CHAPTER 4: FACILITY REQUIREMENTS

Introduction

This chapter of the Airport Master Plan analyzes the existing and anticipated future facility needs at the Perham Municipal Airport (16D). The report is divided into sections that assess the needs of primary airport elements including airside, support, and landside facilities.

Airside requirements are those necessary for the operation of aircraft. Landside requirements are those necessary to support airport, aircraft and passenger operations. Proposed airport needs are based on a review of existing conditions, capacity levels, activity demand forecasts and airport design standards using FAA guidance and industry standards. This chapter identifies existing facility deficiencies along with facility needs to meet demand through the planning period. The level of review completed is sufficient to identify major elements that should be addressed in this comprehensive airport plan.

This chapter provides a review of the facility needs for the following airport infrastructure categories:

- Airside Facilities
- General Aviation
- Support Facilities
- Landside Facilities

Specific alternatives that propose solutions to address facility needs are evaluated in **Chapter 5: Alternatives Analysis**.

National Plan of Integrated Airport Systems (NPIAS)

Inclusion of an airport into the FAA's NPIAS can provide an avenue for federal funding to assist in airport development. One element of this master plan study was an evaluation of the process for requesting the Perham Municipal Airport be included in the NPIAS. The Master Plan Advisory Committee (MPAC) received a presentation on the process during the meeting on July 9, 2019. The Perham Municipal Airport does not meet the standard requirements for inclusion in the NPIAS because of its proximity to two airports currently in the NPIAS, Detroit Lakes (DTL) and Wadena (ADC). On this basis, the effort to secure FAA approval for inclusion would be quite lengthy and the outcome would be uncertain. After discussion of the issues, the MPAC arrived at a consensus to delay efforts for inclusion.

Planning Activity Levels (PALs)

There are various airport activity measures used to determine airport facility requirements including annual operations, peak hour activity, and based aircraft. Airport activity can be sensitive to industry changes, national and local economic conditions. This results in difficulty in identifying a specific calendar year for associated demand-driven improvements.

For this study, PALs are used to identify demand thresholds for many recommended facility improvements. If an activity level is approaching a PAL, then the airport should prepare to implement the improvements. Alternatively, activity levels that are not approaching a PAL can allow improvements to be deferred. The demand forecasts developed in this study correspond to an anticipated planning level calendar year to each PAL (2023, 2028, 2033, 2038) from the preferred aviation forecasts as seen in **Table 4-1**.

Table 4-1 – Planning Activity Levels (PALs)

Key Activity Metrics	BASE	PAL 1	PAL 2	PAL 3	PAL 4
Forecast Year	**2018**	**2023**	**2028**	**2033**	**2038**
Operations	6,300	6,720	7,169	7,647	8,157
Based Aircraft	21	22	24	25	27

Source: KLJ Analysis

Airside Facilities

Airfield Design Standards

Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. FAA guidance is found in FAA AC 150/5300-13A, *Airport Design (Change 1)*. Careful selection of basic aircraft characteristics for which the airport will be designed is important. Airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft unlikely to operate at the airport are not economical.

- Critical Design Aircraft
- Airfield Design Classifications
    - Aircraft Approach Category (AAC)
    - Airplane Design Group (ADG)
    - Approach Visibility Minimums
- Airport Reference Code (ARC)
- Runway Design Code (RDC)
- Runway Reference Code (RRC)
- Taxiway Design Group (TDG)

Critical Design Aircraft

The critical design aircraft types must be identified to determine the appropriate airport design standards to incorporate into airport planning. The existing and future critical design aircraft characteristics at the Perham Municipal Airport (16D) are summarized in the following sections with aircraft examples depicted in **Exhibit 4-1**.

The overall design aircraft fleet mix is currently an ARC B-I Small, TDG-2 airplane. The heaviest aircraft to regularly use the airport is approximately up to 12,500 pounds maximum aircraft weight. As discussed in the Forecast Chapter 3, a large majority of the operations at Perham are A/B-I, Small aircraft, but it is important to note there are numerous Beechcraft King Air 200 aircraft operations which is a B-II, Small aircraft. These aircraft are mostly operating as medical life flights for the community. We recommend designating the Beechcraft King Air 200 as the critical design aircraft to ensure the fleet can continue to provide this vital service to the community.

Exhibit 4-1– Existing Critical Design Aircraft Family

ARC A-I/Small Aircraft		ARC A-II/Small Aircraft	
Cessna 402		Pilatus PC-12	
ARC B-II/Small Aircraft		**ARC B-II**	
Beech King Air 90		Air Tractor 802	
Beech King Air 200		Cessna Citation II	

Photography Source: Airliners.net

SUMMARY

The existing design airplane characteristics for Runway 13-31 are described in **Table 4-2**.

Table 4-2 – Existing/Future Airfield Design Aircraft Summary

Design Characteristics	Runway 13-31
Aircraft Make/Model	Beechcraft King Air B-200
Airplane Approach Category	B
Airplane Design Group	II
Taxiway Design Group	2
Wingspan	57’ 11” (w/ winglets)
Length	43’ 9”
Height	15’ 0”
Cockpit to Main Gear	8’ 4”
Main Gear Width	18’ 7”
Approach Speed (1.3 x Stall)	97 knots
Maximum Takeoff Weight	12,500 pounds
Landing Gear Configuration	Single Wheel
Aircraft Classification Number	2-4

Source: Beechcraft, Cessna, Transport Canada, KLJ Analysis

Based on current trends, the future fleet mix for Perham is not expected to change appreciably. The forecast fleet mix is based on national trend forecasts. It shows a slight increase in operations for all aircraft, resulting in a relatively constant fleet mix for Perham. Consequently, the critical design aircraft for Perham remains the King Air 200 (B-II, Small).

The future design aircraft for Runway 13/31 is expected to remain the same.

Meteorological Considerations

Meteorological conditions that affect the facility requirements of an airport include but are not limited to wind direction, wind speed, cloud ceiling, visibility, and temperature. As described in Chapter 2 Inventory, Perham does not have a weather reporting system. As a result, hourly metrological data was reviewed from the Detroit Lakes (DTL) Automated Weather Observation System (AWOS) facility, available from the National Climatic Data Center (NCDC). Periodic "special" weather observations within each hour were removed. This method considers the true average weather trends at an airport without skewing conditions toward IFR where multiple observations may be taken each hour due to changing conditions.

Wind coverage and weather conditions are evaluated based on the two different flight rules, VFR and IFR. Visual Meteorological Conditions (VMC) are encountered when the visibility is 3 nautical miles or greater, and the cloud ceiling height is 1,000 feet or greater. Conditions less than these weather minimums are considered Instrument Meteorological Conditions (IMC) requiring all flights to be operated under IFR.

