CHAPTER 1: AIRPORT, COMMUNITY & AVIATION ACTIVITY

Purpose and Scope

The information presented in this report represents the study findings for the 2023 Airport Master Plan study prepared for the Mercer County Regional Airport Authority, 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 AIP 3-38-0075-021-2023.

This study for the Mercer County Regional Airport (HZE) 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 since the last Airport Layout Plan (ALP) was approved in 2008. An Airport Master Plan study was completed in 1992.

The airport sponsor and Kadrmas, Lee & Jackson (KLJ) developed the scope for the project in cooperation with FAA Airports District Office and the North Dakota Aeronautics Commission 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 March 2023 from the airport sponsor. The baseline project data is from inventory efforts completed in December 2023. Data from year 2022 was used to establish a baseline of existing airport information.

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.

As stated previously, the last airport master plan was completed in 1992 which reviewed three sites for the future Mercer County Regional Airport. Each site included a 5,500-foot-long by 75-foot-wide runway, a parallel taxiway, and development of an apron area. The Hazen site was selected and there after alternatives were based on that location. The last ALP was approved in 2008. A parallel taxiway was planned, airport industrial lots, fixed based operator (FBO) lots, and runway extension by 1,000 feet on the Runway 33 End (32 designation in 2008 ALP).

The master plan is more than 30 years old, and the ALP is over 10 years old. New development demands and the need to meet current FAA design standards are the factors that are driving the need for an update. 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 the need for a crosswind turf runway to achieve 95% crosswind coverage
- Evaluate the approach runway lighting and optimize the instrument approach procedures
- Evaluate the current split terminal areas
- Examine the demand for hangar space and configuration of hangars and terminal area to maximize the use of space while maximizing the functionality for each type of use
- Update ALP to current design standards

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 is being conducted as a part of this Master Planning study. The imagery was collected in June 2023. A detailed obstruction analysis will be completed using data from the aeronautical survey. This detailed obstruction identification and mitigation disposition is identified in the Airport Layout Plan developed at the end of this planning study.

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.

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.

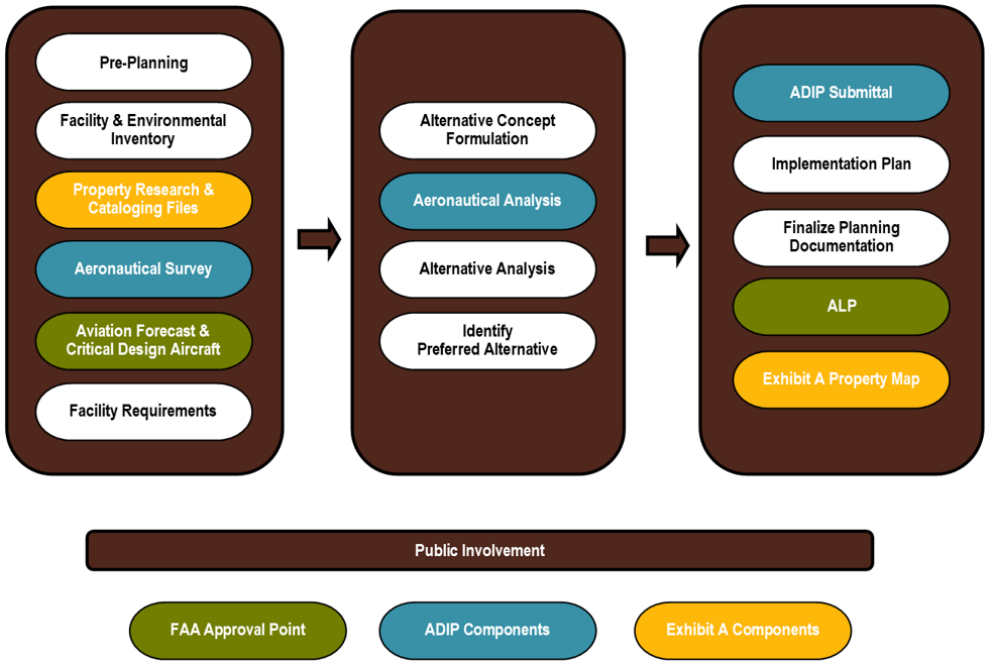
Environmental Factors – What are the potential effects of the alternatives upon the natural and built environment.

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

The Airport Master Planning process involves several coordinated steps. The master plan study for HZE 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.
- **Forecast of Aviation Demand** – Using established forecasting methods, estimate current and project future airport activity for general aviation, air cargo, and passenger enplanements.
- **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 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.
- **Land Use Compatibility** – Complete a comprehensive review of land surrounding the airport for potential uses that are incompatible with safe airport operations and provide mitigation recommendations.
- **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: KLJ

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 – Recycling and Solid Waste 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 Mercer County Regional Airport Authority in October 2024. The ALP was submitted to the State and FAA for review and approval in November 2024.

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.

The Planning Advisory Committee (PAC) is comprised of several airport authority board members and airport users and was established to provide input throughout the life of the study. The purpose of the PAC was to facilitate group discussion and feedback regarding the draft planning materials. There are also stakeholders that were contacted in the planning process. These included the following stakeholder groups.

- City of Hazen and other cities in the County
- Mercer County
- Airport Users/Tenants
- Community/Area Businesses

A project website, https://inputcentral.com/hze-airportplan was developed as a forum to share information about the project with the public. This website was used to distribute project documentation as well as collect feedback. Draft study documents were posted progressively and made available for review. An online comment form ran throughout the life of the project to provide feedback directly to the project team.

See **Appendix C: Public Involvement** for other information including copies of public involvement meeting agendas, attendees, presentations, and summaries.

Airport & Community Overview

General

The Mercer County Regional Airport is a general aviation airport serving the City of Hazen and surrounding areas of Mercer County in west central North Dakota. The airport is classified as local by the Federal Aviation Administration (FAA) in the FAA's ASSET study. See **Appendix B: General Aviation Airports 101** for additional details about airport classifications.

Mercer County Regional Airport has one lighted, 75-foot-wide by 4,999-foot-long asphalt runway. Airport facilities are split into two different apron areas, one north and one south. The south apron has 8 asphalt tiedowns and 2 concrete tiedowns. Additionally, there are two hangars, a terminal building, and a Snow Removal Equipment (SRE) building. Aircraft fueling is also located on this apron. The south apron is accessed by a paved airport road with designated vehicle parking. The county road from Highway 200 to the airport road is however gravel. The north apron has three asphalt tiedowns, 4-unit T-hangar, four box hangars, and a storage facility. The apron can be accessed from a dirt road and provides no designated vehicle parking spots.

Location and Area Setting

Mercer County is located in west central North Dakota. The largest city within the county is Beulah which is approximately 13 miles west of the Mercer County Regional Airport (HZE). Other nearby cities include Bismarck, 69 miles to the southeast and Dickinson, 90 miles to the southwest. The airport is also 15 miles south of Lake Sakakawea, the third largest man-made lake in the United States. **Figure 1-2: Airport Location Map** provides an overview of the airport's local environment.

The airport is two miles east of the central business district of Hazen which has a population of 2,281. The airport can be accessed by State Highway 200. The airport elevation is 1,814 feet above mean sea level (AMSL). The terrain around the airport is generally flat and primary land use around the airport is agricultural.

Airport Ownership & Management

The airport is owned and operated by the Mercer County Regional Airport Authority. The authority consists of six appointed members who represent the surrounding cities of Hazen, Zap, Golden Valley, Pick City, Stanton, and Mercer County.

Airport History

In 1992, Airport Authority received a grant from the FAA to prepare a study to determine the need of a 5,000 foot by 75-foot runway in the area. The current site of Hazen Municipal Airport was selected for development and in June 1993, construction began. The runway was completed in December 1993.

A complete list of major airport development projects that received funding from FAA and the State can be found in **Table 1-1 - Past Airport Projects.**

