fit each individual airport's needs and address critical issues.

The required and recommended contents of Airport Master Plans are detailed per FAA standards. Effective airport master plans are based on the analysis of significant amounts of data, and many airport master plans typically present not only the planning conclusions, but all data and accompanying analysis in considerable detail.

This Master Plan study presents data in a sequential manner following the typical FAA planning process. Appendices are included to provide more detailed information on a subject. In addition, internet hyperlinks are included to reference documents that are current as of the time of this report.

The Airport Master Planning process involves several coordinated steps. The master plan study for MDS consists of the following elements:

- **Pre-Planning** – Airport development concerns are identified and planning objectives prepared to address these issues. An overall vision for the study is formulated that will guide the process.
- **Facility & Environmental Inventory** – Overview of airport setting and environment; infrastructure and assets which includes airside, landside, and support facilities; airspace, navigational aids, and airport access utilizing data from an FAA Aeronautical Survey. Provide an overview of anticipated environmental impacts as part of the development of alternatives.
- **Determination of Critical Design Aircraft** – Evaluate fleet of aircraft utilizing the airport and using established forecasting methods, determine current and future critical design aircraft for the airport.
- **Demand Analysis and Facility Requirements** – Compare the existing capacity with the future demand and identify the facility requirements to satisfy the aviation safety, capacity, and compatibility needs.

Alternatives Analysis

The alternatives evaluation process is the most collaborative portion of the master plan study. The alternatives are reviewed and refined through meetings with federal/state agency representatives and the study's advisory group. Evaluation criteria is used to compare the alternatives. The alternative evaluation criteria for this study includes the following:

Operational Performance - How does each alternative allow the airport, and specifically the runway/taxiway system, to operate as a functional system, meet design standards, and meet the needs of the community.

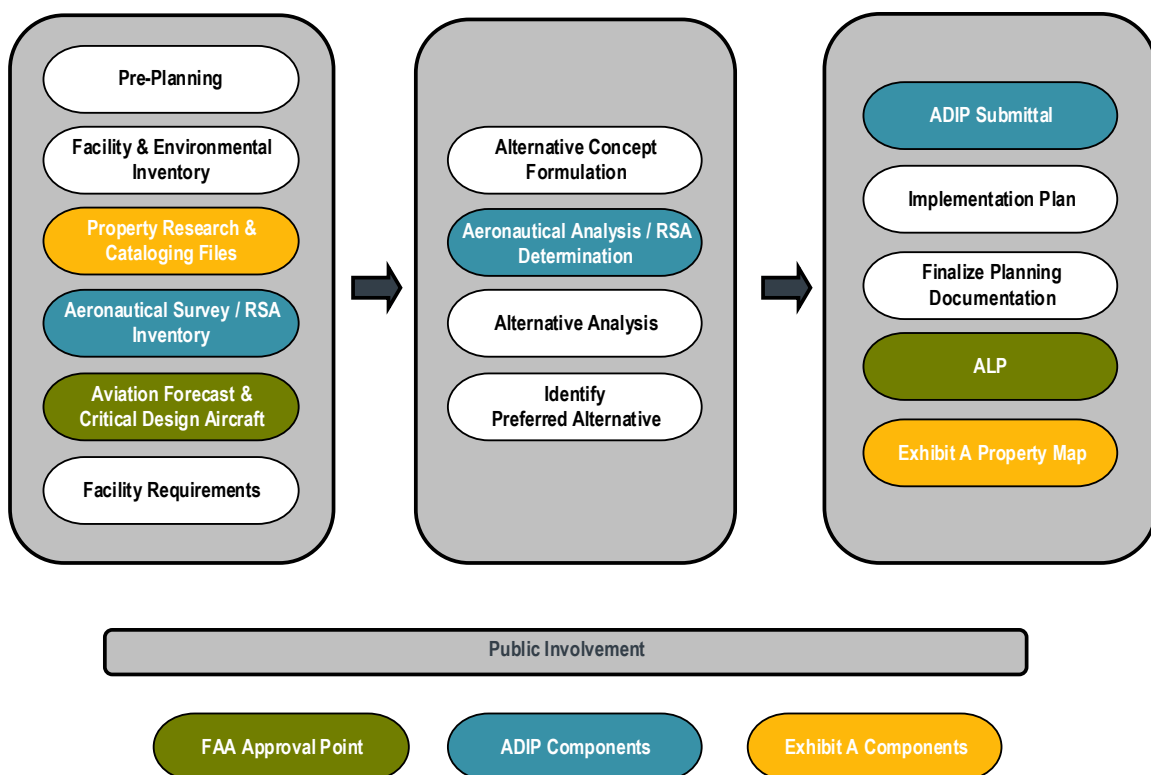
Best Planning Tenets – What are the strengths and weaknesses of the alternatives as it relates to 1) flexibility to meet demand and react to unforeseen changes; 2) highest and best on- and off-airport land use; 3) feasibility to implement politically and within practical phases; and 4) ability to satisfy airport user needs.

Environmental Factors – What are the potential effects of the alternatives upon the natural and built environment.

Fiscal Factors – How much will the options cost as compared to each other, while making the most use of federal, state and local resources.

- **Alternatives Development and Evaluation** – Identify and evaluate options considering both on-airport and off-airport impacts consistent with the study goals and objectives. A preferred alternative is selected.
- **Implementation Plan** – Provide a comprehensive plan for implementation of the preferred alternative including project triggers, sequencing, and cost estimates.
- **Airport Layout Plan (ALP)** – Document the existing and planned airport facilities through a set of drawings approved by the airport sponsor, state, and FAA.
- **Stakeholder and Public Involvement** – Prepare and execute a plan to engage important airport stakeholder and the public throughout the study to gather their input and address their concerns.

Figure 1-1 – Airport Master Planning Process



Source: KLI

Study Documentation & Approvals

The Master Plan Update was divided into chapters of information to document airport planning data, analysis, findings, and recommendation of the study. The following sections included in the narrative report:

- Chapter 1 – Airport, Community & Aviation Activity
- Chapter 2 – Runways & Taxiways
- Chapter 3 – Terminal Area & Support Facilities
- Chapter 4 – Implementation & Compatibility
- Chapter 5 – Airport Layout Plan

- Appendix A – Glossary of Terms
- Appendix B – General Aviation Airports 101
- Appendix C – Meetings and Public Involvement
- Appendix D – Runway Length Analysis
- Appendix E – Obstacle Action Plan
- Appendix F – Recycling, Reuse and Waste Reduction Plan

Each chapter was prepared separately and distributed to the airport owner for review and comment. After the airport owner's review, each draft chapter findings were made available to key airport stakeholders including the State and FAA for input prior to a final review and approval by the airport owner. Each approved final draft chapter was then published on the airport's website for public viewing.

The Master Plan Update was adopted by the City of Madison on [FUTURE DATE]. The ALP was submitted to the State and FAA for review and approval on [FUTURE DATE].

Public Involvement

Public involvement is a key component to the successful development of an Airport Master Plan study. The purpose is to encourage information sharing and feedback from airport stakeholders including the airport owner, airport users/tenants, local government officials, resource agencies, elected and appointed officials and the public. Public involvement provides valuable input to assist the airport owner in decision making and develop consensus on study conclusions.

A Planning Advisory Committee (PAC) was established to provide input throughout the study. The purpose of the PAC was to facilitate group discussion and feedback from different stakeholder groups, provide recommendations to the airport owner. Members represented the following stakeholders:

- Airport Board Members
- City Officials
- FBO Operator/Airport Manager
- Madison Regional Health System
- Madison High School

A website was created to post key meeting materials and provide a way for the public to submit comments and questions throughout the planning study. Additionally there will be a public open house to allow the general public to learn about the planning study and provide feedback once alternatives have been developed. See **Appendix C: Public Involvement** for other information including copies of public involvement meeting agendas, attendees, presentations, and summaries.

Airport & Community Overview

General

The Madison Municipal Airport is a general aviation airport serving the City of Madison and the surrounding areas of Lake County in east central South Dakota. The airport is part of the FAA's National Plan of Integrated Airports System (NPIAS) and is classified as a non-primary Local General Aviation (GA) airport. The 2020 South Dakota State Aviation System Plan (SDSASP) classified MDS as a Large General Aviation airport. See **Appendix B: General Aviation Airports 101** for additional details about airport classifications.

MDS has two active runways as shown in **Figure 1-2**. One runway is paved with a length of 5,000 feet and the other is a turf runway with a length of 2,380 feet. Additional airport facilities consist of a variety of hangars, aircraft tie down positions, self-service fueling and a terminal building. Fixed Base Operator (FBO) services are provided by Riggin Flight Service which includes pilot training and aircraft maintenance.

The apron can be accessed by a paved road and provides vehicle parking at the terminal building.

Location and Area Setting

Lake County is located in east central South Dakota. Madison is the largest city in the county. MDS is located approximately 1.8 miles east of Madison's central business district and is accessible via County Highway 36. Sioux Falls is located 36 miles to the south east and Brookings is approximately 25 miles to the north east.

The airport elevation is 1,718 feet above mean sea level (AMSL). The terrain around the airport consists of rolling hills and land use surrounding the east and north side of the airport is primarily agricultural, while on the south and west side is primarily commercial and residential.

Airport Ownership & Management

The airport is owned, operated and governed by the City of Madison with an airport advisory board. The board consists of five individuals appointed by the Mayor and City Commission. The Airport Board oversees the operations of the airport and the airport manager. Airport management services are provided under contract by the FBO (Riggin Flight Service) while maintenance and snow removal is provided by City of Madison employees.

Airport History

The Madison Municipal Airport was put into service in 1965 by the FAA . A list of major airport development projects in the last 15 years can be found in **Table 1-1 Past Airport Projects**.