WIND COVERAGE

Wind coverage is important to airfield configuration and utilization. Aircraft ideally takeoff and land into a headwind aligned with the runway orientation. Aircraft are designed to land during limited crosswind conditions and pilots are trained to land in those conditions. Small, light aircraft are most affected by crosswinds. To mitigate the effect of crosswinds, FAA recommends runways be aligned so that excessive crosswind conditions are encountered at most 5 percent of the time. This is known as a "95 percent wind coverage" standard. Each aircraft's AAC-ADG combination corresponds to a maximum crosswind wind speed component.

Small Aircraft Crosswind Landing Diagram (faasafety.gov)

Even when the 95 percent wind coverage standard is achieved for the design airplane or airplane design group, cases arise where certain airplanes with lower crosswind capabilities are unable to utilize the primary runway. The maximum crosswind component for different aircraft sizes and speeds are shown in **Table 4-3**.

Table 4-2 – FAA Wind Coverage Standards

AAC-ADG	Maximum Crosswind Component
A-I & B-I	10.5 knots
A-II & B-II	13.0 knots

Source: FAA AC 150/5300-13A – Change 1, Airport Design

Wind coverage for the airport is separated into all-weather and IMC periods. All-weather analysis helps determine runway orientation and use. Local weather patterns commonly change in IMC. An IMC review helps determine the runway configuration for establishing instrument approach procedures.

Table 4-4 – All-Weather Wind Analysis

Runway	AAC-ADG	Crosswind Component (Wind Speed)	
		10.5 knots	13.0 knots
Runway 13-31	B-II	96.16%	98.75%

**Combined assumes up to maximum design aircraft crosswind component for each runway*
Source: National Climatic Data Center data from DTL AWOS (2008-2017; hourly)

For all-weather conditions, the B-II design aircraft crosswind component (13 knots) is accommodated on Runway 13/31 during all-weather conditions with airfield wind coverage exceeding 95 percent. For A-I and B-I small aircraft, Runway 13/31 provides adequate wind coverage (10.5 knots) exceeding 95 percent. **The current runway configuration meets FAA standards for overall all-weather wind conditions.**

Table 4-5 – IMC Wind Analysis

Runway	AAC-ADG	Crosswind Component (Wind Speed)	
		10.5 knots	13.0 knots
Runway 13/31	B-II	96.95%	98.97%

**Combined assumes up to maximum design aircraft crosswind component for each runway*
Source: National Climatic Data Center data from DTL AWOS (2008-2017; hourly)

Runway 13/31 is currently capable of accommodating operations in IMC. Wind coverage to this runway meets the recommended levels for the design aircraft during IMC. **The current runway configuration meets FAA standards for IMC wind conditions.**

WEATHER CONDITIONS

Cloud Ceiling & Visibility

When IMC weather conditions occur, aircraft must operate under IFR and utilize instrument approach procedures to the runway. These IMC conditions drive the need to accommodate instrument approach procedures with sufficient weather minimums to enhance airport utilization.

For the current GPS instrument approach, the weather minimums are 295-foot cloud ceiling and 1-mile flight visibility for both Runway 13 and 31. Although the established minimum ceiling is documented at 295 feet, 300 feet will be used to simplify comparisons to other standards. Weather conditions are broken down into occurrence percentages based on current instrument approach minimums in the following table.

Table 4-6 – Meteorological Analysis

Weather Condition	Cloud Ceiling Minimum	Visibility Minimum	Total Observation Percentage	Hours Per Year (avg.)
VMC	1,000 feet	3 miles	86.03%	7,536
Usable IMC	300 feet	1 mile	11.62%	1018
Closed (Below Minimums)	< 250 feet	< 1 mile	2.35%	206

Source: National Climatic Data Center data from DTL AWOS (2008-2017; hourly), KLJ Analysis

Temperature

Average high temperature data for the hottest month was reviewed from climate data available from the NCDC for Perham. Using locally available data, the average high temperature in the hottest month from 1981-2010 was 82.1 degrees Fahrenheit. Temperature affects recommended runway lengths.

INSTRUMENT PROCEDURES

Instrument approach procedures to a runway end are used by landing aircraft to navigate to the airport during instrument conditions when the cloud ceiling is less than 1,000 feet and/or visibility is less than 3 miles. Establishing approaches with the lowest possible weather minimums allow the airport to maximize its operational utility. Each approach type requires differing infrastructure and navigational aids. Types of approach procedures include non-precision approach (NPA), approach with vertical guidance (APV) and precision approach (PA).

This section discusses instrument procedure upgrades/options that can be explored for Perham. FAA airport design standards must be met as shown in **Figure 4-2**. Coordination with FAA Flight Procedures Office is recommended to review the feasibility of implementing any new approach procedure.

Figure 4-2 – FAA Airport Design Standards for Instrument Approach Procedures

Table 3-4. Standards for Instrument Approach Procedures

Visibility Minimums [1]	**< 3/4 statute mile**	**3/4 to < 1 statute mile**	**≥ 1 statute mile straight-in**	**Circling** [2]
HATh [3]	< 250 ft	≥ 250 ft	≥ 250 ft	≥ 350 ft
TERPS GQS [4]	Clear	Clear	Clear	Not applicable
PA final approach surfaces [5]	Clear	Not Required	Not Required	Not applicable
POFZ (PA & APV only)	Required	Not Required	Not Required	Not applicable
TERPS Chapter 3, Section 3	34:1 clear	20:1 clear	20:1 clear [6]	20:1 clear [6]
ALP [7]	Required	Required	Required	Recommended
Minimum Runway Length	4,200 ft (paved)	3,200 ft [8, 9]	3,200 ft [8, 9]	3,200 ft [8, 9]
Runway Markings (See AC 150/5340-1)	Precision	Non-precision [9]	Non-precision [9]	Visual (Basic) [9]
Holding Position Signs & Markings (See AC 150/5340-1, AC 150/5340-18)	Precision	Non-precision [9]	Non-precision [9]	Visual (Basic) [9]
Runway Edge Lights [10]	HIRL / MIRL	HIRL / MIRL	MIRL / LIRL	MIRL / LIRL (Required only for night minimums)
Parallel Taxiway [11]	Required	Required	Recommended	Recommended
Approach Lights [12]	MALSR, SSALR, or ALSF	Recommended [13]	Recommended [13]	Not Required
Applicable Runway Design Standards, e.g. OFZ	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums	Not Required
Threshold Siting Criteria To Be Met (Reference paragraph 303)	Table 3-2, row 7	Table 3-2, row 6	Table 3-2, rows 1-5	Table 3-2, rows 1-4
Survey Required [14]	VGS	VGS (PA & APV) NVGS	NVGS [15]	NVGS [16]

Source: FAA AC 150/5300-13A, Airport Design

RUNWAY 13/31 APPROACHES

Perham has GPS-based procedures established for Runway 13-31 with varying minimums. See **Table 4-7**. These achieve the lowest possible weather minimums with the current infrastructure. The airport is interested in exploring upgraded approach procedures to accommodate lower instrument minimums to increase airport utility. This is important to support the presence of regular medical flights. A review of the basic airport design standards to upgrade the existing approaches was completed.