Table 1-1 – Past Airport Projects

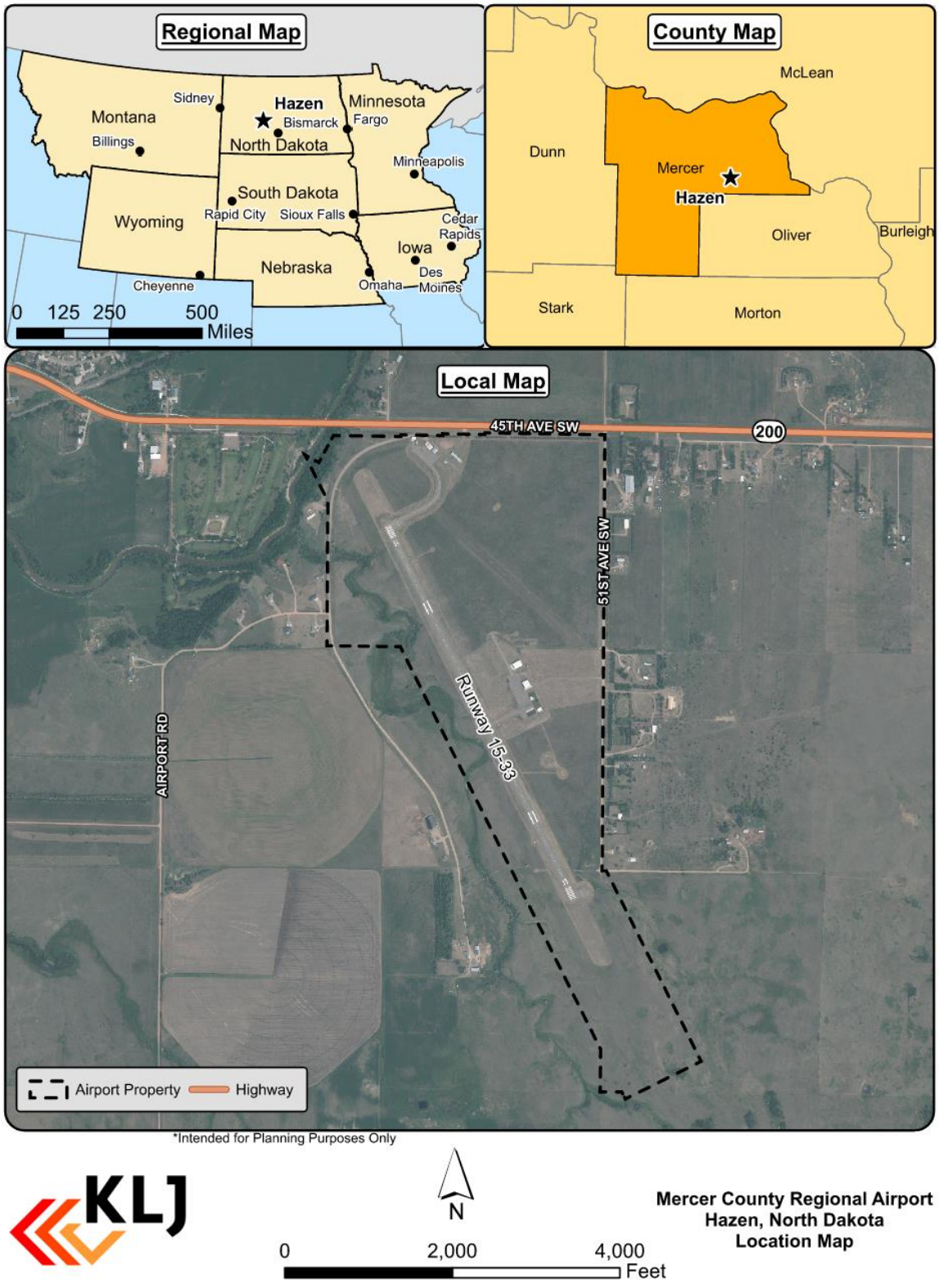
Year	Project	Federal Grant
2006	Rehabilitate Runway	$10,000
2006	Update Airport Master Plan Study	$76,642
2007	Construct Building (Hangar)	$318,280
2007	Rehabilitate Runway	$10,000
2008	Construct Fuel Farm	$34,985
2008	Rehabilitate Runway	$10,164
2009	Acquire Snow Removal Equipment	$34,521
2010	Acquire Snow Removal Equipment	$138,400
2011	Install Airport Beacons	$83,050
2011	Rehabilitate Runway	$26,387
2013	Rehabilitate Runway	$46,278
2015	Construct Apron	$80,000
2015	Improve Building	$169,400
2015	Rehabilitate Apron	$30,000
2015	Rehabilitate Runway	$93,036
2015	Rehabilitate Taxiway	$20,000
2017	Install Miscellaneous NAVAIDS	$7,200
2017	Reconstruct Taxiway	$37,085
2018	Install Miscellaneous NAVAIDS	$45,000
2018	Reconstruct Taxiway	$266,415
2019	Rehabilitate Apron	$40,000
2019	Rehabilitate Runway	$73,457
2019	Rehabilitate Taxiway	$25,000
2021	Reconstruct Runway Lighting	$637,826
2021	Rehabilitate Runway	$2,067,174

Source: FAA Records, KLJ Analysis

Land Area

The airport began acquiring land in 1983 and continued expanding along with airport development projects. According to the 2008 Airport Layout Plan, the Airport has 367 acres owned in fee simple and 21 acres in easement. The airport's Exhibit A Property Map will be updated as a part of this study to the FAA's SOP 3.00 requirements.

Figure 1-2 – Location Map



Airport Role & Design

HZE 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, personal and business aviation. Additionally, general aviation airports serve a key role in the facilitation of pilot training. HZE does not have an FBO at the airport, but Vanco Aviation operates from the airport and provides aircraft exterior refurbishing and painting. The airport serves Mercer County which includes five cities and customers such as Basin Electric Coop, Sanford Health, U.S. Army Corp of Engineers, Bismarck Air Medical, and agricultural sprayer operations. Public use airports in the United States within 50 nautical miles are listed in **Table 1-2** to provide background into the other area airports.

Table 1-2 – Surrounding Public Airports

Airport Name / City	FAA ID	Location from HZE	Driving Distance	Based Aircraft	Instrument Approach	Longest Runway
Mercer County Regional/ Hazen	HZE	-	-	16	400’ 1m	4,999’
Beulah/Beulah	95D	11 W	15 mi	20	Visual	4,030’
Garrison Municipal/Garrison	D05	23 N	51 mi	17	400’ 1m	3,699’
Glen Ullin Regional/Glen Ullin	D57	31 S	49 mi	12	300’ 1m	3,799’
Mandan Regional/Mandan	Y19	32 SE	66 mi	97	300’ ¾ m	4,399’
Bismarck Municipal/Bismarck	BIS	46 SE	73 mi	105	200’ ½ m	8,794’
Dunn County/Killdeer	9Y1	49 W	61 mi	8	600’ 1m	4,200’

Source: AirNav.com, KLJ Analysis

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 a Local airport. The North Dakota Aeronautics Commission developed a State Aviation System Plan (SASP) in 2014 and airports were placed into four different classifications: Commercial, Local, Basic, Community Pave and Community Turf. HZE is classified as Basic in the SASP.

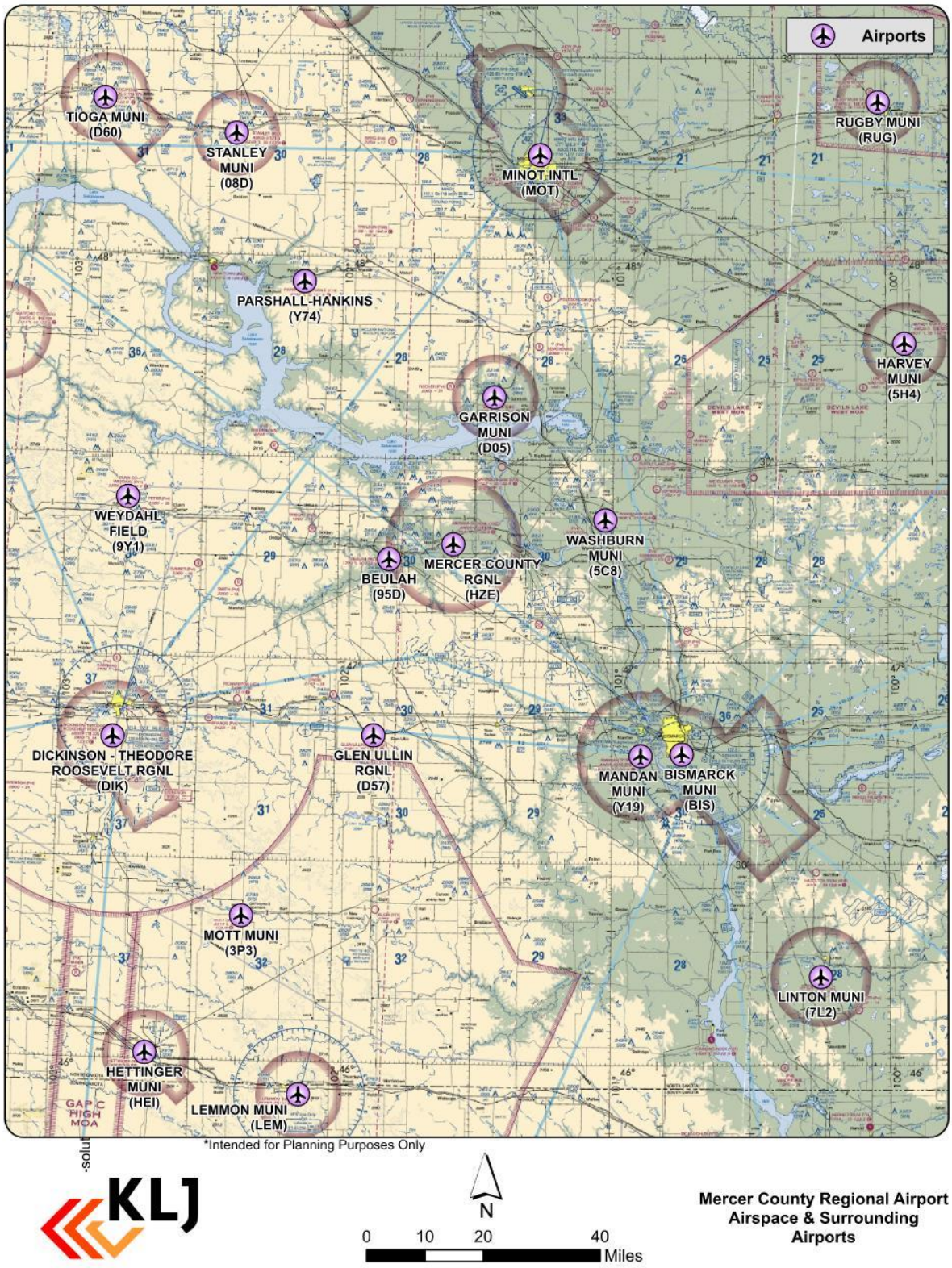
The FAA’s Airport Reference Code (ARC) identifies a design category based on aircraft wingspan, tail height and approach speed for aircraft types that regularly use the airport. For HZE, the existing ARC is B-II. This means the airport is designed for aircraft approach speeds of up to 121 knots and wingspans of up to 79 feet. **Table 1-3** summarizes the airport’s role and design. See **Appendix B: General Aviation Airports 101** for more details on FAA design classifications and State classifications.