Table 1-1 – Past Airport Projects

Year	Project
2010	Reconstruct Hangar Taxiways
2010	Major Crack Repair Apron and Taxiway
2012	Land Acquisition
2014	Prepare Wildlife Hazard Management Plan
2016	Drainage Improvements, Wetland Mitigation and Fence
2017	Wetland Mitigation
2018	Construct Parallel Taxiway
2019	Rehabilitate Runway 15-33
2021	Construct South Apron
2023	Reconstruct Hangar Taxilane
2023	Reconstruct Parking Lot and Access Road

Source: FAA Records, KLJ Analysis

Land Area

The land for the original airport was acquired in 1965 and continued expanding along with airport development projects. The airport's Exhibit A Property Map is being updated as a part of this study to the FAA's SOP 3.00 requirements. Research supporting this update shows that the Airport has [FUTURE RESEARCH] acres owned in fee simple and [FUTURE RESEARCH] acres in easement.

Airport Role

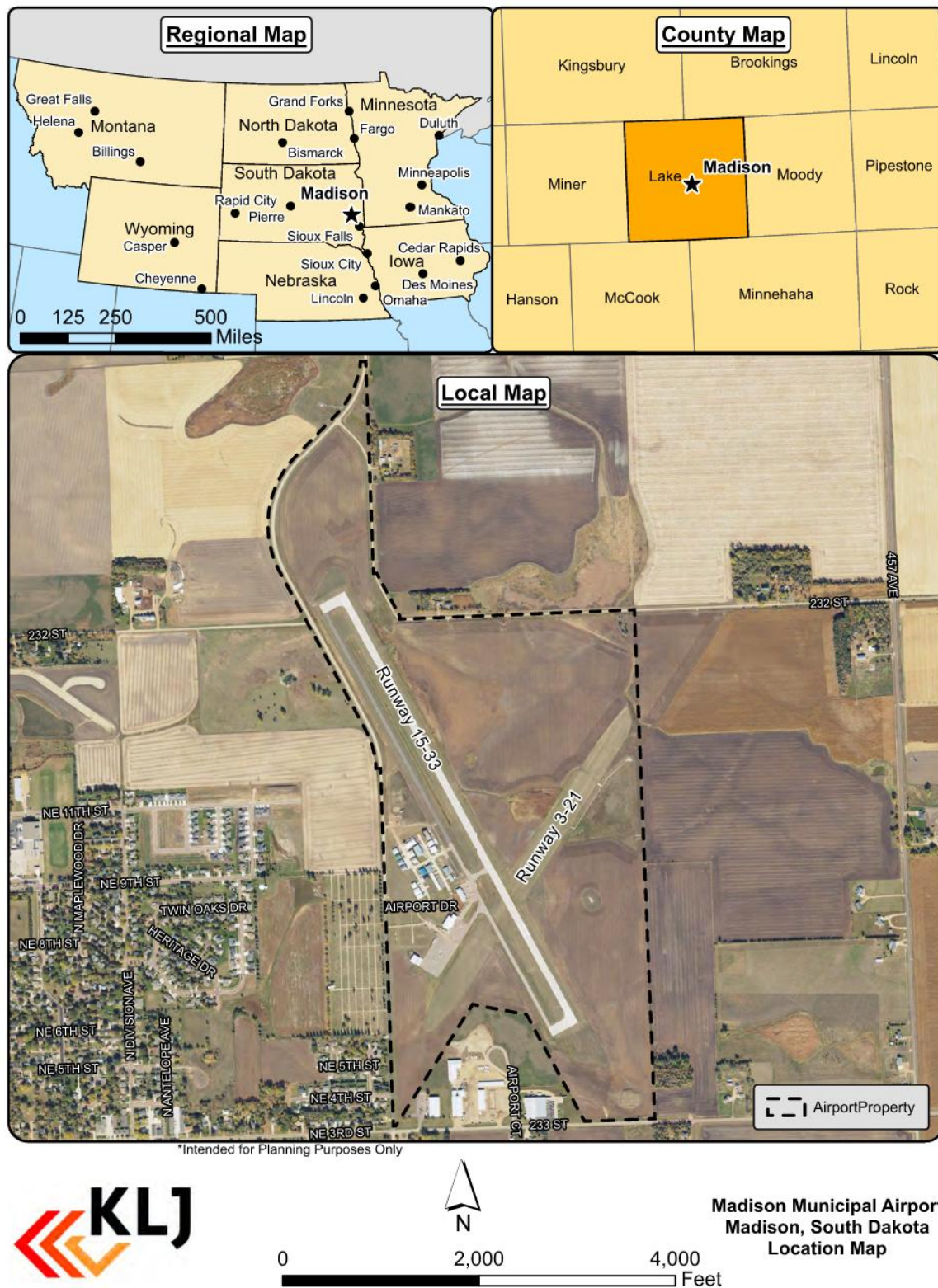
MDS is a general aviation (GA) airport, meaning it accommodates aeronautical activity other than scheduled commercial air service. GA airports provide vital services for the public including emergency response, community access and personal and business aviation. Additionally, general aviation airports serve a key role in the facilitation of pilot training. Nearby public use airports are listed in **Table 1-2** to provide background into what other airport facilities in the area offer.

Table 1-2 – Surrounding Public Airports

ID	Airport Name	City, State	Location from Airport	Instrument Approach	Longest Runway
MDS	Madison Municipal	Madison, SD	-	500' – 1 mi	5,000'
BKX	Brookings Regional	Brookings, SD	20.8 NE	400' – ½ mi	6,000'
4P3	Flandreau Municipal	Flandreau, SD	21.3 E	-	3,099'
FSD	Joe Foss Field	Sioux Falls, SD	30.0 SE	200' – ½ mi	9,000'
6E5	Wilder Airport	Desmet, SD	32.3 NW	300' – 1 mi	3,700'
PQN	Pipestone Municipal	Pipestone, MN	34.1 E	300' – 1 mi	4,306'
Y14	Marv Skie-Lincoln County	Tea, SD	35.9 S	-	3,650'
MHE	Mitchell Municipal	Mitchell, SD	43.8 SW	300' – ½ mi	6,701'
LYV	Quentin Aaneson Field	Luverne, MN	44.7 SE	200' – 1 mi	4,200'

Source: Airmav, SkyVector,

Figure 1-2 – Airport Location Map



The airport is part of the National Plan of Integrated Airport Systems (NPIAS) as classified by the Federal Aviation Administration (FAA). NPIAS airports are vital to the national air transportation system. According to FAA standards, the airport is classified as Local General Aviation Airport. The South Dakota Aeronautics Commission developed a State Aviation System Plan (SASP) in 2020 and airports were classified into five different roles: Basic Service, Small GA, Medium GA, Large GA and Commercial Service. Madison is classified as a Large General Aviation in the 2020 SD SASP. **Table 1-3** summarizes the airport's role and design as well as surrounding airports. See **Appendix B: General Aviation Airports 101** for more details on FAA design classifications and State classifications.

Table 1-3 Airport Role

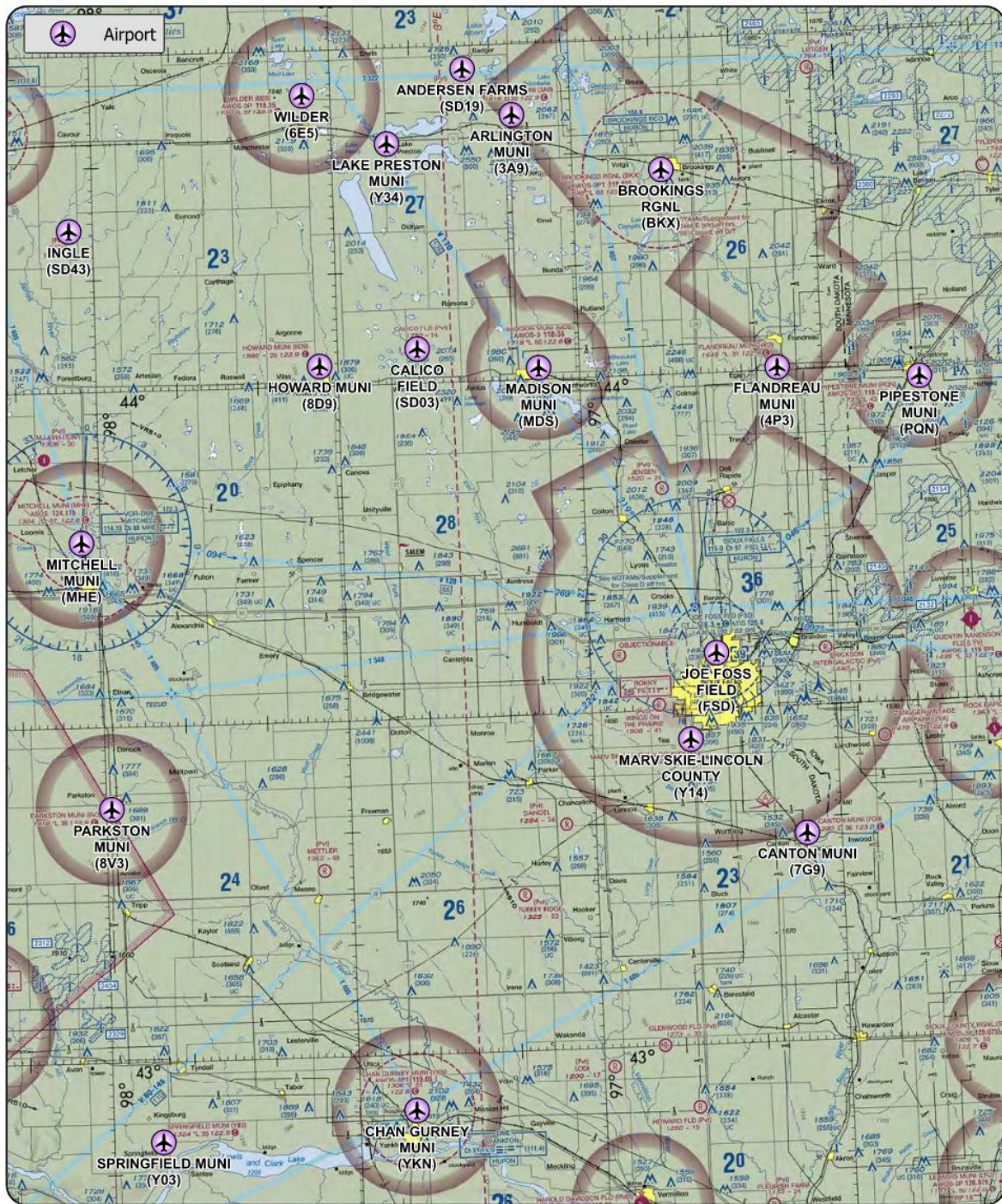
Airport ID	City, State	State Classification	FAA Classification	Based Aircraft
MDS	Madison, SD	Large GA	GA Local	49
BKX	Brookings, SD	Large GA	GA Regional	61
4P3	Flandreau, SD	Small GA	GA Basic	17
FSD	Sioux Falls, SD	Commercial Service	Primary Small Hub	93
6E5	De Smet, SD	Small GA	GA Basic	11
PQN	Pipestone, MN	Intermediate Large	GA Local	22
Y14	Tea, SD	Large GA	GA Local	106
MHE	Mitchell, SD	Large GA	GA Regional	38
LYV	Luverne, MN	Intermediate Large	GA Local	19