Table 4-7 – Runway Approaches

Runway Approach	Cloud Ceiling Minimum	Visibility Minimum
13 LPV/31 LPV	300/300 feet	1/1miles
13 LNAV/VNAV//31 LNAV/VNAV	300/800 feet	1/ 2.5 mile
13 LNAV/31 LNAV	400/800 feet	1/1 mile
13/31 Circling	800 feet	1 mile

Source: KLJ Analysis

After evaluating system requirements, it was determined the current airport infrastructure will not support upgraded approaches. Analysis shows that decreasing the visibility minimums from 1 mile to not less than ¾ mile would only provide an additional 19 hours of airport usability per year. To meet the FAA requirements for an upgraded approach, a parallel taxiway and expanded RPZs (approximately 40 acres per RPZ) would be required. With the minimal increase in airport usability and the requirements for a parallel taxiway and expanded RPZs, the benefits of an upgraded approach are not cost-effective. **It is recommended that the current approach minimums be maintained at this time.**

Runways

The Perham Municipal Airport has one existing runway. This section will look at the variety of design issues to assure the runway will meet needs through the planning period. The design issues begin with identifying the applicable design codes and then follow with design standards and other design aspects.

RUNWAY DESIGN CODE

The design aircraft and instrument approach minimums drive the RDC designation for the runway.

Runway 13/31: The existing RDC is A/B-II(small)-5000 for both runway ends. It is not anticipated Runway 13/31 will need to accommodate larger or heavier aircraft greater than 12,500 pounds in the future. **Recommend the runway infrastructure be maintained to continue an RDC of A/B-II(small)-5000 (Not lower than 1 mile).**

DESIGN STANDARDS

Basic Safety Standards

One primary purpose of a master plan is to review and achieve compliance with all safety and design standards. FAA design standards vary based on the RDC as established by the design aircraft. Some of the safety standards include:

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)

Other basic design standards include runway width, runway surface gradient, runway shoulder width, blast pad, and required separation distances to markings, objects, and other infrastructure for safety. Critical areas associated with navigational aids as well as airspace requirements are described further in this chapter. More information on RSA, ROFZ and ROFZ can be found in **Appendix B: General Aviation Airports 101.** The existing RSA, ROFA, and ROFZ meet existing FAA airport design standards. The basic safety standards dimensional requirements for all runways are summarized in **Table 4-16**.

LAND USE CONTROL

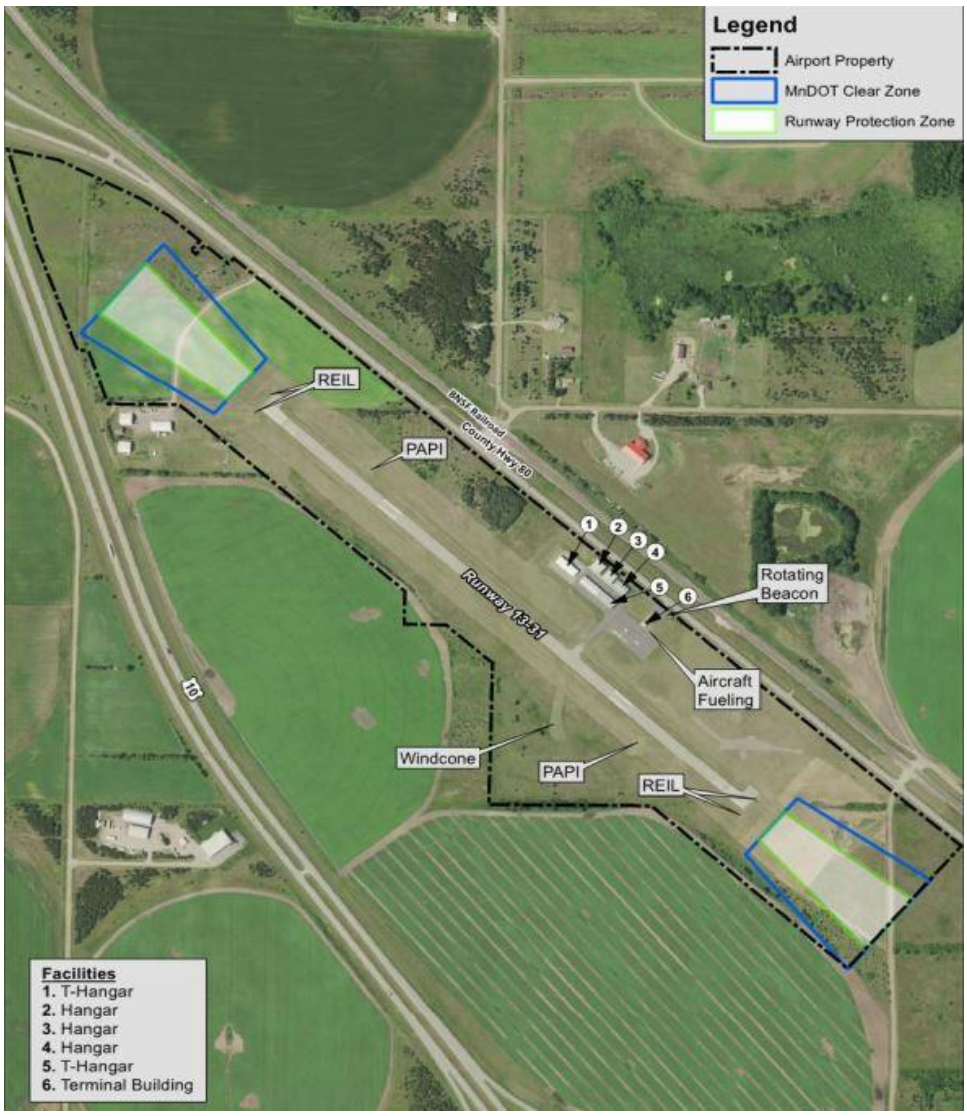
MnDOT Clear Zone

Policy Statement No. 1 from MnDOT Office of Aeronautics outlines the Clear Zone (CZ) requirements at a public airport in Minnesota. Like the FAA's RPZ, the MnDOT CZ is a trapezoidal area beyond the

runway end to restrict land uses *"which may be hazardous to the operational safety of aircraft and protect the life and property in runway approach areas […]"*.

MnDOT Aeronautics encourages airport sponsors to acquire and maintain each CZ for the ultimate development of the airport and Policy Statement No. 1 focuses on those areas that airports should acquire in fee and the Office of Aeronautics will participate in funding the acquisition of those areas. The policy also states that State participation in improvement projects may be limited to those airports that have adequate CZs.