Table 1-3 – Airport Role & Design

Airport ID	City	State Classification	FAA Classification	FAA GA Asset Group	ARC
HZE	Hazen	Basic	Non-Primary	Local	B-II
95D	Beulah	Basic	none	none	B-I
D05	Garrison	Local	Non-Primary	Basic	B-I
D57	Glen Ullin	Basic	Non-Primary	Basic	A-I
Y19	Mandan	Local	Non-Primary	Local	B-II
BIS	Bismarck	Commercial Service	Primary Non- Hub	-	D-IV
9Y1	Killdeer	Basic	-	-	B-I

Source: NDSASP, ARC = Airport Reference Code, FAA NPIAS Appendix A

Figure 1-3 – Surrounding Airports



Climate

Mercer County Regional Airport is located in a humid continental climate zone. Winters are cold and relatively dry, while summers are warm and wet. The average annual temperature is 43.2°F from 1991-2020 and an annual precipitation of 16.88 inches. **Table 1-4 – Average Weather** provides the normal conditions that are experienced throughout the year in Mercer County.

The airport has an AWOS-IIIPT located on the airfield, which is an automated weather observation system. Data from the station shows 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 is found in **Chapter 2: Runways and Taxiways**.

Figure 1-4 – Mercer County Regional Airport Wind Chart

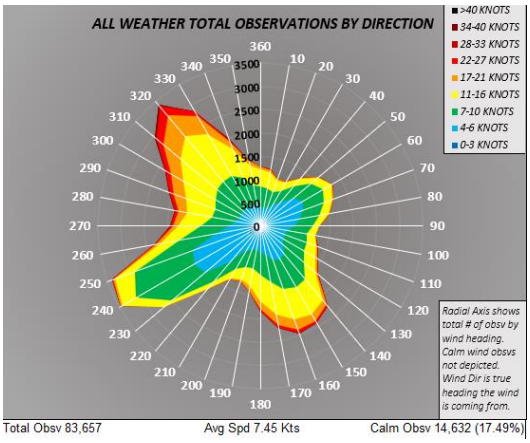


Table 1-4 – Average Weather

Month	Precipitation (in.)	Average Low Temperature (°F)	Average High Temperature (°F)
January	0.26	2.8	23.3
February	0.53	18.0	29.2
March	0.72	30.4	42.5
April	1.61	43.7	58.2
May	2.40	55.1	69.4
June	3.29	64.2	78.0
July	2.50	70.6	85.5
August	1.85	69.8	85.9
September	1.53	60.3	76.8
October	1.33	45.4	58.9
November	0.63	29.4	41.0
December	0.23	17.9	27.8

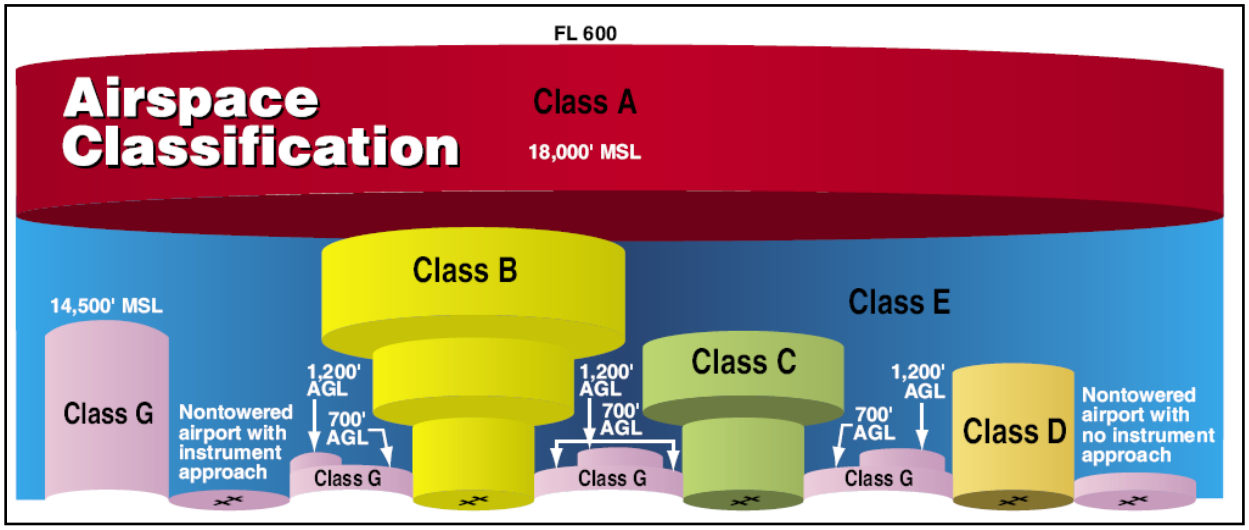
Source: National Weather Service Climate 1991-2020 – Beulah, ND 9 mi W of HZE

Airspace & Area Navigation Systems

The National Airspace System (NAS) consists of various classifications of airspace regulated by the FAA. Airspace classification ensures the safe separation of VFR and IFR aircraft. Airspace is separated into controlled, uncontrolled, special use, or other airspace. Controlled airspace is classified as A, B, C, D, or E. Uncontrolled airspace is classified as G. These classes specify appropriate minimum cloud clearances, visibility requirements, and other operating requirements for aircraft. The major difference between controlled and uncontrolled airspace is that the FAA does not exercise air traffic control over aircraft operating within uncontrolled airspace. Airspace is segregated into controlled, uncontrolled, special use or other airspace. Each airspace class has different operating rules.

HZE is located in uncontrolled Class G Airspace. Controlled Class E Airspace begins at 700 feet above the surface. Flights departing the Airport under instrument flight rules (IFR) must receive an IFR clearance from Minneapolis Center before reaching an altitude of 2,514 feet above mean sea level.

Figure 1-5 – FAA Airspace Classifications



Source: Federal Aviation Administration (FAA) Pilot's Handbook of Aeronautical Knowledge (2007)

Automatic Dependent Surveillance-Broadcast (ADS-B)

ADS-B is a satellite-based surveillance technology in which aircraft transmit GPS position information to other aircraft and to ATC facilities. ADS-B will supplement primary ground-based radar. FAA has required all aircraft operating within airspace requiring a transponder to have ADS-B transmitting equipment installed by the year 2020 as part of the Next Generation Air Transportation System (NextGen) initiative. Various ground stations have been located nationwide to provide ADS-B coverage.

Communications & ATC

The ability for pilots to communicate with other pilots and air traffic control (ATC) is critical for the safety and efficiency of the overall air transportation system. HZE will continue to be an uncontrolled airport however there is a Common Traffic Advisory Frequency (CTAF) that can be used for pilots to communicate with one another while operating on or around the airfield.

Airspace Protection

Airspace is an important resource around airports that is essential for safe flight operations. The airspace is protected through several layers of protection which include property ownership, avigation easements and land use/height restriction zoning.

LAND ACQUISITION

Land acquisition allows the airport to protect airspace and land use areas from possible intrusions. FAA encourages the airport sponsor to own the following land for existing and planned airport facility:

- Airport Infrastructure
- Runway and Taxiway Object Free Areas
- Runway Protection Zones
- Building Restriction Line
- Navigational Aid Critical Areas
- Airspace Protection

AVIGATION EASEMENTS

Avigation easements can control height and/or land use. They have often been used to control the area inside the Runway Protection Zone however the FAA has more recently recommended full acquisition of these properties. The easements can still be a very useful tool to protect the airport depending on the circumstances of particular properties and the type of protection that is needed.

LAND USE AND HEIGHT RESTRICTION ZONING

FAA recommends airport sponsors protect airport land use and airspace through local zoning. Owners of public airports are encouraged to enact airport zoning to protect airspace and surrounding land use for public safety. The intent of zoning is to:

- Protect the airport from incompatible land uses that could interfere with the safety operation of the airport,
- Protect public safety by reducing the potential for fatalities, property damage or noise complaints within the vicinity of the airport, and
- Protect the public investment made by taxpayers in the airport and the economic benefits it provides to the region restrict land uses

Federal - Part 77 Civil Airport Imaginary Surfaces

Title 14 CFR (Code of Federal Regulations) Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace* is used to determine whether man-made or natural objects penetrate three-dimensional airspace surfaces and are obstructions. See **Appendix B – General Aviation Airports 101** for a detailed explanation of Part 77 surfaces. **Table 1-5** depicts the existing approach airspace surfaces for HZE. Any existing, future, or ultimate Part 77 obstructions located around HZE will be identified on the ALP and later in this report for further action.