Source: 2020 SD SASP, 2022 MnSASP, basedaircraft.com, NPIAS

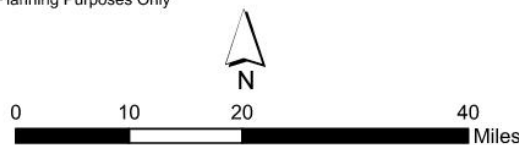
Airport Design

The FAA's Runway Design Code (RDC) identifies a design category based on aircraft wingspan, tail height and approach speed for aircraft types for each runway and its associated taxiway (if applicable). For Runway 15-33, the RDC is A/B-II, while the RDC for Runway 3-21 is A/B-I Small. This means the primary runway for MDS is designed for aircraft approach speeds up to 121 knots and wing spans of up to 118 feet and tail heights of up to 45 feet.

Figure 1-3 – Surrounding Airports



*Intended for Planning Purposes Only



**Madison Municipal Airport
Airspace & Surrounding
Airports**

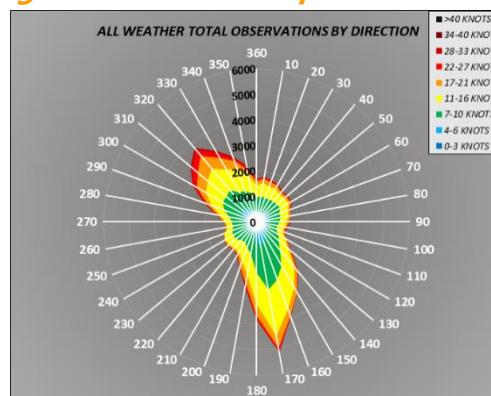
Climate

Municipal Airport is located in a hot summer humid continental climate zone. Winters are cold and relatively dry, while summers are warm and humid. Precipitation is consistent throughout the year. The average annual temperature is 44.7°F from 1991-2020.

Madison receives an average of 26.37 inches of precipitation annually. **Table 1-4 – Average Weather** provides the normal conditions that are experienced throughout the year.

The airport has an Automated Weather Observation System (AWOS) located on the airfield. Data from the station shows that prevailing winds are from the southeast and are generally aligned with the airport's runway orientation. More detailed discussion of meteorological conditions and wind coverage can be found in **Chapter 2: Runways and Taxiways**.

Figure 1-4 – MDS Airport Wind Chart



Source: KMDS AWOS (01/2015-12/2024, Hourly)
from National Climatic Data Center

Table 1-4 Average Weather

Month	Precipitation (in.)	Snow (in.)	Average Low Temperature (°F)	Average High Temperature (°F)
January	0.46	5.6	5.0	23.7
February	0.66	8.4	9.5	28.5
March	1.03	5.0	21.5	41.2
April	2.70	4.2	33.4	55.6
May	3.74	0.1	45.9	68.1
June	4.24	-	56.6	78.2
July	3.33	-	60.9	83.3
August	3.38	-	58.4	80.9
September	3.21	-	49.6	73.1
October	2.16	0.8	35.7	58.7
November	0.85	4.9	22.6	42.2
December	0.61	7.8	11.0	28.7

Source: NCEI Climate Normals

Environmental Inventory

Introduction

This section provides an overview of environmental conditions and issues at the airport and the immediate vicinity. This environmental review section is not intended to fulfill the requirement of an environmental review required by National Environmental Policy Act (NEPA), or provide a definitive class of action determination for the proposed improvements. The purpose of this environmental review is to provide community, airport sponsor, and regulatory awareness of the importance of minimizing the environmental impacts this airport improvement area, and to provide a general indication of the likely need for further investigation. Appropriate environmental documentation in accordance with [FAA Order 5050.4B, NEPA Instructions for Airport Actions](#) and [FAA Order 1050.1G, FAA National Environmental Policy Act Implementing Procedures](#) is required to be completed prior to commencing with project actions.

Key environmental resources are described for the existing airport area. **Figure 1-5: Environmental Overview Wetland Inventory** provides a graphical depiction of the existing environmental conditions described in this section.

Relevant Environmental Features

BIOLOGICAL RESOURCES

Biological resources include flora and fauna that are present in an area. MDS is located in the Western Corn Belt Plains Ecoregion, according to the U.S. Geological Survey. The high agricultural productivity of this area is due to its fertile soil, temperate climate, and adequate precipitation during the growing season. Topography is level with gentle rolling glacial till plains. The original tall grass prairie vegetation has been converted to intensive rowcrop agriculture of corn, soybeans, and feed grains to support livestock production.

The following is not a comprehensive list of fauna that may be present in the area but represents species most likely to be encountered. Historically, bison roamed through this region. Wildlife species commonly found in the area surrounding the airport include white-tailed deer, mule deer, pronghorn antelope, white-tailed jackrabbits, eastern cottontail rabbits, North American beaver, coyotes, red fox, American mink, muskrat, fox squirrel, weasel, and raccoon.

According to the U.S. Fish and Wildlife Services website Information for Planning and Consultation (IPaC), federally listed endangered, threatened, proposed or candidate species in Lake County, near the airport, include the Rufa Red Knot, Western Prairie Fringed Orchid, Monarch Butterfly, Western Regal Fritillary, and Suckley' cuckoo bumble bee. There are no Federal designated critical habitats near the Airport. In accordance with Section 7 of the Endangered Species Act, consultation with USFWS to determine the potential for occurrences of federally-listed threatened and endangered species in the project area would be necessary. Additionally, according to IPaC, there are likely Bald and Golden Eagles present in the area surrounding the Airport. There are no documented nesting sites, however they may be foraging near the area. Prior to project implementation, further analysis is required to identify the potential for fish, wildlife and plant impacts because of any proposed projects.

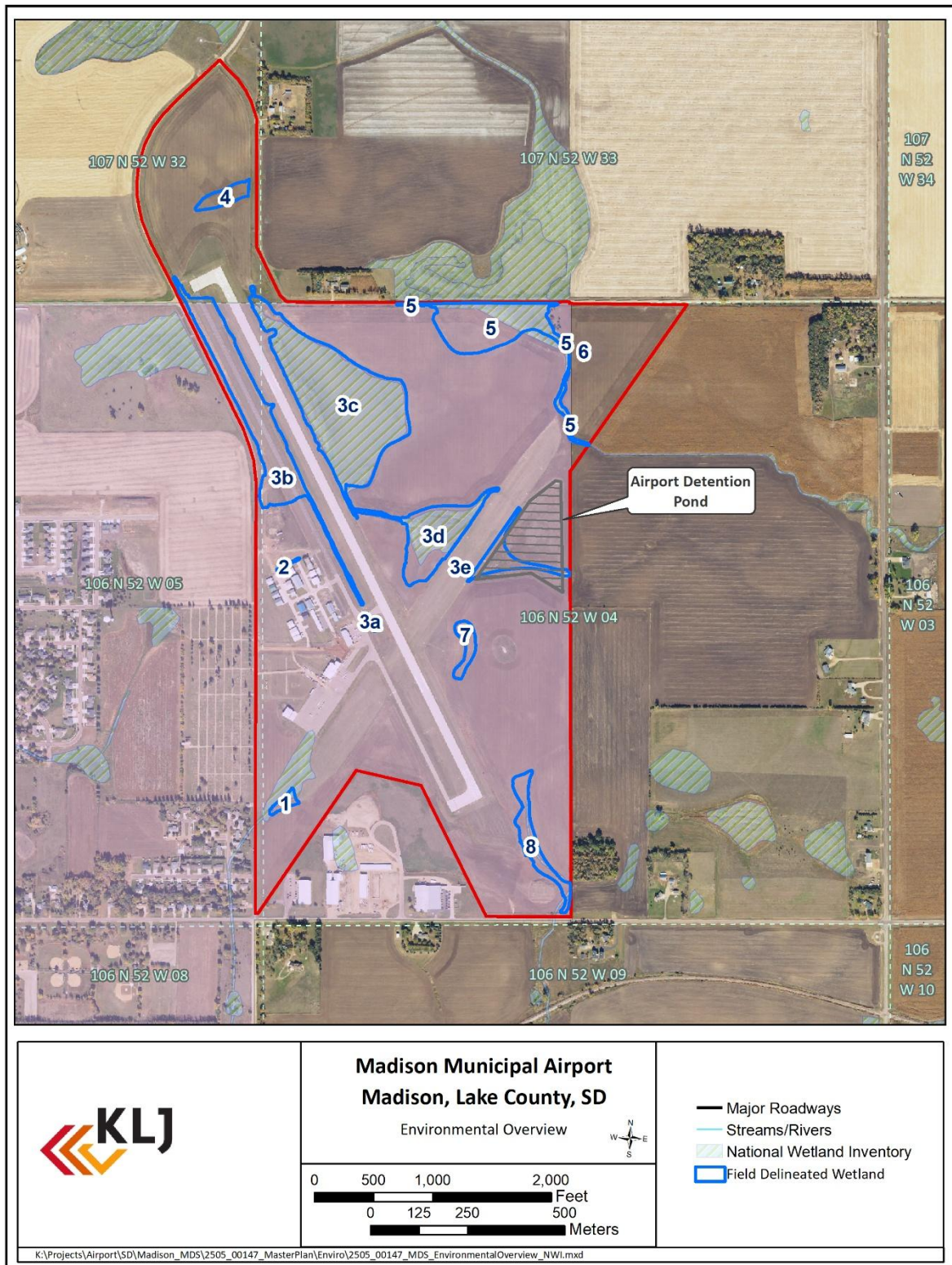
HISTORICAL, ARCHITECTUAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

In 2008, approximately 470 acres on and surrounding the airport property were inventoried to Level III Cultural Resource Survey Standards. This included a literature review of South Dakota State Historical Preservation Office (SHPO) records that indicated no previously recorded cultural resources or National Registered sites were located within the airport property, but seven historic properties (structures) have been recorded within 1,000' surrounding the inventory area. One prehistoric site, and one historic railroad, Chicago, Milwaukee, St. Paul Railroad were recorded with a one-mile radius of the surveyed area. During the 2008 survey, no archaeological resources were identified within the investigation area, and 16 structures were encountered on airport property and recorded. At the time of the survey, none of the 16 structures were over 50 years of age due to their construction in 1968 or later.