Exhibit 4-2 – Clear Zones



The following land uses exist within the current CZs:

- **Runway 13:** a private access road from County Highway 80 to an aerial agricultural operation outside airport property
- **Runway 31:** a secondary un-paved road from County Highway 80 to County Highway 34 which also serves as a snow mobile trail

MnDOT Aeronautics expects all property in the required CZs be purchased by the airport sponsor as soon as practicable. If immediate acquisition is not possible, the airport sponsor should provide written

documentation to MnDOT stating why the sponsor cannot purchase the entire CZ and describing the sponsor's plans to acquire the property, including a detailed acquisition plan with timelines and triggering events. State funding is only available for fee simple acquisitions.

Land controls for each of the existing CZs are identified below:

- **Runway 13:** The Runway 13 CZ is owned in fee however there is a private road that runs within the boundary. It was not determined what instrument or documentation grants the use of the roadway to the adjacent landowner. It is recommended the airport ensures they have adequate control to protect airfield operations.
- Runway 31: The Runway 31 CZ is owned in fee however there is an unpaved road / snow mobile trail that runs within the boundary. It was not determined what instrument or documentation grants the use of this roadway within the property. It is recommended the airport ensures they have adequate control to protect airfield operations.

Land Acquisition

Land acquisition allows the airport to protect airspace and land use areas from possible intrusions. FAA and MnDOT encourage airport sponsors 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

Perham currently owns the land in its clear zones. If the airport wanted to establish approaches with lower minimums, larger RPZs would be required, necessitating additional land acquisition. However, as stated previously, increased minimums would only provide minimal improvements in airport usability and would not be cost-effective. MNDOT policy supports ownership of the land within the clear zone and typically participates in acquisition of property within the clear zone. Therefore, **no land acquisition is recommended at this time.**

Airport Zoning

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

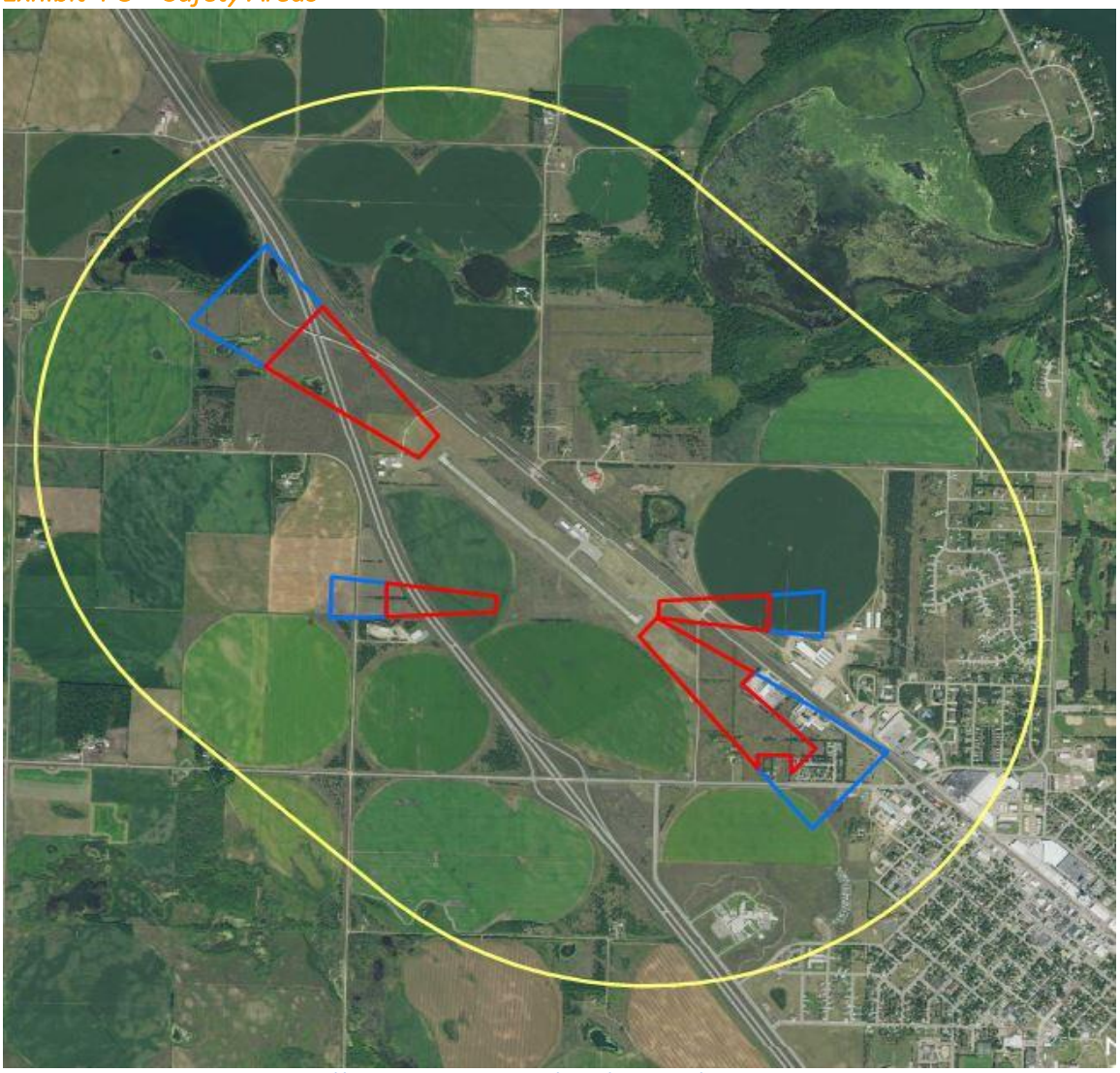
- Protect the airport from incompatible land uses that could interfere with the safety operation of the airport,
- Protect public safety by reducing the potential for fatalities, property damage or noise complaints within the vicinity of the airport, and
- Protect the public investment made by taxpayers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

MnDot Administrative Rules **8800.2400 Airport Zoning Standards** establish minimum standards for the zoning of public airport as to airspace, land use safety, and noise sensitivity. Figure 4-3 shows the current land use safety zones for Perham. Since the current turf runway is not used, this master plan focused on the safety zones for Runway 13/31 with the following analysis:

- **Runway 13:** Both Safety Zones A and B comply with the land use restrictions identified in 8800.2400

- **Runway 31 Safety Zone A:** Safety Zone A has been notched out to accommodate non-conforming development that was in existence prior to the establishment of the safety zone boundaries. 8800.2400 Subpart 6, Use Restrictions, specifies that no buildings or uses that bring together an assembly of persons is permitted. Current nonconforming uses include a motel, a trucking company (warehouse), and associated buildings. Although 8800.2400 does not require immediate action, in the interest of protecting life and property in the event of an aircraft accident, the City should consider targets of opportunity to implement new zoning or remove the nonconforming uses from Safety Zone A.
- **Runway 31 Safety Zone B:** Safety Zone B contains a mobile home park which does not conform to the land use requirements of 8800.2400. The mobile home park development was in existence prior to the establishment of the safety zone boundaries. This existing use would be permitted however future non-compatible uses would be prohibited.