Table 1-5 – Part 77 Approach Airspace Requirements

Runway End	Approach Standards	Part 77 Code	Inner Width*	Outer Width	Length	Slope
Existing						
15-33	Non-Precision Other than Utility As low as 1 mile	C	1,000’	3,500’	10,000’	34:1

*Source: Title 14 CFR Part 77, KLJ Analysis *Inner width is also the Primary Surface width driven by the most demanding approach to a runway.*

Local Airspace Protections

Mercer County Zoning Ordinance follows FAA recommendations regarding airspace protection surrounding HZE. Current zoning ordinances regulate and restrict the height of structures and objects and use of property in the vicinity of the airport in accordance with the FAA. More information regarding how the county protects land surrounding the airport can be found on the county’s website.

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 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 1050.1F, *Environmental Impacts: Policies and Procedures* is required to be completed prior to commencing with project actions.

Key environmental resources are described for the existing airport area. **Figure 1-6: Environmental Overview Wetland Inventory** provides a graphical depiction of the existing environmental conditions described in this section.

Relevant Environmental Features

BIOLOGICAL RESOURCES



HZN Airport Setting

Biological resources include flora and fauna that are present in an area. HZN is in the Northern Great Plains Ecoregion according to US Geological Survey, a semiarid rolling plain interspersed with intermittent buttes and badlands, which is characterized by vast grasslands and prairies. The area has a continental climate that experiences hot summers and cold winters. The region is primarily used for agricultural purposes, with crops such as wheat, corn, and soybeans grown extensively. The area is home to several grassland and prairie plant species such as big bluestem, switchgrass, and prairie coneflower. Along the nearby Knife River, cottonwood and ash trees can be found. Wildlife in the area includes white-tailed deer, coyotes, prairie dogs, and various bird species such as the western meadowlark and red-tailed hawk. The Knife River and Spring Creek also provides habitat for fish such as suckers, catfish, perch, walleyed pike, and northern pike.

The following is not a complete list of fauna that could be present in the area; it represents the species most likely to be encountered. Bison historically roamed through the area. The wildlife that you are most likely to encounter near the Airport depends on the time of year. In general, the area is known for its population of white-tailed deer, antelope, coyotes, fox, badger, raccoon, jackrabbit, skunk, prairie dogs, and beaver. During the summer months, you may see various bird species such as western meadowlarks, red-tailed hawks, and other migratory birds. The marbled godwit and Prairie Falcon are USFWS Bird of Conservation Concern and may warrant special attention for projects that may occur outside of the existing airport boundary.

According to the U.S. Fish and Wildlife Services website, federally listed endangered, threatened, proposed or candidate species in Mercer County include the Northern long-eared bat, Whooping crane, piping plover, red knot rufa, dakota skipper, and monarch butterfly. 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. Prior to project implementation, further analysis is required to identify the potential for fish, wildlife and plant impacts as a result of any proposed projects.

DEPARTMENT OF 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 1-6: Environmental Overview Wetland Inventory** provides a graphical depiction of the Airport property and surrounding area.

There are no known publicly owned lands from parks, recreation areas, or refuge areas within the immediate vicinity of the Airport. There is a semi-private golf club (privately owned but open for public use) located to the northwest of the Airport. Further review of the potential to impact Section 4(f) resources 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 Mercer County indicates that 47 grants have been issues 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.

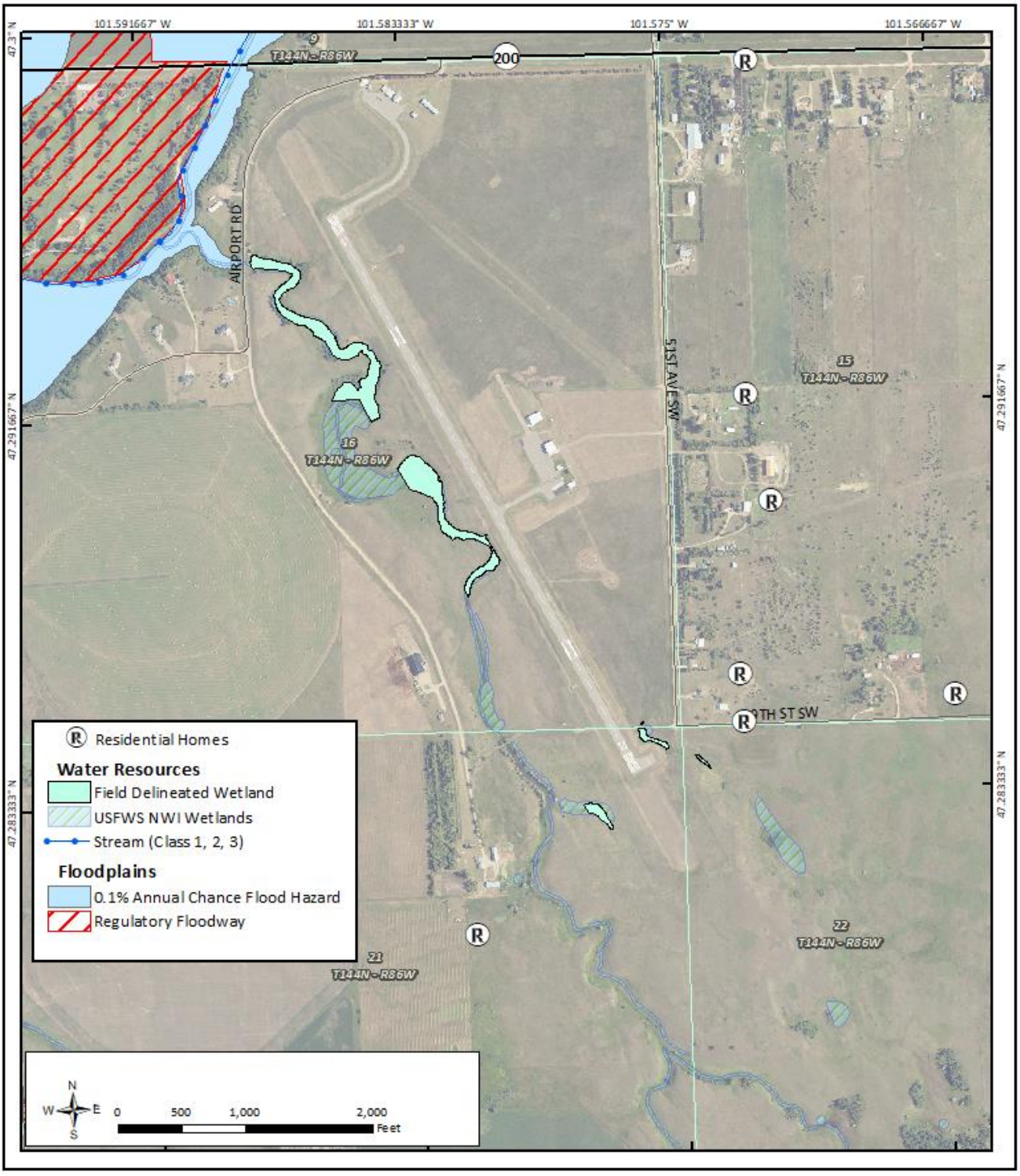
HAZARDOUS MATERIALS

There have been no reported spills or hazardous material leaks in or around HZN. This is based on a review of the ND Department of Environment Quality and Environmental Protection Agency databases regarding underground storage tanks, listings for superfund sites, and sites covered under the Resource Conservation and Recovery Act. 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 recommends a Solid Waste Management Plan to be developed as part of this Airport Master Plan study. A Solid Waste study is in **Appendix E: Recycling & Solid Waste Plan**.

Figure 1-6 - Environmental Overview Wetland Inventory



HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act of 1966, as amended, requires that federally funded projects be evaluated for the effects on historic and cultural properties included in, or eligible for listing in, the National Register of Historic Places (NRHP). The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.

Before a project that involves land disturbance is implemented, an analysis to identify the potential for cultural resources would need to be conducted for the project area. Coordination with the State Historic Preservation Office (SHPO) is necessary for projects involving land disturbance. Additionally, any project affecting buildings that have the potential to be listed in the NRHP would require coordination with SHPO.

Prior to this master planning effort a file search was completed at the State Historical Society of North Dakota (SHSND) on July 31, 2019 there are eight previously recorded cultural resources within a one-mile radius of the master plan study area. These consisted of one prehistoric sites, three historical era sites, one architectural sites, one historic lead, one prehistoric isolated find, and one historic isolated find. Of these, the eastern portion of prehistoric site 32ME405 is located within the planning area.