Coordination with the SHPO is necessary for projects involving land disturbance. Additionally, any project affecting buildings that have the potential to be listed in the National Register of Historic places would require coordination with SHPO. The 16 previously recorded structures that are more than 50 years old may now be eligible for inclusion on the NRHP and would need to be reevaluated.

Projects that involve ground surface disturbance in areas not previously disturbed by the construction of the Airport or included in the 2008 inventory will need a determination of affect to historic properties to be obtained from the SHPO.

Figure 1-5 - Environmental Overview Wetland Inventory



DEPARTMENT OF TRANSPORTATION SECTION 4(F) AND SECTION 6(F)

Section 4(f) is applicable to projects which require the use of publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance. **Figure 1-5 – Environmental Overview Wetland Inventory** provides a graphical depiction of the areas surrounding the Airport property.

There are no known publicly owned lands from parks, recreation areas, or refuge areas within the immediate vicinity of the Airport. Further review of the potential to impact Section 4(f) resources specifically regarding potential cultural sites or historic properties would be required at the environmental documentation phase of any projects that would require ground disturbance.

Section 6(f) from the Land & Water Conservation Fund Act provides that the Secretary shall not approve any program or project which requires the use of state and local parks, lakes, trails, beaches, and conservation lands, unless: (1) if the request complies with Section 4(f), (2) information is provided that is needed to make findings required under Section 6(f), and (3) coordination is carried out with the NPS and the state agency responsible for the Section 6(f) property. A review of Land Water Conservation Fund grants for Lake County indicates that 39 grants have been issued for properties within the county. These properties are not located near the Airport. Proposed improvements are not anticipated to impact existing Section 6(f) properties; therefore, no further analysis is required.

HAZARDOUS MATERIALS

A review of the SD Department of Agricultural & Natural Resources (SDANR) and Environmental Protection Agency (EPA) databases regarding underground storage tanks, abandoned mines, listings for superfund sites, and sites covered under the Resource Conservation and Recovery Act found two previously reported spills on the Airport. Both reports have been corrected and closed, with the most recent one closed in 2015. Prior to acquisition of new land to be owned in fee title by an airport sponsor, FAA recommends that an Environmental Due Diligence Audit (EDDA) be performed. An EDDA includes a more detailed review of an area, relative to NEPA-level review, for the possible presence of environmental contamination.

SOLID WASTE

The airport has not produced significant amounts of solid waste including garbage, refuse or sludge as compared to the broader community. FAA requires a Solid Waste Management Plan to be developed as part of this Airport Master Plan study. A Solid Waste study is in **Appendix F: Recycling & Solid Waste Plan**.

FARMLAND

Impacts to farmlands considered to be prime, unique or statewide or locally important need to be considered under NEPA. The Farmland Protection Policy Act (FPPA) of 1981 provides protection to prime and unique farmlands. The Act defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. Unique farmland is farmland that is used for production of specific high value food, feed, and fiber crops. Statewide farmland is of statewide importance to produce food, feed, fiber, forage, and oil seed crops, and is determined by state agencies. Locally important farmland is where the production of food, feed, fiber, forage, and oilseed crops, are not identified as having national or statewide importance but identified by local agencies as important.

A search of the USDA Natural Resources Conservation Service (NRCS) web soil survey identified land located on and around the Airport contains Prime Farmland and Farmland of Statewide Importance. If land outside the existing airport property were to be acquired and converted to airport property, further consultation with NRCS would be required during a project environmental review stage to calculate the Farmland Conversion Impact Rating. No further review is needed for projects occurring on existing airport property.

LAND USE

Compatible land uses are those that typically are not influenced by normal airport operations. The compatibility of existing land uses in the vicinity of an airport is usually associated with the extent of noise impacts occurring from airport property and safety concerns. Incompatible land uses are typically items such as fuel storage facilities, areas of public assembly, tree rows, high density residential areas, and areas that have the potential to attract hazardous wildlife. Other land use considerations including surrounding physical land uses, airport zoning regulations and FAA airport design land use compatibility standards have been previously identified in this Chapter.

MDS is located east of Madison, SD. There are residential homes located on the west and south sides of the airport off airport property and within 500 feet of the Runway 3 end. The areas north and east of the Airport contain mostly crop land and open spaces.

Wildlife Hazards

FAA has implemented procedures and guidelines to mitigate wildlife damages to aircraft and aviation operations. Wildlife collisions have increased across the country over the past two decades and reporting has increased awareness of hazards to human health, safety and financial losses.

The airport has two runways. The primary Runway 15-33 (5000' x 75') is a concrete paved runway and Runway 3-21 (2380' x 200') is turf. In 2016 a project to reduce wildlife attractant on the airport eliminated and modified the existing wetlands to reduce wildlife. In addition to the safety areas that are maintained as short grass, the airport also contains grass, cropland, and wetland habitats. The airport is surrounded by a wildlife perimeter fence that stands approximately ten feet in height. Most wildlife management at MDS is conducted through habitat manipulation, primarily mowing. Safety areas are mowed short. Other areas are mowed or leased as cropland. Wildlife damage or threats by mammals such as rodents or badgers is controlled by lethal removal. Pyrotechnics are also used to scare away geese when present. If necessary, the airport will contact the police or the South Dakota Department of Game Fish and Parks (SDGFP) if geese need to be lethally removed.

The City's wastewater treatment ponds and Madison Lake are located about four miles southeast of the Airport have been known to attract geese. The 10-foot wildlife exclusion fence has been effective in keeping large mammals off of the Airport. The Airport should monitor all types of wildlife and issue NOTAMs to alert pilots when gulls, snow geese, other waterfowl, or large mammals are within the area. The Airport should monitor wildlife concerns and if an issue is identified a site visit from a qualified wildlife biologist could help to provide recommendations to reduce wildlife concerns at the airport.

WATER RESOURCES

Wetlands

Wetlands are defined in Executive Order 11990, Protection of Wetlands, as those areas that are inundated by surface or groundwater with a frequency to support, and under normal circumstances

does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Three parameters that define a wetland as outlined in the US Army Corps of Engineers Wetland Delineation Manual are hydric soils, hydrophytic vegetation, and hydrology. Wetlands help to maintain water quality in rivers and recharge groundwater. Wetlands also can provide habitat for many species of plants and wildlife. However, their potential to attract wildlife can be hazardous to aircraft using the Airport.

Wetlands identified in the National Wetland Inventory (NWI) are located on and near the airport property. As noted in the wildlife section, a project was constructed in 2016 to eliminate and/or modify wetlands on MDS. Approximately 29 acres of wetlands were filled and regraded, existing drainage ditches were cleared to prevent retention of runoff and an engineered detention pond was constructed that would minimize wildlife usage. Two segments of the wetlands shown on **Figure 1-5** were only modified and remain on the Airport. The others have been eliminated from the airport with mitigation provided at an offsite wetland mitigation bank. The remaining wetlands are Wetlands 3c and 3d. The remainder of the airport property consists mostly of upland areas. Any projects impacting these two wetlands will require a delineation and coordination with the U.S. Army Corps of Engineers (USACE) during the early project development phase.

Surface and Ground Waters

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, issue permits for discharges (Section 402) and for dredged or fill material (Section 404).

Airport activities have the potential to impact water quality, primarily due to stormwater runoff from paved surfaces. Implementing best management practices, such as grass-lined swales and ditches, helps treat runoff from runways, taxiways, and apron areas, minimizing potential water quality impacts.

At MDS, the primary drainage flows onto the airport from the north and exits the airport to the east flowing into an unnamed pothole/pond located about a mile east of the airport. Drainage from the southern portion of the airport flows into vegetated ditches, eventually making its way toward the Lake Madison, approximately 4.0 miles southeast of the airport.

Environmental Features Not Relevant

AVIATION EMISSIONS AND AIR QUALITY

The FAA Order 5050.4B outlines procedures for determining when airport-related projects require air quality analysis, and if so, what level of analysis may be necessary. The Airport is located within an area of attainment for all National Ambient Air Quality Standards (NAAQS); due to the small size of the airport and limited number of operations that would occur at the airport detailed analysis is very unlikely to be required.

COASTAL RESOURCES

Coastal Resources include Coastal Barriers and Coastal Zone Management. Coastal Barriers include islands that protect the mainland from storm or hurricane-driven winds or waves by providing a buffer to the shoreline. Coastal Barriers protect fish, wildlife, human life, and property along coasts and shorelines. Facilities are not recommended to be built within the Coastal Barrier Resource System (CBRS). Coastal Zone Management includes development provisions actions to protect major shorelines

and associated recreational, historical, cultural, and aesthetic values. The area is not located near a coastal zone as defined in the Coastal Zone Management Act of 1972. No further analysis is required.