Exhibit 4-3 – Safety Areas



Source: MnDOT Aeronautics (http://www.dot.state.mn.us/aero/planning/zoning-warehouse.html)

Under the authority of Minnesota statutes 360.061 – 360.074, the City of Perham has adopted zoning ordinances consistent with state airport zoning regulations. **No changes are recommended to the current airport zoning ordinance.**

RUNWAY LENGTH

Runway 13/31 is the single runway for Perham Municipal Airport with a length of 4,102 feet. As of the date this Master Plan study was initiated, FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, was the current FAA guidance for determining runway lengths at airports. The MnDOT SASP classifies Perham as an **Intermediate** airport with runway lengths less than 5000 feet. One of the recommendations of the 2012 SASP is to increase the runway length to 5000 feet.

Small Airplanes Up to 12,500 Pounds

The FAA design approach to determine recommended runway length in small aircraft is identified in Chapter 2 of FAA AC 150/5325-4B. The method requires several steps to be performed including identifying percentage of fleet and using airport data to calculate runway length based on curves.

Table 4-8 – FAA AC 150/5345-4B Runway Length Requirements (≤ 12,500 lbs.)

Airport and Runway Data	
Airport Elevation	1376 feet
Mean Daily Maximum Temperature of Hottest Month	82.1°F
Aircraft Classification	**Recommended Runway Length**
Small Airplanes 12,500 Pounds or less	
10 or more passenger seats	**4,300 feet**
Less than 10 passenger seats at 100 percent of fleet	3,900 feet
Less than 10 passenger seats at 95 percent of fleet	**3,400 feet**

Source: FAA AC 150/5325-4B, KLJ Analysis
Note: Runway length requirements estimated based on charts for airport planning purposes only.

For small general aviation aircraft, the FAA runway length requirements of 95 percent of fleet would apply at Perham due to its distance from metropolitan locations. However, the King Air 200, as the critical design aircraft, has 10 or more passenger seats. Therefore, **the recommended runway length is 4,300 feet.**

Other Considerations

For an intermediate airport like Perham, the Minnesota State Aviation System Plan identifies the minimum runway length as 2,400 feet. Key system airports have a minimum runway length of 5,000 feet. An update to the State Airport System Order would be required to designate Perham as a Key System Airport to construct a runway length of 5,000 feet or greater. There are currently 30 Key System airports statewide and up to 40 allowed per Minnesota Statute Chapter 360.305. Minimum system objectives triggered by classification as a Key System Airport include but are not limited to:

- Runway length of 5,000 feet or greater
- Runway width of 100 feet
- Full parallel taxiway
- Precision instrument approach to one runway end
- MALSR or other Approach Lighting System
- Vertically guided approach to opposite runway end
- Automated Weather Observation System
- Perimeter fencing of entire airport

RUNWAY WIDTH

Runway width is driven by the RDC and approach visibility minimums for each runway as identified in FAA AC 150/5300-13A. Based on the existing and recommended future design standards, no changes are recommended to the existing runway width (see **Table 4-16**). **The width for Perham is currently 75 feet and is recommended to remain at this width**.

PAVEMENT STRENGTH & CONDITION

Airfield pavements should be adequately maintained, rehabilitated, and reconstructed to meet the operational needs of the airport. The published pavement strength is based on the construction materials, thickness, aircraft weight, gear configuration and operational frequency for the pavement to perform over its useful life.

Table 4-9 – Pavement Strength Requirements

Runway	Capacity
Runway 13/31	12,500 Single Wheel (SW)

Source: 16D FAA 5010 Airport Master Record, KLJ Analysis

The typical useful life of a bituminous pavement ranges from 20 to 30 years if properly maintained. The useful life for a concrete pavement can extend to 40 years and beyond. In 2016, the Minnesota Department of Transportation, Office of Aeronautics completed a pavement management system update for Perham. For simplicity, the runway, taxiway, taxilane, and apron pavements are all addressed in this section for the runway. A summary of the existing pavement condition with recommendations is contained in **Table 4-10**.

Table 4-10 – Pavement Condition & Recommendations

Pavement ID	Pavement Condition Index (	Action Plan (Lowest PCI)		
		0-5 Years	6-10 Years	11-20 Years
Runway 13/31	88	Maintain	Maintain	Major Rehab.
Taxiways	72-88	Maintain	Maintain	Major Rehab.
Taxilane	88-94	Maintain	Maintain	Major Rehab.
Apron	61	Maintain	Major Rehab.	Maintain

Source: MNDOT Pavement Condition Assessment (2016), KLJ Analysis

Airspace Protection

Airspace is an important resource around airports that is essential for safe flight operations. As of the time of this report, an obstruction analysis is underway to identify obstructions to Part 77 and other airspace surfaces utilizing data collected in 2019. **There are no known airspace penetrations to the existing FAA airport design runway approach (threshold siting) surfaces.** There may be obstacles that penetrate other airspace surfaces that require further study. The full results of this analysis will be identified in the ALP drawing set.

AREA AIRSPACE

The existing Class G airspace with Class E beginning at 700’ allows for controlled airspace for most of the approach and is considered sufficient to support any enhancement to instrument approach procedures.

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 "imaginary" three-dimensional airspace surfaces and are obstructions. **Table 4-11** depicts the existing, future, and ultimate approach airspace surfaces for Perham:

Table 4-11 – Part 77 Approach Airspace Requirements

Runway End	Approach Standards	Inner Width*	Outer Width	Length	Slope
13/31	Non-Precision Utility As low as 1 mile	500'	2,000'	5,000'	20:1

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

Any existing, future, or ultimate Part 77 obstructions located around Perham will be identified on the ALP for further action.

RUNWAY APPROACH/DEPARTURE SURFACES

FAA identifies sloping approach surfaces that must be cleared at an absolute minimum for safety for landing aircraft. These surfaces are identified in Table 3-2 of FAA AC 150/5300-13A, Change 1, as modified by Engineering Brief EB-99.

The departure surface applies to runways with instrument departures available. It begins at the end of the takeoff distance available and extends upward and outward at a 40:1 slope.

The applicable approach/departure surface standards are identified in **Table 4-12**:

Table 4-12 – Approach/Departure Surface Requirements

Runway End(s)	Table 3-2 Row	Description	Slope
Existing			
13/31	4	Approach end of runways expecting to support instrument night operations greater than or equal to ¾ mile visibility	20:1
13/31	7	Departure runway ends for all instrument operations	40:1
Future/Ultimate			
13/31	4	Approach end of runways expecting to support instrument night operations greater than or equal to ¾ mile visibility	20:1
All	7	Departure runway ends for all instrument operations	40:1

Source: FAA AC 150/5300-13A, Change 1 with Engineering Brief 99, KLJ Analysis

Both runway ends at Perham are available for departures, but Runway 13 has published procedures as depicted below.