A Class III Inventory was also conducted of the master plan study area during August 2019 by two KLJ archaeologist and two Traditional Cultural Specialists(TCS) from the Standing Rock Sioux Tribe. During the inventory, one previously documented prehistoric site, three newly documented isolated finds and one newly documented historic-era site with modern intrusions were encountered. Isolated finds 32MEX815, 32MEX816, and 32MEX817 each consisted of single artifacts. Site 32ME405 is a previously recorded sparse cultural material scatter. Site 32ME2649 consists of a scatter of historic and modern debris and a push-pile of rocks, bricks, concrete, metal, and glass. The isolated finds and site 32ME2649 were recommended Not Eligible for the NRHP. Site 32ME405 was previously recommended in 2010 as Not Eligible due to the site being destroyed by construction of a water pipeline and gravel road. The KLJ archaeologists agreed with this recommendation.

Provided that no new sites are recorded within the existing airport boundary, no additional inventories would be necessary, and a determination of no historic properties affected could be made during consultation with the ND SHPO. This consultation would need to occur at the environmental documentation phase.

FARMLAND

Under the National Environmental Policy Act (NEPA), it is essential to consider the impacts on farmlands classified as prime, unique, or of statewide or local importance. The Farmland Protection Policy Act (FPPA) of 1981 aims to safeguard prime and unique farmlands. Prime farmland is characterized by the optimal combination of physical and chemical properties for producing food, fiber, forage, feed, and oilseed crops and is available for such purposes. Unique farmland, on the other hand, refers to farmland used to produce specific high-value crops for food, feed, and fiber. Statewide farmland is of critical importance to the production of food, feed, fiber, forage, and oilseed crops, and its designation is determined by state agencies. Local agencies identify locally important farmland where food, feed, fiber, forage, and oilseed crop production are essential at the local level, but not nationally or statewide.

A search of the USDA Natural Resources Conservation Service (NRCS) web soil survey identified land located on and around the Airport is classified as not prime farmland with small pockets of farmland of statewide importance located off the Runway 33 end. Further consultation with NRCS would be required during a project's environmental review stage to calculate the Farmland Conversion Impact Rating if land outside the existing airport property would be acquired and converted to airport property.

LAND USE

Compatible land uses refer to land uses that are not significantly impacted by the normal operations of an airport. These land uses are typically located in the vicinity of the airport and are generally associated with noise impacts and safety concerns. Noise impacts are a major consideration when determining the compatibility of land uses near an airport. Airport operations can generate significant levels of noise, particularly during takeoffs and landings. As a result, areas near the airport that are designated for residential, commercial or other noise-sensitive uses may not be compatible with the noise levels generated by the airport. Safety concerns are also a key factor in determining the compatibility of land uses near an airport. Runways and flight paths require clear zones that must be kept free of obstacles, which can limit the types of land uses that can be in these areas. Additionally, there may be specific restrictions on the height of buildings or other structures in the vicinity of an airport to ensure that they do not interfere with flight operations. Ultimately, the compatibility of land uses near an airport is an important consideration for both airport operators and neighboring communities. Careful planning and zoning can help to ensure that noise and safety concerns are addressed, while still allowing for compatible land uses that can benefit the community and support the airport's operations.

Land uses considered incompatible often include fuel storage facilities, public assembly venues, tree-lined areas, densely populated residential zones, and regions likely to attract hazardous wildlife. Generally, the area surrounding HZN is characterized by open spaces, lightly populated rural residential development, and agricultural land use towards the south.

WILDLIFE HAZARDS

The FAA has developed protocols and guidelines aimed at mitigating wildlife-related damage to aircraft and aviation infrastructure. In the last two decades, there has been an uptick in wildlife collisions, with improved reporting mechanisms bringing greater attention to the associated risks to human health, safety, and economic interests.



Sewage Treatment ponds northwest of the Airport

The area around HZN Airport includes private pasture lands and irrigated croplands to the southwest. Additionally, the town of Hazen's sewage disposal ponds, situated approximately 1.25 miles northwest of the airfield, necessitate regular monitoring to prevent them from attracting wildlife that could endanger aircraft operations at HZN. The Knife River, located less than a quarter mile north of the airport, also requires surveillance for similar reasons.

The airport is encircled by a perimeter fence consisting of three or four wires, which offers limited deterrent against wildlife such as deer, antelope, and coyotes from entering the airport's operational areas, including the runway. It is imperative for the airport to stay vigilant regarding wildlife activity. Should concerns arise, consulting a qualified wildlife biologist for a site assessment could yield strategic recommendations to alleviate wildlife hazards at the airport.

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

The social repercussions of a project are determined by its influence on the lifestyle, behavior, and economic status of the individuals residing in the project's vicinity. This includes the project's impact on local businesses, job opportunities, transportation, utilities, and other factors crucial to the community's social fabric. Actions that either negatively or positively alter these aspects can be seen as having a social impact on the inhabitants of a certain area. Projects confined to the premises of an existing airport are generally not expected to negatively affect minority and low-income groups. Given that the airport is situated within a community identified by the EPA as disadvantaged, any expansion beyond the current airport boundaries could potentially result in disproportionate impacts. Therefore, to prevent any unequal and adverse effects on minority and/or low-income populations, conducting further analyses in the early phases of project development would be necessary.

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.

There are wetlands shown in the National Wetland Inventory (NWI) located on the Airport property. A wetland field delineation was completed on the Airport in 2019 prior to a pavement rehabilitation project on the runway, taxiways, and apron. Three wetlands, comprised of six segments, were delineated. The delineated wetlands totaled approximately 8.31 acres. The wetland located on the westside of Runway 15-33 was determined to be a jurisdiction water of the U.S the USACE on January 7, 2020. Coordination with USACE would need to be completed at the environmental documentation phase for any project that impacts this resource, and the field delineation may require an update if more than five years have passed since the determination was issued. In addition to maintaining water quality in rivers and recharging groundwater among other positive benefits, wetlands may have the potential to attract wildlife that can be hazardous to aircraft using the Airport. Please refer to **Figure 1-6**.

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).

Activities at the airport can impact water quality, primarily through stormwater runoff from paved surfaces. Implementing best management practices and incorporating vegetated swales for treating stormwater runoff from runways, taxiways, and apron areas can significantly reduce potential water quality degradation. At HZN Airport, drainage typically flows directly from paved surfaces across grass covered scopes and into an unnamed tributary of the Knife River, located along the airport's western boundary. This tributary joins the Knife River about a quarter mile north of the airport, which then flows into the Missouri River, situated approximately 10 miles eastward.



Drainage on west side of Runway 15- 33

Environmental Features Not Relevant

AIR QUALITY CLASSIFICATION

The FAA Orders 1050.1F and 5050.4B outline procedures for determining when airport-related projects require an 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.

CLIMATE

Although there are no federal standards for aviation-related Green House Gas (GHG) emissions, it is well-established that GHG emissions can affect climate. The Council on Environmental Quality (CEQ) has indicated that climate should be considered in NEPA analyses. As noted by CEQ, however, “it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions; as such direct linkage is difficult to isolate and to understand.”

With respect to GHG emissions, aviation activity at Mercer County Regional Airport represents a small percentage of U.S. and global emissions; therefore, no further review is 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 HZN would require additional energy but is 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 HZN then no further noise analysis is required.

VISUAL IMPACTS

The aesthetic value of an area is influenced by its landscape and the viewer's response to the view, scenic resource, or man-made features. The extent of potential visual contrast/compatibility effects with adjacent landforms and land uses are addressed from the vantage point of those looking to an airport from outside the system.

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. While the floodplain is located just northwest of the Airport, HZN is not located within a 100-year floodplain. No further analysis is required.

Wild and Scenic Rivers

No designated Wild and Scenic Rivers are located near HZN. The segment of the Knife River located north of the airport is not listed in National Rivers Inventory. No direct or indirect impacts to wild scenic rivers would occur due improvement. No further analysis is required.

Aviation Activity

The Aviation Activity Forecasts chapter of the Airport Master Plan analyzes current and future airport activity at the Mercer County Regional Airport (HZE). 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.

Forecasting efforts are based on a "snapshot" of existing aviation trends and socioeconomic climate. As such, forecasting tends to be a dynamic element of airport master planning. When conditions change dramatically, forecasts should be reviewed and updated accordingly to reflect the changed environment.

The forecasts developed for HZE will be important to adequately plan, size, and sequence development of future facilities to meet future projected growth. Development at airports, however, is demand-based from actual numbers rather than forecasts.

To thoroughly analyze and develop a probable aviation forecast, a technical review has been completed using several methods to help quantify the potential aviation activity over the next 20 years.

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.

Forecasts developed for airport master plans and/or federal grants must be approved by the Federal Aviation Administration (FAA). It is the FAA's policy, listed in FAA AC 150/5070-6B, Airport Master Plans, that FAA approval of forecasts should be consistent with the Terminal Area Forecasts (TAF). Master plan forecasts for operations and based aircraft are consistent with the TAF if they meet the following criteria:

1. Forecasts differ by less than 10 percent in the five-year forecast and 15 percent in the 10-year period, or
2. Forecasts do not affect the timing or scale of an airport project, or
3. Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.5, Formulation of the National Plan of Integrated Airport Systems (NPIAS) and the Airports Capital Improvement Plan (ACIP).