NATURAL RESOURCES AND ENERGY

Impacts on energy supplies and natural resources are related to changes of stationary facilities, such as airfield lighting or terminal building heating and expansion, as well as any increase of fuel consumption by aircraft or ground vehicles. Proposed improvements at MDS would require additional energy but they are not anticipated to cause significant impacts to energy supplies or natural resources. No further analysis is required.

NOISE AND NOISE COMPATIBLE LAND USE

Noise emitted from aircraft can significantly affect the well-being of people living or working near an airport. The FAA requires noise studies for certain projects. If a project involves Airplane Design Groups I and II and has forecasted operations of less than 90,000 annual propeller operations or 700 annual adjusted jet operations such as the case at MDS then no further noise analysis is required.

SOCIOECONOMIC IMPACTS AND CHILDREN' S ENVIRONMENTAL HEALTH AND SAFETY RISKS

Social impacts from a project depend on how that project affects the character, habits, and economic conditions of the people living within the affected area of the project. The project's effects on business, employment, transportation, utilities, etc. are factors that affect the social climate of a community. Any action that would either adversely or beneficially affect the factors stated above would be considered as having some type of social impact on the residents of a particular community. The airport's location and runway orientation minimize health and safety risks to children, as there are no schools, hospitals, or places of worship along the airport's approach and departure paths.

VISUAL EFFECTS

Minor development projects at Madison Municipal Airport are not expected to significantly impact the visual aesthetics of the area. The landscape and surrounding views, along with viewers' responses to scenic resources or man-made features, are unlikely to be noticeably affected. From the perspective of those viewing the airport from outside, any potential visual contrast or compatibility issues with nearby landforms and land uses are expected to be minimal.

WATER RESOURCES

Floodplains

Floodplains constitute lands situated along rivers and their tributaries that are subject to periodic flooding on the average interval of 100 years or less. MDS is not located within a 100-year floodplain; therefore, no further analysis is required.

Wild and Scenic Rivers

There are no river segments near MDS that are listed in the National Rivers Inventory or designated Wild and Scenic Rivers in the National System. No direct or indirect impacts to wild scenic rivers would occur due to improvements at the airport. No further analysis is required.

Aviation Activity

The Aviation Activity Forecasts section of the Airport Master Plan analyzes current and future airport activity at the Madison Municipal Airport. Forecasting provides an airport with a general idea of the magnitude of growth, as well as fluctuations in activity anticipated over the forecast period. They assist the Airport in determining existing and planned future facility needs based on airport activity level estimates and projections. Forecasts attempt to develop a realistic estimate of future changes.

Prior to 2024, the FAA required forecasting of annual airport operations and based aircraft as well as the critical design aircraft. This was a key approval point for the FAA where they would approve the forecast operations, based aircraft, critical design aircraft and airport layout plan.

Recently this has changed for airports like MDS. On August 12, 2024, the FAA released guidance regarding the requirement for forecasts developed for airport master plans. According to the guidance a detailed forecast is not warranted for GA airports with less than 90,000 annual operations and not expected to exceed 90,000 operations in the foreseeable future. For these cases, in lieu of the detailed forecast the FAA will only approve the existing and future Critical Design Aircraft. MDS is currently below 90,000 annual operations and will remain below this level for the foreseeable future. **As such, the Sponsor will not be seeking FAA forecast approval. The Critical Design Aircraft will be the only element in this chapter approved by the FAA.** Additional forecasting for this Airport Master Plan will therefore be focused on practical elements that are still needed and listed as follows:

- Critical Design Aircraft (requires FAA approval);
- Based Aircraft (to determine the amount and type of hangar space needed);
- Annual Airport Operations (needed when pavement designs are completed in the future); and,
- Peak Aircraft Operations (to determine the amount of apron space and hangar space needed for itinerant aircraft)

The forecasting will use simple socioeconomic/demographic projections, quantifiable airport activity, and industry metrics used to determine activity. The forecasts developed for the airport will be important to adequately plan, size, and sequence development of future facilities to meet future projected growth.

It is important to point out that forecasts in this context are to demonstrate how much activity could likely occur at an airport through the planning period. In most cases, development at airports is based on actual demand rather than forecasts. Projects identified later in this study will require justification based on current activity levels when the project occurs.

Forecast Rationale

Forecasting the demand for airport use is a critical step in airport development. It allows an airport to examine its ability to satisfy the needs of the aircraft and people it serves, and to determine the approximate timing of necessary improvements by projecting airport user activity levels. FAA provides general guidance in evaluating factors that affect aviation activity. [FAA AC 150-5070-6B](#) states:

“Planners preparing forecasts of demand or updating existing forecasts should consider socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation.”

For the purpose of this forecast, the following defining factors have been used to develop the forecast:

1. Based on availability of data when the project began (June 2025), the last full year of data, 2024 has been used to establish the baseline year, 2025;
2. The forecast period is 20 years encompassing years 2025 through 2045; and,
3. The core airport service area is considered the City of Madison and Lake County.
4. The Sioux Falls Metropolitan Statistical Area (MSA) will be evaluated due to proximity to Madison.

The forecasts prepared for the airport assume an unconstrained scenario where facilities are available for use to meet demand. Time periods will be in 5-year increments, including:

- Short-Term (5-year);
- Mid-Term (10-year); and,
- Long-Term (20-year) resulting in forecasts for years 2030, 2035, and 2045.

Forecasting Methods

Various methodologies are used to develop aviation forecasts. Forecasts should not be considered predictions of the future but rather an educated projection of future activity. Some of the following forecasting methods were applied for this analysis, including trend extensions, socioeconomic methodologies, and professional judgment.

Trend Extensions - A trend extension forecast identifies historical growth patterns and projects those patterns into the future. Often, a trend line can be drawn through a graph of the historical data to reveal an overall trend, which can then be extended into the immediate future to develop a forecast.

Socioeconomic Methodologies - Socioeconomic information within the airport service area can provide insight into factors that affect aviation activity at an airport. Commonly evaluated metrics include population, employment, income, gross regional product, and retail sales. Historic trends, current data and forecast estimates are also evaluated in this section to identify socioeconomic trends that may affect aviation activity forecasts at the airport. Growth rates are used as a method to compare the airport service area to other regional, statewide, and national trends.

Professional Judgement - Judgmental methods are educated estimations of future events based on the industry knowledge, experience, and intuition of the forecaster. This method permits the inclusion of a broad range of relevant information into the forecasting process and is usually used to refine the results of the other methods.

Socioeconomic Data

Socioeconomic information within the airport service area can provide insight into factors that affect aviation activity at an airport. Commonly evaluated metrics include population, employment, income, gross regional product, and retail sales. Historic trends, current data and forecast estimates are evaluated in this section to identify socioeconomic trends that may affect aviation activity forecasts at MDS. Growth rates are used as a method to compare the airport service area to other regional, statewide, and national trends. For purposes of this study analysis, Lake County has been determined to represent the core local airport service area.

Population

Population is a basic indicator of the number of people who may utilize the airport. The City of Madison is in Lake County. Based on data from the United States Census Bureau, the population of Madison was reported as 6,191 in 2020. The City of Madison makes up approximately 56% of the total population in Lake County.

Table 1-5 – Population

Year	Lake County	Sioux Falls MSA	South Dakota	United States
2000	11,214	198,013	755,844	282,162,375
2005	10,624	216,125	775,793	295,516,551
2010	11,251	239,143	816,090	309,379,450
2020	11,016	287,413	887,948	331,577,720
Historical Annual Growth Rate	-0.090%	1.880%	0.809%	0.810%
2025 (Baseline)	11,038	311,967	930,581	342,265,910
2030	11,157	330,482	959,214	352,789,184
2035	11,211	348,770	985,804	371,778,659
2045	11,127	384,280	1,032,385	380,613,305
Forecast Annual Growth Rate	0.040%	1.048%	0.520%	0.532%

Source: Woods & Poole Economics, U.S. Census Bureau

Income

Per Capital Personal Income (PCPI) was also considered as a factor affecting aviation activity. Those who have more disposable income may have a higher propensity to utilize the time savings of aviation, or simply more disposable income for leisure. Lake County historically has shown growth in PCPI at a rate of 2.871% and continues to grow through the end of the planning period at a rate of 0.575%. This growth is slightly lower than the state of South Dakota and U.S growth rates.

Table 1-6 – Per Capita Personal Income

Year	Lake County	Sioux Falls MSA	South Dakota	United States
2000	\$34,027	\$41,169	\$36,204	\$41,384
2005	\$50,265	\$45,601	\$40,832	\$43,432
2010	\$46,823	\$50,907	\$45,599	\$44,807
2020	\$59,941	\$63,272	\$56,787	\$56,492
Historical Annual Growth Rate	2.871%	2.172%	2.276%	1.568%
2025 (Baseline)	\$75,509	\$66,400	\$61,238	\$59,371
2030	\$77,448	\$71,006	\$65,021	\$64,220
2035	\$79,516	\$75,671	\$68,834	\$69,097
2045	\$84,681	\$85,678	\$77,067	\$79,475
Forecast Annual Growth Rate	0.575%	1.283%	1.156%	1.469%

Source: Woods & Poole Economics, Current 2017 Dollars

Employment

Total employment is the measure of the active workforce. Lake County has a strong manufacturing, farming and state/local government based economy. The sum of these three industries make up approximately 36 percent of the workforce.