PERHAM, MN
PERHAM MUNI (16D)
TAKEOFF MINIMUMS AND (OBSTACLE)
DEPARTURE PROCEDURES
AMDT 1 13234 (FAA)
DEPARTURE PROCEDURE: **Rwy 13**, climb heading 128° to 1900 before turning left.
TAKEOFF OBSTACLE NOTES: **Rwy 13**, REILs 8' from DER, 79' right of centerline, 2' AGL/1373' MSL. Trees beginning 6' from DER, 350' right of centerline, up to 50' AGL/1386' MSL and trees beginning 138' from DER, 115' right of centerline, up to 50' AGL/1433' MSL. Light 8' from DER, 79' left of centerline, 2' AGL/1373' MSL. Trees beginning 261' from DER, 251' left of centerline, up to 50' AGL/1387' MSL. **Rwy 31**, REILs 9' from DER, 79' right of centerline, 2' AGL/1378' MSL. Ground 8' from DER, 223' right of centerline, 1377' MSL. Poles and tower beginning 627' from DER, 570' right of centerline, up to 43' AGL/1430' MSL. Light, 8' from DER, 79' left of centerline, 2' AGL/1377' MSL. Vehicles on road beginning 431' from DER, 32' left of centerline, up to 18' AGL/1394' MSL. Trees, pole, and building beginning 93' from DER, 377' left of centerline, up to 50' AGL/1409' MSL.

Airspace surface obstructions and mitigation options for future runway configurations will be evaluated in **Chapter 5: Alternatives Analysis**. Mitigation options generally include obstruction removal, lighting/marking, declared distances and/or adjustment of the visual guidance slope indicator angle. Other long-term options include reconfiguring the runway or modifying design standards. New development should be clear of airspace surfaces.

Navigational Aids (NAVAIDs)

Airfield NAVAIDs are any ground or satellite based electronic or visual device to assist pilots with airport operations. They provide for the safe and efficient operations of aircraft on an airport or within the vicinity of an airport. The type of NAVAIDS required are based on an airport's location, activity, and usage type.

AREA NAVIGATION

For area navigation (RNAV), satellite-based NAVAIDs will primarily be used for air navigation with ground-based NAVAIDs used for secondary purposes. Wide Area Augmentation System (WAAS) provides the framework for satellite–based navigation and approach procedures. Perham has satellite-based approaches for both ends of Runway 13/31.

RUNWAY APPROACH

Other NAVAIDs are developed specifically to provide "approach" navigation guidance, which assists aircraft in landing at a specific airport or runway. These NAVAIDs are electronic or visual in type. FAA Order 6750.16D, *Siting Criteria for Instrument Landing Systems* and FAA Order 6850.2B, *Visual Guidance Lighting Systems* defines the standards for establishing these systems.

Visual Guidance Slope Indicator (VGSI)

A VGSI system provides visual descent guidance to aircraft on approach to landing. A Precision Approach Path Indicator (PAPI) system is a typical VGSI system installed on runway ends to enhance visual vertical guidance to the runway end. The 2-light system is for non-jet runways and the 4-light system is for jet-capable runways. Both ends of Runway 13/31 are equipped with a four-box Precision Approach Path Indicator (PAPI) system installed on the left side of the runway with a standard 3.0-degree decent angle. The PAPIs are owned by the city. As the PAPIs are nearing the end of their useful life, it is recommended the City begin planning for the replacement of both PAPIs.

Runway End Identifier Lights (REIL)

REILs consist of high-intensity flashing white strobe lights located on the approach ends of runways to assist the pilot in early identification of the runway threshold. Runway 13 and 31 ends are each equipped with an omni-directional REIL. Replacement of the REILs has been included in the airport's 2019 CIP.

AIRFIELD VISUAL

Visual NAVAIDs provide airport users with visual references within the airport environment. They consist of lighting, signage, and pavement markings on an airport. Visual NAVAIDS are necessary airport facility components on the airfield, promoting enhanced situational awareness, operational capability and safety. FAA AC 150/5340-30, *Design and Installation of Airport Visual Aids* defines the standards for these systems.

Airport Beacon

Perham has a clear and green rotating beacon, which is a two-sided light that assists pilots in the visual identification of a civilian airport. The clear and green beacon indicates a lighted land airport. The airport beacon is located along the south edge of the vehicle parking lot and operates sunset to sunrise. The airport beacon's location at Perham adequately serves the airport without known obstructions to its line of sight. The minimum light beam angle is 2 degrees.

Runway and Taxiway Lighting

Pavement edge lights are placed off the edge of the runway surface to help pilots define the edges and end of the pavement and facilitate safe operations during night and low visibility conditions. Runway 13/31 is equipped with a Medium Intensity Runway Lighting (MIRL) system which was installed in 1992. These lighting systems have a typical lifespan of 30 years and this system is currently nearing the end of its useful life. Taxiway edge lighting exists where the taxiway intersects the runway. There are no additional taxiway edge lighting or retro-reflective blue markers throughout the remaining taxiway and taxilane system. **It is recommended the airport begin planning for the replacement of the MIRL system.**

Lighting Activation

Pilot-controlled lighting systems allow pilots to control the operation and intensity of the airport lighting systems. During the hours of darkness, the edge lighting for Runway 13/31 is preset to low intensity. The pilot-controlled lighting (PCL) system is activated through Common Traffic Advisory Frequency (CTAF). The PCL system is also used to activate the PAPI and REIL systems.

AIRFIELD SIGNAGE

There are currently no guidance signs on the Perham airport.

PAVEMENT MARKINGS

Pavement markings help airport users visually identify important features on the airfield. FAA has defined numerous different pavement markings to promote safety and situational awareness as defined by FAA AC 150/5340-1, *Standards for Airport Markings*. Runway markings vary in complexity depending on the type of approach. Runway 13/31 has Non-Precision markings identifying the runway designation, threshold, aiming points, and centerline.

Taxiway markings include centerline striping and hold position markings. The hold position markings are installed 125 feet from the Runway 13/31 centerline.

METEOROLOGICAL

Aircraft operating to and from an airport require meteorological aids to provide current weather data. Airports have various aids installed providing local weather information.

Surface Weather Observation

There are no automated weather observation systems installed at Perham. The nearest weather-reporting systems are at the Detroit Lakes and Wadena airports. Real-time weather information is very important for pilots using the Perham Airport and a system such as the AWOS II (Automated Weather Observation System) can provide altimeter, wind, temperature, and visibility data. **The airport should work with the MnDOT Office of Aeronautics to procure an AWOS system.**

Wind Cone(s)

A lighted wind cone is installed midfield of Runway 13/31 approximately 400 feet southwest of the centerline. There are currently no segmented circles or supplemental wind cones installed on the airfield.