Forecasts that are inconsistent with the TAF require additional FAA review to confirm the planning assumptions and appropriate methodologies are used.
Furthermore, FAA Order 5090.5 states forecasts should be:

1. *Realistic*
2. *Based on the latest available data*
3. *Reflect the current conditions at the airport*
4. *Supported by information in the study*
5. *Provide an adequate justification for the airport planning and development*

The TAF model used for this report is from the 2022 FAA TAF published in January 2023. This is latest data available when the forecasting effort began for this study.

Factors Affecting Forecasts

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

1. Based on availability of data when the project began (August 2023), Federal fiscal year 2022 (October 1, 2021 through September 30, 2022) has been used as the baseline year.
2. FAA data from 2022 (where available) and State data from 2014 has been used to validate forecast assumptions and update the forecast baseline.

3. The forecast period is 20 years encompassing years 2022 through 2042.
4. The most recent 2022 estimates and future projections of socioeconomic and demographic trends have been utilized for the airport service area.
5. The core airport service area is considered Mercer County, ND for this forecasting effort.

The forecasts prepared for the airport assume an unconstrained scenario where facilities are available for use to meet demand. Any constrained forecasts prepared will be noted throughout the document. Time periods include short-term (5-year), mid-term (10-year) and long-term (20-year) resulting in forecasts for year 2027, 2032, 2037, and 2042. Forecasts may be developed using a composite of methodologies over the planning period.

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, market share analysis, regression analysis, 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.

MARKET SHARE ANALYSIS

Market share analysis assumes a relationship between local and national/regional forecasts. The market share approach to forecasting is a top-down method where activity at an airport is assumed to be tied to growth in some external measure (typically a regional, state, or national forecast).

REGRESSION ANALYSIS

Regression analysis is a statistical technique for estimating the relationships between one or more variables and a specific dependent variable. Regression analysis identifies the correlation between a known independent variable(s) (e.g., estimates and projections of population, income, etc.) and the dependent variable(s) (e.g., based aircraft or aircraft operations). The correlation between the dependent and independent variable is represented by the correlation coefficient defined as the R^2 (R-squared) value. The range of values for the correlation coefficient is quantified as either a positive or negative value between +1.00 and -1.00 indicating a positive or negative relationship between the dependent and independent variable(s). Generally, a correlation coefficient greater than 0.8 is described as strong, whereas a correlation coefficient less than 0.5 is generally described as weak.

PROFESSIONAL JUDGMENT

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 HZE. 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 Mercer County data[1] 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. From **Table 1-6** you can see a very small decline for Mercer County while the state and county are increasing in population.

Table 1-6 – Population

Year	Mercer County	North Dakota	United States
2000	8,597	642,023	282,162,375
2010	8,418	674,752	309,327,089
2020	8,330	778,962	331,501,080
Historical Annual Growth Rate	*-0.158%*	*0.971%*	*0.809%*
2022 (base)	8,322	780,262	334,193,837
2027	*8,321*	*806,206*	*345,453,926*
2032	*8,320*	*831,260*	*356,413,897*
2037	*8,319*	*854,976*	*366,893,550*
2042	*8,318*	*881,844*	*376,916,244*
Forecast Annual Growth Rate	*-0.002%*	*0.58%*	*0.60%*

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.

Table 1-7 – Per Capita Personal Income

Year	Mercer County	North Dakota	United States
2000	$26,783	$25,892	$30,672
2005	$32,423	$31,967	$35,868
2010	$43,547	$44,284	$40,690
2015	$56,189	$54,014	$48,738
2020	$59,364	$60,451	$59,147
Historical Annual Growth Rate	*4.06%*	*4.33%*	*3.34%*
2022 (Base)	$64,833	$68,502	$65,831
2027	$80,893	$86,526	$83,842

[1] Woods and Poole Economics 2022 Data Set

2032	$100,332	$108,351	$105,939
2037	*$124,430*	*$135,956*	*$133,943*
2042	*$153,898*	*$170,492*	*$169,054*
Forecast Annual Growth Rate	*4.37%*	*4.61%*	*4.78%*

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

Employment

Total employment is the measure of the active workforce. For Mercer County, the largest five industries are Utilities, Mining, Health Care, State/Local Government and Retail. These five groups make up 56% of the total employment.

Table 1-8 – Airport Service Area Employment (2022)

Industry	Employment	Earnings (in millions)
Utilities	983	$127.42
Mining	621	$86.48
Health Care and Social Assistance	571	$22.57
State and Local Government	531	$23.98
Retail Trade	506	$11.16
Construction	444	$38.26
Farming	350	$3.11
Lodging and Food	269	$3.76
Other	243	$8.04
Finance and Insurance	216	$7.31
Real Estate and Rental Leasing	162	$2.12
Professional and Technical Services	134	$4.85
Administrative and Waste Services	126	$2.62
Information	112	$7.37
Wholesale Trade	107	$6.56
Forestry, Fishing and Related Activities	100	$4.54
Transportation and Warehousing	67	$2.14
Arts, Entertainment and Recreation	55	$0.46
Federal Military	49	$1.66
Manufacturing	47	$1.12
Federal Civilian Government	38	$2.83
Educational Services	35	$0.75
Management of Companies	0	0
All Industries	**100%** **5,766**	**100%** **$369.00**

Source: Woods & Poole Economics (2009 dollars)

Table 1-9 – Total Employment (in thousands)

Year	Mercer County	North Dakota	United States
2000	6,088	440,655	165,370,755
2010	6,363	503,810	172,901,669
2020	5,496	550,691	190,776,766
Historical Annual Growth Rate	*-0.51%*	*1.12%*	*0.72%*

2022 (base)	*5,766*	*595,581*	*207,048,429*
2027	*5,956*	*641,054*	*223,733,232*
2032	*6,060*	*678,509*	*237,417,579*
2037	*6,146*	*715,905*	*250,859,680*
2042	*6,217*	*753,458*	*264,7133,081*
Forecast Annual Growth Rate	*0.31%*	*1.12%*	*1.15%*

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

Based Aircraft

A based aircraft is an operational and airworthy aircraft claiming an airport as its home for most the year. The inventory of based aircraft is maintained using the National Based Aircraft Inventory Program (NBAIP) which is controlled by the FAA. Each airport is able to enter their aircraft into the NBAIP by N-Number. If for any reason that an aircraft is recorded at more than one airport, the aircraft is not counted in any airport's inventory. It is then up to the respective airport managers to communicate with each other and resolve where the aircraft is located.

Historical Data

According to the FAA's Master Record (Form 5010), the based aircraft count is 16 single engine aircraft. The National Based Aircraft Inventory Program (NBAIP) states there are 17 in the FAA Aircraft Registration data inventory but only 16 were validated. The Terminal Area Forecast (TAF) issued in February 2023 reported 16 based aircraft. The 2014 North Dakota State Aviation System Plan stated that there were ten based single engine aircraft with a forecast of only 13 aircraft by the year 2035. Based on this information, 16 based aircraft were decided to be used throughout the study.

Forecast

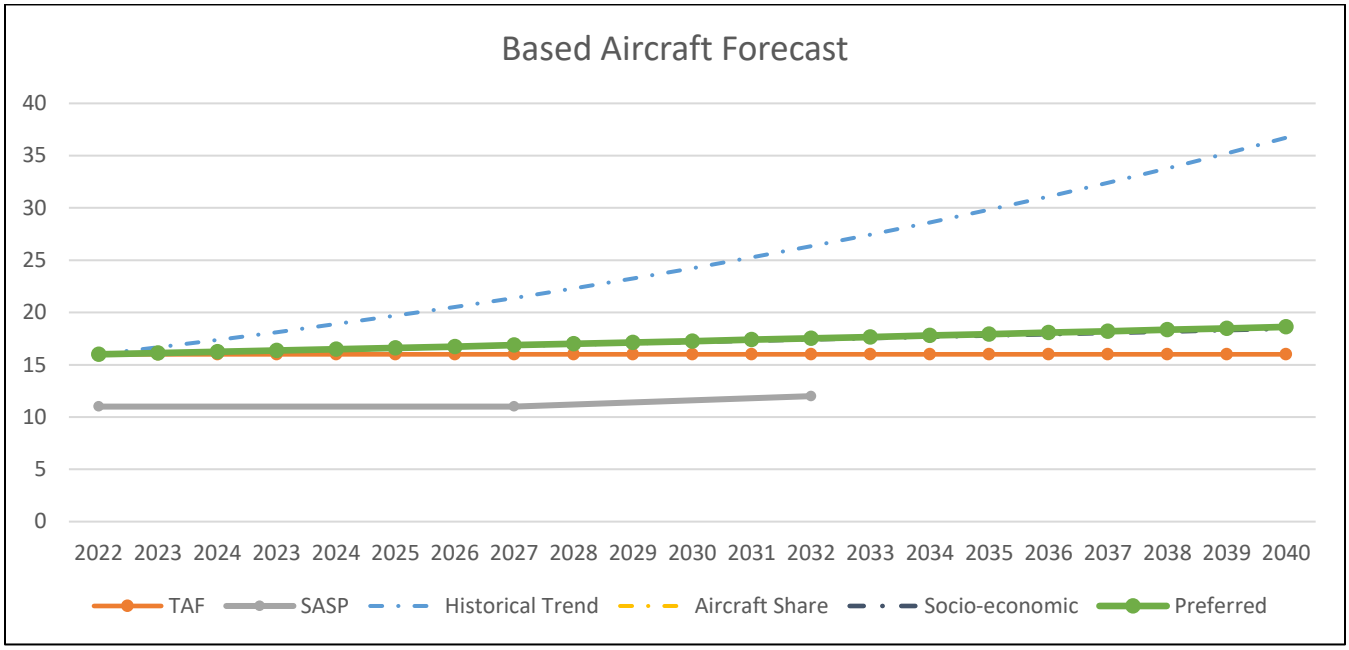
Local industry trends were evaluated when preparing this forecast of based aircraft at HZE. It is estimated that based aircraft will grow at HZE for several reasons:

- From a socio-economic perspective, Mercer County's per capita personal income will increase by 4.37% and total employment will grow by 0.31%. These numbers track with the national per capita personal income of a 4.78% growth rate and national total employment growth of 1.15%. An area with more disposable income will have more of a propensity to use aviation services.
- There is a strong demand for individual aircraft storage space. Many users currently share a large hangar and moving aircraft takes time. Lack of hangar space is a local and regional trend. Over the last three to five years local hangar availability has been no more than one vacant space per year. There is no current waiting list for the airport, but several users have ceased basing aircraft at HZE due to the lack of individual hangars.
- A turf crosswind runway would benefit many current tenants for most do not fly on windy days and utilize the existing non-published turf runway (13-31 alignment used before construction of 15-33) though it is not FAA approved nor maintained. Users stated they are discouraged from flying between 20% to 40% of the time due to the lack of a crosswind runway. Current planning of a turf crosswind runway is believed to increase based users from flying up to 50% more.

- Request for a flight school has been brought up but due to the lack of storage and apron space it has yet to be pursued. Increased infrastructure could attract a flight school and there for increase based operations.

The preferred HZE based aircraft forecast method for HZE will be the aircraft share. The reason for this is because data is coming from the Terminal Area Forecast (TAF) utilizing the state information which follows the socio-economic growth rate end the North Dakota State Aviation System Plan growth rate. With 16 based in 2022, by 2042 the number of based aircraft at HZE should increase by 0.76% which will make the new number of based aircraft 19 single-engine aircraft and one multi-engine aircraft.

Figure 1-7 – Based Aircraft Forecast



Source: KLJ Analysis. TAF=Terminal Area Forecast, SASP=State Aviation System Plan.

General Aviation

General Aviation (GA) is non-commercial aviation activity not classified in another category. At non-towered airports like HZE, FAA estimates operations and classifies them as civil local or GA itinerant. Combined these include all types of general aviation operations.

Local operations are performed by aircraft that remain in the local traffic pattern and stay within a 20–mile radius. These operations typically include practice landings, touch-and-go operations, practice approaches and maneuvering within the local area in non-military aircraft. Local operations are usually performed by recreational and flight training aircraft.

Itinerant operations are performed by a landing aircraft arriving from outside the airport area (20 miles) or a departing aircraft that leaves the airport area. Itinerant operations are conducted in all types of aircraft.

Historical Data

The TAF for the national, state, and airport historical GA itinerant operations shows multiple shifts from decreasing to increasing with the 1990-2020 CAGR for national at -0.01%, state at 0.002% and the airport at -0.02%. From the population, the TAF CAGR for the airport is decreasing at a very slow pace but the state and nation are planning on increasing up to 0.60% through 2043.

This is a non-towered airport so keeping track of the exact number of aircraft operations is not probable. An estimate is used from IFR operations. In 2022 a total of 222 IFR operations were reported from the FAA's Traffic Flow Management System (TFMS). This number does not include VFR operations which account for a lot of the smaller aircraft utilizing the airport for flight training and recreational use. Based aircraft contribute to the local operations and are made up of single engine aircraft used for personal use.

Fuel gallons sold at the airport can be a contributing factor to forecasting apron space and facility needs. The type of fuel sold can also provide insight into the types of aircraft utilizing fueling services. **Table 1-10 identifies annual fuel sales at HZE in the last six years.**

Table 1-10 – Historic Annual Fuel Sales

Year	100LL (Gallons Sold)	Jet A (Gallons Sold)	Total Gallons (Annual)
2016	11,712	13,535	25,247
2017	7,241	12,874	20,115
2018	8,667	10,291	18,958
2019	6,776	10,775	17,551
2020	11,476	1,967	13,443
2021	8,875	3,203	12,078
2022	9,660	8,008	17,668

Source: Mercer County Regional Airport Authority, KLJ Analysis

Forecast

Without an air traffic control tower, there is no accurate method to determine itinerant or local operations at the airport. Several options were evaluated to determine the most realistic aircraft operations. The national and state TAF, 2014 SASP, master record, and inventory collected from outreach to airport users were all considered and evaluated to pull data from.

It was decided 5,000 operations would be the starting point for the GA operations forecast numbers. This was determined by using 300 annual operations per based aircraft which is a typical ratio noted in FAA Order 5090.3C Field Formulation of the NPIAS. **Table 1-11** breaks down the forecasted local and itinerant operations for the planning period.

Table 1-11 – General Aviation Operations Forecast

Metric	2022	2027	2032	2037	2042	*CAGR*
Local Operations	2,600	2,689	2,782	2,878	2,977	0.68%
Itinerant Operations	2,400	2,483	2,568	2,656	2,748	0.68%
Total Operations	**5,000**	**5,172**	**5,350**	**5,534**	**5,724**	**0.68%**

Source: KLJ Analysis. CAGR=Compounded Annual Growth Rate

Fleet Mix

When determining a fleet mix of aircraft at a general aviation airport, information is typically limited to what the sponsor sees or who is based on the airfield. However, most operations conducted under IFR are tracked by FAA at airports that have Instrument procedures. The drawback of this data is it does *not* cover those aircraft operating under VFR or outside of a radar environment. For VFR flights, interpolation and estimating is required. Most corporate general aviation aircraft operate under IFR. FAA's Traffic Flow Management System (TFMS) data was used to determine an overall estimated fleet mix. Specifically, this data was used to determine proration percentages of aircraft types using the airport under IFR. This proration was then applied to existing and future airport operations at HZE.

TFMS data was gathered from years 2018 through 2022. The fleet mix of aircraft identified in the following table is used for itinerant flights conducted under IFR. An aggregate of aircraft types were ranked and the top 20 moved forward to help establish an overall IFR fleet mix. It is estimated about 15 percent of all operations at HZE are operated under IFR.

Table 1-12 – TFMS Data Fleet Mix (2018-2022)

Aircraft ID	Make/Model	Type	Operations
BE20	Beechcraft King Air 200	Turboprop	122
C208	Cessna 208 Caravan	Turboprop	84
E55P	Embraer Phenom300	Turbojet	74
C560	Cessna Citation Ultra	Turbojet	61
SW4	Fairchild Merlin 4/ Metro 2	Turboprop	47
PC12	Pilatus PC-12	Turboprop	41
PA46	Piper Malibu Matrix/Mirage	Single Engine Piston	24
M20P	Mooney M-20C Ranger	Single Engine Piston	22
SR22	Cirrus SR-22	Single Engine Piston	19
EC45	Eurocopter EC145	Helicopter	17
C182	Cessna 182	Single Engine Piston	15
C310	Cessna 310	Multi Engine Piston	15
BE9L	Beechcraft King Air C90	Turboprop	14
C172	Cessna 172	Single Engine Piston	12
P46T	Piper Pa-46 500Tp Malibu Meridian	Single Engine Piston	12
C441	Cessna Conquest II	Turboprop	11
PA34	Piper Pa-34 Seneca	Multi Engine Piston	9
BE35	Beechcraft Bonanza 35	Single Engine Piston	8
P28A	Piper Cherokee	Single Engine Piston	8
C25C	Cessna Citation CJ4	Turbojet	7
		Total Top 20 Sample	**622**
		Turboprop (51%)	319
		Turbojet (26%)	159
		Piston (23%)	144
		Total 2011-2022 IFR Operations	**769**

Source: FAA Traffic Flow Management System (TFMS), KLJ Analysis

The data table above is only a sample of IFR operations as the clear majority of VFR operations are conducted in single-engine piston aircraft. Estimated fleet mix percentages are then identified for all commercial, local and itinerant airport operations conducted under IFR and VFR. Modifications have

been made based on available local data, local user projections, broader industry trends and professional judgement to account for anticipated future user fleet mix changes. The overall estimated fleet mix share breakdown is identified in the table below.

Table 1-13 – Fleet Mix Share Breakdown

Metric	2022	2027	2032	2037	2042	CAGR
Single-Engine Piston	65.00%	65.13%	65.25%	65.38%	65.50%	0.04%
Multi-Engine Piston	15.00%	15.00%	15.00%	15.00%	15.00%	0.00%
Turboprop	7.50%	7.50%	7.50%	7.50%	7.50%	0.00%
Turbojet	7.00%	7.06%	7.13%	7.19%	7.25%	0.18%
Helicopter	5.00%	4.94%	4.88%	4.81%	4.75%	-0.26%
Ultralight/Other	0.50%	0.38%	0.25%	0.13%	0.00%	-100.00%

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

The total annual operations are prorated by the estimated fleet mix share percentage to yield a fleet mix operational forecast.