Table 1-7 – Airport Service Area Employment (2024)

Industry	Employment	Earnings
Manufacturing	1,065	\$174,838,000
Farming	505	\$62,428,000
State and Local Government	1,262	\$60,778,000
Health Care and Social Assistance	657	\$36,630,000
Professional and Technical Services	393	\$30,115,000
Wholesale Trade	291	\$28,113,000
Construction	440	\$26,641,000
Retail Trade	652	\$22,506,000
Finance and Insurance	388	\$17,470,000
Transportation and Warehouse	202	\$14,577,000
Other Services	353	\$13,009,000
Information	80	\$10,608,000
Accommodation and Food Services	554	\$9,018,000
Real Estate, Rental and Lease	336	\$7,719,000
Utilities	41	\$5,914,000
Administrative and Waste	174	\$5,418,000
Federal Civilian Government	53	\$4,938,000
Mining	58	\$3,589,000
Educational Services	90	\$3,484,000
Forestry, Fishing and Related Activities	143	\$3,408,000
Arts, Entertainment and Recreation	125	\$2,129,000
Military	55	\$1,953,000
Management of Companies	8	\$755,000
All Industries	7,925	\$546,038,000

Source: Woods & Poole Economics (2017 Dollars)

Table 1-8 – Total Employment (in thousands)

Year	Lake County	Sioux Falls MSA	South Dakota	United States
2000	6,995	152,588	512,376	165,370,909
2005	6,905	166,182	527,753	172,338,420
2010	7,022	179,689	558,162	172,901,726
2020	7,414	213,090	606,248	195,286,641
Historical Annual Growth Rate	0.320%	1.353%	0.845%	0.835%
2025 (Baseline)	7,974	241,814	667,409	222,120,529
2030	8,202	259,802	698,576	234,867,522
2035	8,419	278,313	730,066	247,621,100
2045	8,851	316,370	793,677	273,289,516
Annual Growth Rate	0.523%	1.353%	0.870%	1.042%

Source: Woods & Poole Economics, U.S. Census Bureau

National Aviation Activity

At a national level, the FAA annually reviews a range of historic aviation activity and generates a 20-year forecast. The latest forecast has been issued for the period of 2024-2044 based on federal fiscal year. Relevant elements of this forecast for the airport have been summarized in the following tables and graphs.

Table 1-9 – Active General Aviation Aircraft

Year	Single Piston	Exprmt	Light Sport	Multi Piston	Turbo Prop	Turbo Jet	Rotor
2013	124,398	24,918	2,056	13,257	9,619	11,637	9,765
2018	130,179	27,531	2,554	12,861	9,925	14,596	9,989
2023	125,490	28,160	2,730	11,580	10,785	16,570	9,925
CAGR	0.05%	0.82%	1.91%	-0.89%	0.76%	2.38%	0.11%
		0.21%					
2024	124,965	28,265	2,835	11,520	10,860	17,045	10,090
2029	122,920	29,325	3,335	11,265	11,190	19,680	11,020
2034	121,350	30,440	3,900	11,065	11,680	22,525	12,030
2044	119,930	32,705	5,105	10,860	13,255	28,325	14,025
CAGR	-0.21%	0.73%	2.98%	-0.29%	1.00%	2.57%	1.66%
		0.05%					
Total Aircraft Growth Rates							
Period	Total Pistons		Total Turbines		Total GA		
2013-2023	-0.06%		1.96%		0.44%		
2024-2034	-0.28%		2.07%		0.36%		
2024-2044	-0.19%		2.00%		0.26%		

Source: FAA Forecast 2024-2044 Table 28



Table 1-10 – General Aviation Hours Flown (Thousands)

Year	Single Piston	Exprmt	Light Sport	Multi Piston	Turbo Prop	Turbo Jet	Rotor
2013	10,706	1,191	173	1,646	2,587	3,488	2,949
2018	12,092	1,153	187	1,694	2,736	4,592	2,922
2023	12,702	1,311	240	1,458	2,932	5,355	2,857
CAGR	1.15%	0.64%	2.21%	-0.81%	0.84%	2.90%	-0.21%
		1.11%					
2024	12,449	1,339	251	1,478	2,994	5,479	2,940
2029	11,413	1,458	306	1,491	3,141	6,280	3,336
2034	11,013	1,545	368	1,491	3,279	7,188	3,715
2044	10,517	1,698	500	1,528	3,718	9,061	4,445
CAGR	-0.84%	1.20%	3.50%	0.17%	1.09%	2.55%	2.09%
		-0.49%					
Total Hours Flown Growth Rates							
Period	Total Piston		Total Turbine		Total GA		
2013-2023	1.14%		2.14%		1.52%		
2024-2034	-0.94%		2.21%		0.60%		
2024-2044	-0.62%		2.11%		0.78%		

Source: FAA Forecast 2024-2044 Table 29

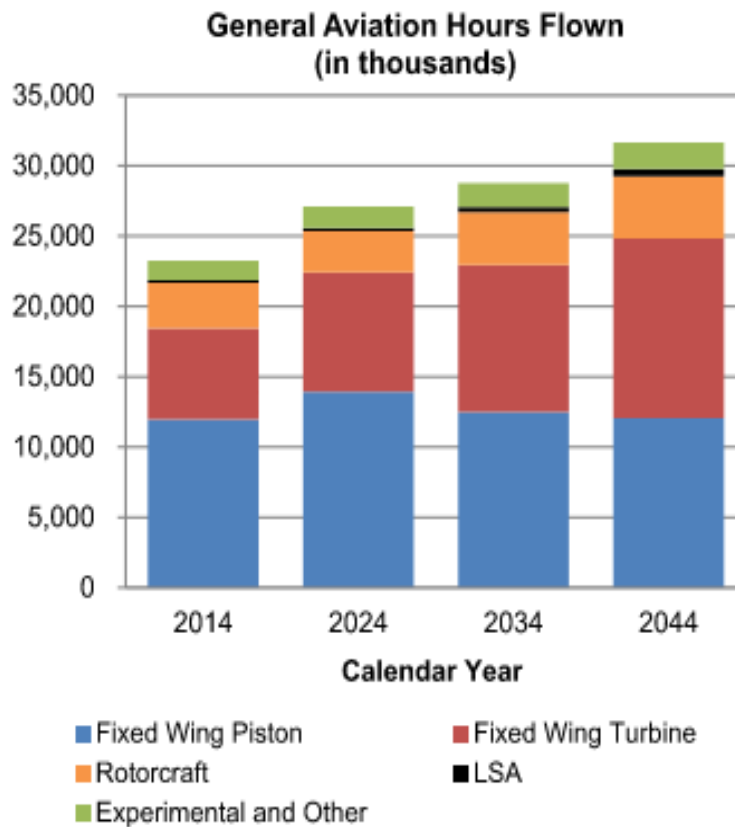


Table 1-11 – Gallons of Fuel for General Aviation (Thousands)

Year	Single Piston	Exprmt	Light Sport	Multi Piston	Turbo Prop	Turbo Jet	Rotor*
2013	117,197	16,484	883	53,853	188,607	945,010	134,667
2018	152,396	20,340	1,028	49,611	233,663	1,454,658	140,231
2023	154,429	21,446	1,321	45,735	248,285	1,702,270	133,127
CAGR	1.85%	1.77%	2.72%	-1.08%	1.85%	4.00%	-0.07%
		1.85%					
2024	151,057	21,914	1,382	46,142	252,520	1,725,076	136,939
2029	137,105	23,686	1,635	45,484	259,786	1,879,920	152,860
2034	130,986	24,907	1,903	44,485	265,865	2,085,869	166,184
2044	121,628	27,047	2,509	43,537	288,882	2,471,085	183,684
CAGR	-1.08%	1.06%	3.03%	-0.29%	0.67%	1.81%	1.48%
		-0.71%					

Source: FAA Forecast 2024-2044 Table 31; * Jet and Aviation Gasoline combined

Aircraft Operations

The key element to examine existing and forecast activity at the airport is to look at all operations at the airport that can be measured. Operations measured through the FAA Traffic Flow Management System (TFMS) are operations conducted with instrument flight plans or under control of Air Traffic Control (ATC). Outside of instrument operations, the visual flight operations are measured by some operators such as aerial applicators or flight training.

Baseline

For this planning study multiple sources of operations data will be used establish a baseline annual aircraft operations number: TFMS, flight training, aerial applicators, based aircraft and transient aircraft.

TFMS

There were 376 TFMS operations in 2024, 63 were operated by Riggin Flight Service Aircraft and have been removed from the total as these flight training operations will be accounted for in a later section. Recognizing that every flight must have an arrival and departure, there logically cannot be an odd number of operations. Thus, the TFMS number was rounded to the nearest even number of 314 total operations by non Riggin Flight Service Aircraft. Most jet traffic as well as medical flights are accounted for through the TFMS data.

Aerial Application

There are two aerial applicators that fly out of MDS: Riggin Flight Service and Wilde Air. Aerial applicator flights operate under Visual Flight Rules and are not tracked under TFMS operations data. During initial outreach and inventory gathering, Wilde Air Service indicated that they operate approximately 300 missions during a typical spray season of July through September. This accounts for 600 operations annually.

Riggin Flight Service operates a fleet of four aircraft for aerial application and their typical season ranges from May through July. The airport manager and owner of Riggin Flight Service estimated that they operate an average of two spray missions per day during their season. This would equate to four total operations per day. Over the course of a three month season, it is estimated that Riggin Flight Service accounts for approximately 360 aerial application operations at MDS.

The sum of these operations is 960 annual operations and will be combined with other measurable operations at MDS to establish a baseline annual operations total.

Flight Training

Riggin Flight Service operates a large flight school at MDS. They offer several different pilot training courses and account for much of the operations at Madison. They currently have a fleet of 39 aircraft and are continuing to grow. They employ six full-time and three part-time flight instructors. Based on information provided by Riggin Flight Service, they dispatch approximately 20 flights per day on average throughout the year. Each flight dispatched would account for approximately 2 operations (one takeoff and one landing). With 40 operations per day, multiplied by 365 days, it is estimated that flight training operations by Riggin Flight Service total approximately 14,600. Flight training frequently involves touch and go operations for students to practice landings, though RFS does not allow their students to do touch and go's, so all practice landings are full stop and back taxiing to takeoff again. It was estimated that one in five flights involve at least one additional take off and landing at Madison. As such, an additional 20 percent or 2,920 operations were added to account for this type of operation. These full stop and back taxi operations will be classified as local, as they remain in the immediate vicinity of the airport. Total RFS flight training operations at MDS are estimated to be approximately 17,520 annually.