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. Perham will continue to be an uncontrolled airport. Communications with ATC are made possible through a Ground Communications Outlet (GCO) system on 121.725 mHz, allowing communications at lower altitudes. Coverage with ATC is expected to be enhanced at lower altitudes with the establishment of satellite-based ADS-B infrastructure over time. No airport action is necessary now.

Taxiways

Taxiways provide for the safe and efficient movement of aircraft between the runway and other operational areas of the airport. The taxiway system should provide critical links to airside infrastructure, increase capacity, and reduce the risk of an incursion with traffic on the runway. The taxiway system should meet the design standard requirements identified in FAA AC 150/5300-13A, Change 1.

DESIGN STANDARDS

FAA identifies the design requirements for taxiways. The design standards vary based on individual aircraft geometric and landing gear characteristics. Those standards are based on the Taxiway Design Group (TDG) and Airplane Design Group (ADG) identified for the design aircraft using a particular taxiway. Some of the safety standards include:

- Taxiway Width
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway Edge Safety Margin (TESM)
- Taxiway/Taxilane Object Free Area (TOFA)

Other design standards include taxiway shoulder width to prevent jet blast soil erosion or debris ingestion for jet engines and required separation distances to other taxiways/taxilanes. More information can be found in **Appendix B: General Aviation Airports 101**.

The existing taxiway meets the ADG-II and TDG-2 design standards. **Table 4-14** and **Table 4-15** describes the specific FAA taxiway design standards for various ADG and TDG design aircraft, respectively. The

taxilanes in the hangar area do not meet the taxilane object free area (TOFA) standards for ADG-I aircraft. Taxilanes on the apron meet the ADG-1 standards, but do not meet the ADG-II TOFA standards.

Taxilane standards in the hangar area cannot be met unless hangars are relocated. Taxilane standards will be incorporated for hangar development in the Alternatives Chapter. The taxilane issues on the apron will be addressed in the Alternatives Chapter.

Table 4-14 – FAA Taxiway Design Standards Matrix (ADG)

Design Standard	Airplane Design Group (ADG)	
	ADG-I	ADG-II
Taxiway Safety Area	49 feet	79 feet
Taxiway Object Free Area	89 feet	131 feet
Taxilane Object Free Area	79 feet	115 feet
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	70 feet	105 feet
Taxilane Centerline to Parallel Taxiway/Taxilane Centerline	44.5 feet	65.5 feet
Taxiway Centerline to Fixed or Movable Object	64 feet	97 feet
Taxilane Centerline to Fixed or Movable Object	39.5 feet	57.5 feet
Taxiway Wingtip Clearance	20 feet	26 feet
Taxilane Wingtip Clearance	15 feet	18 feet
Design Standard	**ADG-I**	**ADG-II**
Taxiways	x	x
Taxilanes	x	
Apron	x	x

Source: FAA AC 150/5300-13A, Change 1, KLJ Analysis
NOTE: Taxiways include respective entrance taxiways to runways

Table 4-15 – FAA Taxiway Design Standards Matrix (TDG)

Design Standard	Airplane Design Group (TDG)		
	TDG-1A	TDG-1B	TDG-2
Taxiway Width	25 feet	25 feet	35 feet
Taxiway Edge Safety Margin (TESM)	5 feet	5 feet	7.5 feet
Taxiway Shoulder Width	10 feet	10 feet	15 feet
Design Standard	**TDG-1A**	**TDG-1B**	**TDG-2**
Taxiways	x	x	x
Taxilanes	x		
Apron	x	x	x

Source: FAA AC 150/5300-13A, Change 1, KLJ Analysis
NOTE: Taxiways include respective entrance taxiways to runways

The only taxiway on the airfield is a connecting taxiway from the apron to Runway 13/31. To upgrade the approaches to the runway or to become designated as a Key airport in the MnDOT SASP, a parallel taxiway would be required.

Airside Data Summary

Table 4-16: Runway 13/31 Design Standard Matrix provides summary data of the facility requirements and recommendations associated with the runway at Perham through the planning period(s).

Table 4-16 – Runway 13/31 Design Standard Matrix

Design Standard	Requirement or Recommendation		
	Existing	Future	Ultimate
Runway Identification	13/31	13/31	13/31
Runway Classification	Utility	Utility	Utility
Aircraft Classification	Small Aircraft	Small Aircraft	Small Aircraft
Runway Length	4,201’	4,300’	4,300’
Runway Design Code (RDC)	A/B-II-5000 Both	A/B-II-5000 (Both)	A/B-II-5000 (Both)
Pavement Strength (Wheel Loading)	12,500 (SW)	12,500 (SW)	12,500 (SW)
Runway Width	75’	75’	75’
Runway Safety Area (RSA) Width	120’	120’	120’
RSA Length Beyond Threshold	240’	240’	240’
Runway Lighting	MIRL	MIRL	MIRL
RPZ Start from Runway	200’	200’	200’
RPZ Length	1,000’	1,000’	1,000’
RPZ Inner Width	250’	250’	250’
RPZ Outer Width	450’	450’	450’
Visibility Minimums	1 mile (Both)	1 Mile (Both)	1 Mile (Both)
Approach Type	NPI (Both)	NPI (Both)	NPI (Both)
14 CFR Part 77 Approach Slope	34:1 (Both)	34:1 (Both)	34:1 (Both)
ROFA Width	250’	250’	250’
ROFA Length Beyond Threshold	240’	240’	240’
ROFZ Width	250’	250’	250’
ROFZ Length Past Runway	200’	200’	200’
Threshold Siting Surface (TSS) Type	Type 4 (Both)	Type 4 (Both)	Type 4 (Both)
TSS Start from Runway End	200’ (Both)	200’ (Both)	200’ (Both)
TSS Length	10,000’ (Both)	10,000’ (Both)	10,000’ (Both)
TSS Inner Width	400’ (Both)	400’ (Both)	400’ (Both)
TSS Outer Width	3,400’ (Both)	3,400’ (Both)	3,400’ (Both)
TSS Slope	20:1 (Both)	20:1 (Both)	20:1 (Both)
Visual and Instrument NAVAIDs	PAPI, REIL	PAPI, REIL	PAPI, REIL
Runway and Taxiway Separation	NA	NA	NA
Runway and Parking Separation	125’	125’	125’
Runway and Hold Line Separation	125’	125’	125’
Centerline Distance to 35’ BRL	495’	495’	495’

Source: FAA AC 150/5300-13A – Change 1, Airport Design, KLJ Analysis

General Aviation

Background

General Aviation (GA) includes all civil aviation activities except for commercial service. Providing necessary facilities and access for general aviation users at Perham Municipal Airport will continue to be important for the vitality of the Perham community. The number of based aircraft is projected to grow a total of 19 percent with operations growing accordingly through PAL 4. Facilities should be planned to provide flexibility for growth including a Fixed-Base Operator (FBO) business providing aeronautical services from Perham. General aviation facilities evaluated in this section include aircraft storage hangars, aircraft parking apron and arrival/departure terminal building.