Table 1-14 – Total Operations Fleet Mix Forecast

Metric	2022	2027	2032	2037	2042	CAGR
Single-Engine Piston	3,250	3,368	3,491	3,618	3,749	0.72%
Multi-Engine Piston	750	776	802	830	859	0.68%
Turboprop	375	388	401	415	429	0.68%
Turbojet	350	365	381	398	415	0.86%
Helicopter	250	255	261	266	272	0.42%
Ultralight/Other	25	19	13	7	0	-100.00%
Total Operations	**5,000**	**5,172**	**5,350**	**5,534**	**5,724**	0.68%

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

Critical Design Aircraft

The critical design aircraft is identified as the most demanding aircraft or family of aircraft to regularly use the airport. 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. The methodology identified in FAA AC 150/5000-17, Critical Aircraft and Regular Use Determination was used for this analysis.

A review of the TFMS data and feedback from airport users was used to determine the design aircraft. At HZE, a fleet mix including turboprop and small jet aircraft were the largest aircraft types to operate.

Existing

The FAA TFMS is one source of information, but outreach was also conducted by the planning team to learn the variety of aircraft operating at HZE. Through this, the range of aircraft that is most demanding was identified. These aircraft are listed in **Table 1-15 - Existing Critical Design Aircraft**. None of these individual aircraft types has 500 annual operations, but from this range it was determined to make the B-II (TDG-2) aircraft to be the existing critical design aircraft. Examples of the aircraft sizes are portrayed in **Figure 1-8**.

Table 1-15 – Existing Critical Design Aircraft

Aircraft Type	FAA AAC	FAA ADG	FAA TDG	MTOW (lbs.)
Air Tractor 402	A	II	1-A	7,860
Air Tractor 502	A	II	1-B	9,400
Air Tractor 802	B	II	1-B	16,000
Beechcraft King Air 200	B	II	2	12,500
Beechcraft King Air 90	B	II	1A	9,650
Cessna Citation Ultra	D	II	2	16,630
Cessna 208 Caravan	A	II	1-A	8,750
Embraer Phenom 300	B	II	1A	17,527
Pilatus PC-12	A	II	2	10,450

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

Future

While it is not expected that the fleet mix at Hazen will change in the future, Basin Electric has expressed interest in operating their Embraer Phenom 300 at the Airport. For planning purposes, the Critical Design Aircraft will continue to be B-II (TDG-2) until the airport's needs dictate otherwise.

Figure 1-8 – Airport Reference Code Aircraft

ARC A-I Aircraft		ARC A-II/Small Aircraft	
Piper PA-28		Pilatus PC-12	
ARC B-I/Small Aircraft		**ARC B-II/Small Aircraft**	
Cessna 421		Beech King Air 90	
ARC B-I Aircraft		**ARC B-II Aircraft**	
Citation CJ1		Beech King Air 200	
Helicopter (more than 7,000 lbs)		**ARC B-II**	
Airbus H145		Phenom 300	

Photography Source: Airliners.net

Peak Activity

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 periods are defined in FAA AC 150/5060-5, *Airport Capacity and Delay*. Peak activity is important when planning the size of facilities with fixed capacities.

- **Peak Month:** The calendar month when peak operations occur
- **Design Day**: The average day in a peak month (peak month / 30)
- **Busy Day**: The busy day of a typical week in a peak month (Design Day + 10 percent)
- **Design Hour**: The peak hour within the design day (10 percent of Busy Day)

Peak periods evaluated include the peak month, design day and design hour characteristics for passenger enplanements and airport operations. The results of the peak activity forecasts will be used to determine the airport facility requirements. The methodology developed is derived from Airports Cooperative Research Program (ACRP) Report 25: *Airport Passenger Terminal Planning and Design*,

which emphasizes the use of design periods to forecast use patterns rather than individual absolute peak periods.

Airport Operations

Peaking tendencies for total airport operations were reviewed for preferred airport activity forecasts.

PEAK MONTH, DESIGN DAY & HOUR

Table 1-16 – Peak & Design Operations Forecast

Metric	2022	2027	2032	2037	2042	CAGR
Annual Operations	5,000	5,172	5,350	5,534	5,724	*0.68%*
Peak Month	750	776	802	830	859	*0.68%*
Design Day	25.0	25.9	26.7	27.7	28.6	*0.68%*
Busy Day (Design Day + 15%)	28.8	29.7	30.8	31.8	32.9	*0.68%*
Design Hour	1.8	1.9	1.9	2.0	2.1	*0.68%*

Source: KLJ Analysis, CAGR = Compounded Annual Growth Rate

Forecast Summary

	Activity Levels					Average Annual Compound Growth Rates			
A. Forecast Levels	**2022**	**2027**	**2032**	**2037**	**2042**	**0-5 Years**	**0-10 Years**	**0-15 Years**	**0-20 Years**
Operations									
Itinerant									
Commuter/Air Taxi	-	-	-	-	-	-	-	-	-
General Aviation	2,400	2,483	2,568	2,656	2,748	0.68%	0.68%	0.68%	0.68%
Military	-	-	-	-	-	-	-	-	-
Total Itinerant Operations	2,400	2,483	2,568	2,656	2,748	0.68%	0.68%	0.68%	0.68%
Local									
Civil	2,600	2,689	2,782	2,878	2,977	0.68%	0.68%	0.68%	0.68%
Military	-	-	-	-	-	-	-	-	-
Total Local Operations	2,600	2,689	2,782	2,878	2,977	0.68%	0.68%	0.68%	0.68%
TOTAL OPERATIONS	5,000	5,172	5,350	5,534	5,724	0.68%	0.68%	0.68%	0.68%
Annual Instrument Approaches	-	-	-	-	-	-	-	-	-
Peak Hour Operations	1.8	1.9	1.9	2.0	2.1	0.68%	0.68%	0.68%	0.68%
Based Aircraft									
Single Engine	16	16	17	17	18	0.51%	0.51%	0.51%	0.50%
Multi Engine	-	-	-	1	1	0.00%	0.00%	0.51%	0.51%
Turbojet	-	-	-	-	-	-	-	-	-
Helicopter	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
TOTAL BASED AIRCRAFT AIRCRAIRCRAFT	16	17	17	18	19	0.76%	0.76%	0.76%	0.76%
B. Operational Factors	16	17	17	18	19	0.76%	0.76%	0.76%	0.76%
GA Operations per Based Aircraft	300	304	315	309	307	0.27%	0.49%	0.19%	0.12%

Source: KLJ Analysis. Note: Some figures are rounded

Forecast Comparison with FAA TAF

Proposed aviation activity forecasts must be reviewed and approved by FAA. A forecast is consistent with the FAA TAF if the proposed activity is within a certain tolerance of the official TAF forecast. If the proposed forecast is inconsistent with the TAF, then differences must be resolved for the forecast to be adopted by the FAA. Key activity measures that are reviewed include based aircraft and total operations. The 2022 FAA TAF issued January 2023 is used for comparison.

BASED AIRCRAFT

The airport's proposed forecast of constrained based aircraft is **consistent** with the FAA TAF for the 10-year forecast horizon. The unconstrained forecast for facility planning purposes yields 19 based aircraft, 16.39 percent greater than the FAA TAF at the end of the planning period.

Table 1-17 – Based Aircraft vs. FAA TAF

Metric	2022	2027	2032	2037	2042	CAGR
HZE Based Aircraft Forecast	16	17	17	18	19	*0.76%*
2022 FAA TAF	16	16	16	16	16	*0.00%*
Difference	0	3.87%	7.88%	12.05%	16.39%	-
Allowable Difference	-	10.0%	15.0%	-	-	-
Consistent with FAA TAF?	-	**YES**	**YES**	-	-	-

Source: KLJ Analysis, FAA Terminal Area Forecast (January 2016), CAGR = Compounded Annual Growth Rate

OPERATIONS

The airport's proposed forecast of constrained total operations is **inconsistent** with the FAA TAF for the 10-year forecast horizon. The unconstrained forecast for facility planning purposes yields 5,724 operations, 274.14 percent greater than the FAA TAF at the end of the planning period.

Table 1-18 – Total Operations vs. FAA TAF

Metric	2022	2027	2032	2037	2042	CAGR
HZE Operations Forecast	5,000	5,172	5,350	5,534	5,724	*0.68%*
2022 FAA TAF	1,530	1,530	1,530	1,530	1,530	*0.00%*
Difference	226.8%	238.04%	249.67%	261.69%	274.14%	-
Allowable Difference	-	10.0%	15.0%	-	-	-
Consistent with FAA TAF?	-	**NO**	**NO**	-	-	-

Source: KLJ Analysis, FAA Terminal Area Forecast (January 2016), CAGR = Compounded Annual Growth Rate

Forecast Approval

The FAA approved the aviation forecasts prepared in this chapter on _____ for use in this master planning effort.