Aircraft from South Dakota State University's flight school in Brookings comes to MDS daily and does approximately 12 touch and go's. Considering poor weather days and being a university with school breaks, it was estimated SDSU comes to Madison 48 weeks out of the year. This translates to roughly 4,000 operations annually at Madison. These operations will be classified as local, as they remain in the immediate vicinity of the airport. While these operations cannot be used for determining critical design aircraft, they help determine runway use and occupancy needs for the airport. Total SDSU flight training operations at MDS are estimated to be approximately 4,000 annually.

Based Aircraft Operations

Of the 49 validated based aircraft at MDS, there are 14 aircraft registered to owners outside of Riggin Flight Service. These are all smaller single engine piston aircraft likely to fly VFR. The airport manager estimates that each aircraft flies once a month on average. Annually these 14 based aircraft account for approximately 340 operations annually. Common destinations include Rapid City, Mitchell, Sioux Falls, Huron and other places in Minnesota. These operations will be classified as itinerant.

Other Activity

MDS receives traffic from transient aircraft throughout the year. The airport manager noted that July is often their busiest month with certain weekly fly in events occurring on Thursday evenings, but on average, they receive one transient aircraft per day, totaling 730 operations annually.

A combination of TFMS data, airport manager reports and information from key airport operators was used to determine a baseline annual operations at Madison.

- TFMS: 314 (Riggin Flight Service aircraft removed)
- Aerial Applicators: 960
- Flight Training - RFS: 17,520
- Flight Training - SDSU: 4,000
- Based Aircraft: 340
- Transient Aircraft: 730

The sum of these operations are 23,863 however due to the fact that these are estimations, the total baseline operations will be rounded to 24,0000 operations. It is estimated that approximately 60 percent of these operations (14,400) are classified as itinerant, meaning they depart the local area. The remaining 40 percent of operations (9,600) are local, meaning these flights remain in the immediate area. This is common especially with flight training when students are practicing touch and goes or practice approaches. This will serve as the 2025 baseline annual operations at MDS. This will be forecasted to determine future needs for hangar space, apron, aircraft parking and runway design.

Forecast Operations

In order to forecast growth at MDS, it is important to evaluate national and local trends to develop logical growth rate. County, state and national socioeconomic statistics are important, as population and per capita personal income growth can lead to more community members flying either for pleasure or business. In addition to this, Madison is located adjacent to one of the counties that is part of the Sioux Falls Metropolitan Statistical Area (MSA) and growth in employment and PCPI can lead to more of the population flying.

It is important to note that there are several unique characteristics of MDS that indicate local socioeconomic trends do not adequately capture the growth occurring at the airport.

Riggin Flight Service operates a robust flight training program at the airport offering many different pilot training courses. They have been steadily adding to their fleet, with additional aircraft on order and several pending registration. This flight school draws people from all over the country with some students coming from as far as California to obtain their flight training. As such, understanding national growth trends in aviation will provide a more accurate basis on which to forecast future growth at MDS.

The FAA U.S Civil Airmen Statistics is a study published annually providing statistics about airmen in the United States using certification records. As student pilots progress through training, they obtain new certificates. This information is useful for forecasting growth at Madison, as a large portion of the operations are flight training. Riggin Flight Service offers private, instrument, and certified flight instructor courses. The table below shows the annual growth rate and number of certificates held by airman, by certificate type from 2019 to 2024. Steady growth in the number of certificated airmen demonstrates there is demand for pilot training and it is believed that this will continue. As such, airports like Madison which play a key role in providing pilot training will continue to show growth in operations.

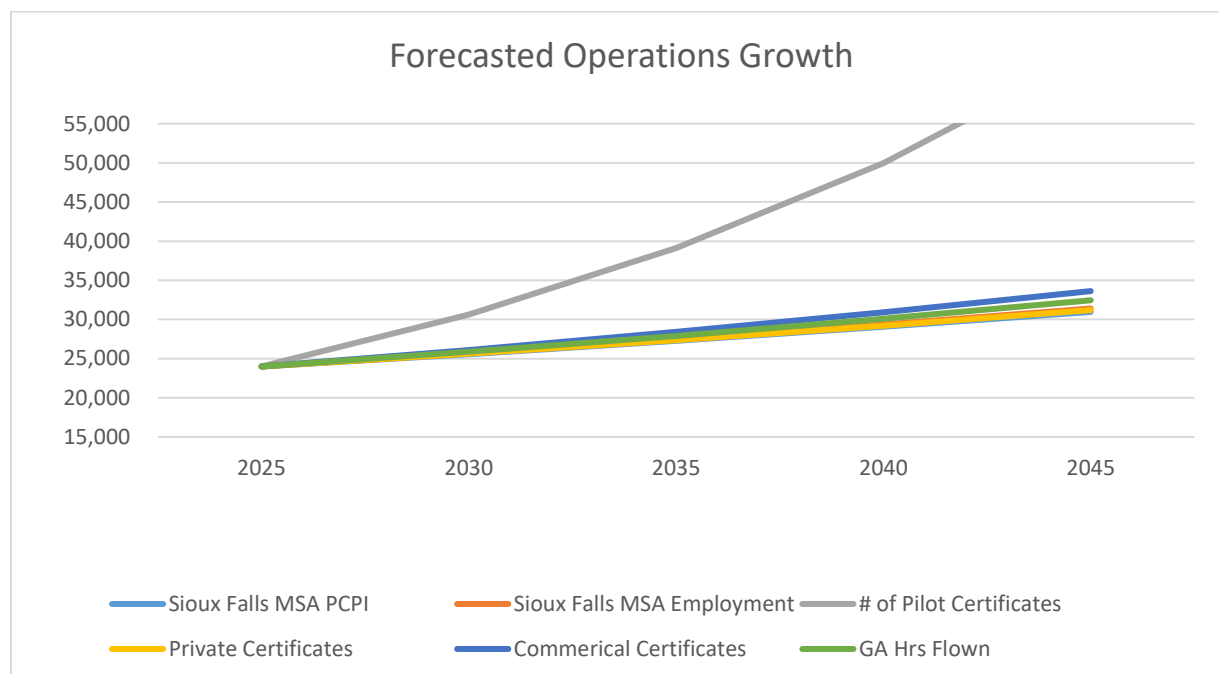
Table 1-12 FAA Civil Airmen Statistics

Certificate	2019	2020	2021	2022	2023	2024	CAGR
Private	161,105	160,860	161,459	164,090	167,711	172,012	1.32%
Instrument	314,168	316,651	317,169	321,217	332,313	342,400	1.74%
Commercial	100,863	103,879	104,610	104,498	106,711	109,727	1.70%
Certified Flight Instructor	113,445	117,558	121,270	125,075	131,577	138,127	4.02%

Source: 2024 U.S Civil Airmen Statistics

As discussed previously, several key metrics were applied to the baseline operations through the end of the planning period. It is important to consider local and national trends as MDS is utilized by people from outside the immediate area. The figure below shows these key metrics applied to the baseline operations through the end of the planning period.

Figure 1-5 Forecasted Operations Growth



Source: Woods and Poole 2025, FAA U.S Civil Airmen Statistics, KLJ Analysis

It was determined that annual operations at MDS will grow annually at a rate of 1.50% annually. This growth rate considers employment and PCPI growth occurring in areas surrounding Madison/Lake County, such as the Sioux Falls MSA. In addition to area growth, the number of pilots obtaining certificates is also increasing. In return, this will lead to an increase in operations at MDS as more pilots seek flight training that is offered at the airport. **Table 1-13** shows that based on forecasted growth, it can be expected that there will be approximately 32,000 annual operations by the end of the planning period

Table 1-13 Forecasted Annual Operations

Category	2025	2030	2035	2040	2045	CAGR
Local	9,600	10,342	11,141	12,002	12,930	1.50%
Itinerant	14,400	15,513	16,712	18,003	19,395	1.50%
Total	24,000	25,855	27,853	30,006	32,325	1.50%

Source: KLJ Analysis, FAA TFMS Traffic Counts, Airport Manager

Based Aircraft Forecast

A based aircraft is an operational and airworthy aircraft claiming an airport as its home for most of the year. Knowing the number and types of based aircraft helps the airport assess the existing aircraft storage needs and the forecast of based aircraft helps determine future storage needs.

Historical Data

According to the National Based Aircraft Inventory¹, there are 50 aircraft based at the airport. It should be noted that Riggins Flight Service provided a list of their current flight training aircraft fleet. There were an additional five aircraft on the list that are not validated on the NBAIP list because they are pending registration to Riggins Flight Service however it can be presumed that these aircraft regularly operate at MDS. Additionally, the NBAIP list indicates there is currently one single engine piston aircraft listed as based at MDS but it is being claimed by another airport. For this planning study, 50 based aircraft will be used as the baseline.

Table 1-14 – Based Aircraft Fleet Mix

Aircraft Type	Based Aircraft	Percent of Total
Piston (Single)	43	86%
Piston (Multi)	4	8%
Turboprop	1	2%
Jet	1	2%
Helicopter	1	2%
Ultralight/Other	0	0%
Total Based Aircraft	50	100%

Source: National Based Aircraft Inventory Program, KLJ Analysis

Forecast

It is expected that the number of aircraft based at MDS will increase by 20 total aircraft through the end of the planning period. This is approximately 1.70 percent growth annually for a total of 70 aircraft in 2045. It is important to note, that there are currently five aircraft pending FAA registration owned by Riggins Flight Service that are not included in the existing based aircraft number. Had these aircraft been included with the existing based aircraft, this would result in only 1.21 percent annual growth through the end of the planning period. Annual operations at MDS are projected to continue growing and based aircraft are expected to continue to grow for the following reasons:

- As annual operations increase at MDS, flight training is expected to be a key part of said growth. The flight school will continue to need to acquire new single engine and multi-engine piston aircraft to accommodate future students and these aircraft will be based at MDS.

¹ In the National Based Aircraft Database only one airport can claim an aircraft as 'based'. If there is a dispute on the location, the aircraft is not counted at either airport then the respective airport managers must work together to resolve which airport will be able to claim the aircraft as based.

- The airport receives requests for available hangar space indicating demand for owners to store their aircraft at MDS and it is presumed that as additional hangars are built, the number of based aircraft will increase.
- The current aerial applicator based at MDS owns older single engine piston aircraft, however as these aircraft reach time for replacement, it is expected that they will be replaced by newer turboprop aircraft similar with national trends.

Table 1-15 – Based Aircraft Forecast

Aircraft Type	2025	2030	2035	2040	2045	CAGR
Piston (Single)	43	48	52	55	60	1.68%
Piston (Multi)	4	4	5	6	6	2.05%
Turboprop	1	1	1	2	2	4.73%
Jet	1	1	1	1	1	0.00%
Helicopter	1	1	1	1	1	0.00%
Other	0	0	0	0	0	0.00%
TOTAL	50	55	60	65	70	1.70%

Source: KLJ Analysis. CAGR = Compounded Annual Growth Rate *Does not include 5 aircraft pending registration

Critical Design Aircraft

The critical design aircraft is identified as the most demanding aircraft or family of aircraft to regularly use the airport. According to FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination* a critical design aircraft type or family must operate at least 500 annual operations at the airport to be considered 'regular use' by FAA for improvements to be justified for FAA funding.

Existing and Future

At MDS, the vast majority of aircraft operations are of smaller A-I aircraft commonly used for flight training. As such, these operations will not have a significant impact on determining the critical design aircraft. Wilde Air Service accounts for 600 annual operations of their Air Tractor 802, which is B-II with a TDG 1-B weighing greater than 12,500 pounds. In addition to the aerial applicator aircraft, the TFMS operations data indicates that MDS receives occasional traffic by larger aircraft.

Table 1-16 Existing Annual Operations by Critical Design Aircraft Characteristics

AAC		ADG		TDG		MTOW	
A	23,072	I	23,124	1-A	23,186	< 12,500 lbs	23,236
B	790	II	740	1-B	610		
C	4	III	0	2-A	70	≥ 12,500 lbs	630
D	0	IV	0	2-B	0		

Source: KLJ Analysis, FAA TFMS Operations Data NOTE: Shading indicates operations by critical design aircraft

National trends indicate smaller piston engine aircraft growth is declining however Riggins Flight Service is continuing to grow and it is expected that as they add to their fleet, these additional aircraft will continue to be A-I. The trend in the agricultural aircraft industry is seeing smaller aircraft being replaced with the larger Air Tractor 802. As such, the future critical design aircraft for MDS will continue to be B-II, TDG 1-B aircraft weighing greater than 12,500 pounds. The operations broken down by aircraft characteristics will grow at the same growth rate utilized for determining annual airport operations.

Table 1-17 shows future forecasted annual operations by the critical design aircraft

Table 1-17 MDS Design Aircraft Forecast

Metric	2025	2030	2035	2040	2045	CAGR
AAC-B	790	851	917	988	1,064	1.50%
ADG-II	740	797	859	925	997	1.50%
TDG-1B	610	657	708	763	822	1.50%

Source: KLJ Analysis, AAC = Aircraft Approach Category, ADG = Airplane Design Group, TDG = Taxiway Design Group

Peak Activity Forecast

Peak demand periods help quantify aviation activity during busy periods. Time periods evaluated include the peak month, design day and design hour characteristics for airport operations. Peak activity is important when planning the size of facilities with fixed capacities including the terminal, apron area and itinerant hangar space.

- **Peak Month:** The calendar month when peak operations occur (July)
- **Design Day:** The average day in a peak month (peak month / 31)
- **Busy Day:** The busy day of a typical week in a peak month (Design Day + 15 percent)
- **Design Hour:** The peak hour within the design day (20 percent of Busy Day)

PEAK MONTH

The peak month of general aviation operations was determined by reviewing the prior five years of monthly fuel sales records from the airport sponsor. There was no available data from April of 2022 through December of 2022. See **Table 1-18**. Excluding the missing months of data from 2022, monthly fuel sales were analyzed to determine which month accounted for the highest percentage of annual sales. July is when most of the fuel sales occur at the airport and July fuel sales have averaged 20 percent of total annual fuel sales at MDS. As such, the peak month at MDS will be July and will represent 20 percent of the annual operations.

Table 1-18 Monthly Combined Fuel Sales By Year

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2019	1,093	1,123	1,994	2,098	3,575	2,972	6,088	3,771	3,106	2,988	2,160	529
2020	637	819	1,827	2,629	2,804	3,208	2,741	2,428	2,575	3,298	1,901	1,686
2021	1,166	2,227	3,784	2,804	5,325	3,935	5,002	3,617	5,135	3,071	1,707	1,379
2022	1,076	1,628	3,006	-	-	-	-	-	-	-	-	-
2023	1,089	2,124	1,410	2,843	7,154	5,264	14,175	7,517	4,495	4,580	5,856	4,133
2024	1,253	3,749	4,039	4,651	5,052	5,390	13,249	12,093	5,995	4,543	2,697	2,220

Source: City of Madison, KLJ Analysis

Table 1-19 – Peak Month Operations Forecast

Metric	2025	2030	2035	2040	2045	CAGR
Annual Operations	24,000	25,855	27,853	30,006	32,325	1.50%
Peak Month (20%)	4,800	5,171	5,571	6,001	6,465	1.50%

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

DESIGN/BUSY DAY AND DESIGN HOUR

The design day represents the average day in the peak month. The busy day accounts for a peaking activity during a time of concentrated activity such as weekends for airports with recreational traffic. The busy day is calculated as an average day plus 15 percent.

The peak hour is based on the average hourly operations during a design day with an additional factor for concentrated activity. To determine the peak hour figure, the design day operations are averaged over a 14-hour period as most general aviation activity occurs during daylight hours, then increased by 20 percent.

Table 1-20 – Design Day Operations Forecast

Metric	2025	2030	2035	2040	2045	CAGR
Peak Month	4,800	5,171	5,571	6,001	6,465	1.50%
Design Day	155	167	180	194	209	1.50%
Busy Day (Design Day + 15%)	178	192	207	223	240	1.50%
Peak Hour Total	13	14	15	17	18	1.50%

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

Forecast Summary

Table 1-21 – Aviation Activity Forecast Summary

Metric	2025	2030	2035	2040	2045	CAGR
Operations						
Itinerant						
General Aviation	14,400	15,513	16,712	18,003	19,395	1.50%
Military	-	-	-	-	-	-
Total Itinerant Operations	14,400	15,513	16,712	18,003	19,395	1.50%
Local						
Civil	9,600	10,342	11,141	12,002	12,930	1.50%
Military	-	-	-	-	-	-
Total Local Operations	9,600	10,342	11,141	12,002	12,930	1.50%
Total Operations	24,000	25,855	27,853	30,006	32,325	1.50%
Based Aircraft						
Piston (Single)	43	49	53	56	61	1.68%
Piston (Multi)	4	4	5	6	6	2.05%
Turboprop	1	1	1	2	2	4.73%
Turbojet	1	1	1	1	1	0.00%
Helicopter	1	1	1	1	1	0.00%
Other	0	0	0	0	0	0.00%
Total Based Aircraft	50	55	60	65	70	1.70%
Operational Factors						
Design Day Operations	155	167	180	194	209	1.50%
Busy Day Operations	178	192	207	223	240	1.50%
Peak Hour Operations	13	14	15	17	18	1.50%

Source: KLJ Analysis. Note: Some figures are rounded

Forecast Approval

The FAA approved the critical design aircraft prepared in this chapter on March 30, 2026, for use in this master planning effort. See **Figure 1-6 – Critical Aircraft Determination**

Figure 1-6 – Critical Aircraft Determination



U.S. Department
of Transportation
**Federal Aviation
Administration**

Dakota-Minnesota
Airports District Office

6020 28th Avenue South, Suite 102
Minneapolis, MN 55450
2301 University Drive, Building 23B
Bismarck, ND 58504

March 30, 2026

The Honorable Roy Lindsay
Mayor of Madison
116 W Center Street
Madison, SD 57042-0016

Madison Municipal Airport (MDS)
Madison, South Dakota
FAA Forecast Approval / Critical Aircraft Determination

Dear Mayor Lindsay:

The Federal Aviation Administration (FAA) accepts the baseline scenario through year ten in the MDS Chapter 1 – Aviation Activity Forecast, submitted on November 17, 2025, for use in the master plan study. We found the forecast to be generally consistent with the FY 2025-2045 FAA Aerospace Forecasts. It uses data and is supported by generally accepted forecasting methodologies.

The existing and future critical aircraft for Primary Runway 15/33 is determined to be RDC B-II, TDG-1B.

The existing and future critical aircraft for Crosswind Runway 3/21 is determined to be RDC A/B-I/Small, TDG-1A.

The long-term conceptual scenario covering years 11 through 20 is not approved but is accepted for planning purposes.

The approval of the forecast does not automatically constitute a commitment on the part of the United States to participate in any development recommended in the master plan or shown on the Airport Layout Plan (ALP). FAA approval of the baseline scenario in this forecast does not constitute justification for future projects. Justification for future projects will be made based on activity levels at the time the project is requested for development, in accordance with criteria in FAA Orders 5090.5 and 5100.38. Documentation of actual activity levels meeting planning activity levels will be necessary to justify Airport Improvement Program (AIP) funding for eligible projects. Further, the approved forecast may be subject to additional analyses if the fundamental rationale of the forecast or the critical aircraft changes materially.

Please feel welcome to contact me at 701-323-7382 or brian.p.schuck@faa.gov with any questions.

Sincerely,

Brian P. Schuck

Brian P. Schuck, Planner

cc: Mr. Jon Becker, SDDOT (email)
Mr. Kent Penny, KLJ (email)
Mr. Andrew Zielike, KLJ (email)
Mr. Aaron Storm, KLJ (email)
Mr. David Ferrel, FAA (email)