Aircraft Storage

Aircraft storage requirements are driven by operational requirements, aircraft size, local climate, and owner preferences. For based aircraft, the harsh winters in the upper Midwest drive all owners to seek aircraft storage facilities rather than outdoor parking on an aircraft parking apron. Owners prefer to have covered, secure storage for their aircraft with space for other aeronautical facilities including an office or maintenance/storage areas. All based aircraft at Perham are stored in aircraft storage hangars. Transient aircraft travel to airports for up to a few days at a time. These aircraft typically park on the aircraft apron or seek temporary indoor aircraft storage, especially during adverse weather conditions.

A facility space model was developed to estimate aircraft storage hangar size needs. The model uses the based aircraft fleet mix forecast and estimates a size per aircraft type to determine recommended facility space. The Perham based aircraft forecasts estimate another six (6) based aircraft through the planning period (PAL 4) consisting of a fleet mix of 4 single-engine/other and 2 multi-engine.

BASED AIRCRAFT

All 20 based aircraft and 1 ultralight aircraft are currently stored in approximately 36,050 square feet of available aircraft storage space. The following assumptions were made about aircraft storage space requirements:

- Single-Engine Piston/Other/Ultralight: 45’ x 35’ storage area (1,575 SF)
- Multi-Engine/Turboprop: 55’ x 45’ storage area (2,475 SF)
- Turbojet: 65’ x 55’ storage area (3,575 SF)
- Helicopter: 45’ x 45’ storage area (2,025 SF)
- Additional 20 percent for general aeronautical storage and supplies

Using these assumptions with based aircraft forecasts, a projected need for based aircraft storage space is determined. It is important to understand that this projection provides a broad estimate of needed space into the future for facility planning. Actual space needs are demand-driven. For example, the presence of an FBO may require additional space for aircraft maintenance.

Table 4-17 – Based Aircraft Storage Requirements

Category	*Existing*	Base	PAL 1	PAL 2	PAL 3	PAL 4
Based Aircraft Storage Space (SF)						
Aircraft Storage Space	*35,400*	34,200	35,775	41,400	42,975	47,025
Capacity/Deficiency	**-**	**1,200**	**375**	**6,000**	**7,575**	**11,625**

Source: KLJ Analysis. Note: RED indicates a deficiency to existing capacity.

The above analysis suggests sufficient aircraft storage space exists to accommodate based aircraft needs only until PAL 1. In addition, there are seven aircraft owners on a waiting list for space in the T-hangars when it becomes available.

The recommended hangar types to accommodate aircraft storage depend on airport and aircraft owner preferences and financial position. There are two main hangar types:

- T-Hangar: Nested small aircraft storage units within a rectangular building.
- Conventional Hangar: Commonly known as "box" hangars are square/rectangular.

Hangars are constructed with public or private funds as demand warrants. This facility requirement analysis shows there is a need for approximately 30 percent more total hangar space at Perham to accommodate forecasted based aircraft through PAL 4.

TRANSIENT AIRCRAFT

Transient aircraft storage is utilized on an as-needed basis as aircraft require temporary storage. Aircraft types that require this type of storage are typically larger and more expensive airplanes such as turboprop and turbojet aircraft. Storage timeframes vary but can be for a few hours to several days.

Transient aircraft storage should plan to accommodate one single-engine and one multi-engine/turboprop airplane through PAL 3. **Long-term needs would require additional storage for a turbojet aircraft.**

Table 4-18– Transient Aircraft Storage Requirements

Category	*Existing*	Base	PAL 1	PAL 2	PAL 3	PAL 4
Transient Aircraft Storage Space (SF)						
Corporate Hangar	*0*	4,050	4,050	4,050	4,050	7,625
Capacity/Deficiency	**-**	**4,050**	**4,050**	**4,050**	**4,050**	**7,625**

Source: KLJ Analysis. Note: RED indicates a deficiency to existing capacity.

Aircraft Parking Apron

GA aircraft parking is utilized by transient or based aircraft. With all the based aircraft at Perham stored in hangars, the aircraft parking necessary for transient aircraft requiring parking for a few minutes to a few days. Itinerant aircraft will require either covered aircraft storage (based or transient) or apron parking space.

AIRCRAFT DEMAND

The apron size is driven by the number and size of maneuvering and parked aircraft. The purpose of this analysis is to determine the triggering point for additional GA apron space using the aviation activity demand forecasts.

Apron size must accommodate both the required aircraft parking positions and maneuvering standards. The Perham apron, shown in Exhibit 4-3, is 6,600 square yards and currently has eight (8) tie down positions for ADG-I aircraft, but no designated parking positions for ADG-II aircraft. Aircraft maneuvering at Perham are required to accommodate safety setbacks for FAA ADG-II wingspan for the design aircraft to access parking positions and the fueling area. During the summer tourist season, parking demands occasionally exceed available capacity. In addition, the number of ADG-II aircraft using the Perham Airport has been increasing.

Exhibit 4-3 – Perham Apron

Apron size must accommodate both the required aircraft parking positions and maneuvering standards. The current apron configuration has a number of limitations. It does not meet maneuvering or parking standards for the design aircraft. Parking positions, including hard stand positions for heavier aircraft, are needed for ADG-II aircraft. The location of the fuel system limits circulation on the apron and there is currently no position for the establishment of an FBO.

Based on this assessment, the existing apron is not sufficient to accommodate the existing and projected need. The apron will require reconfigured tie-downs, additional parking spaces, and additional apron space to meet ADG-II needs. **Chapter 5: Alternative Analysis**, will evaluate various options for more efficient use of the apron, including potential relocation of the fueling system, relocation of the terminal building, expanding the apron, adding hard stands for larger aircraft, and providing room for development.

GA Terminal Building

Also known as the arrival/departure building, the terminal building is on the northeast side of the apron, near the fueling system. Built in 1993, the terminal building has a total area of 750 sq ft. The building includes a waiting area, a flight-planning and weather-briefing station, restrooms, and an office. While the building appears to meet the needs for the foreseeable future, aircraft parking apron requirements may drive the need for the relocation of the terminal facility. This will be evaluated further in **Chapter 5: Alternative Analysis.**

Support Facilities

Support facilities are necessary for a safe and efficiently run airport that support airport operations and the travelling public.

Airport Administration

The Perham Municipal Airport is owned and operated by the City of Perham. Airport administration is conducted by city staff located in off-airport city offices. This arrangement is expected to continue and be sufficient. A small manager's office is in the A/D building.

Airport Maintenance & Snow Removal

The Perham Municipal Airport does not have maintenance or snow removal equipment stored onsite at the airport. All equipment designated for maintenance or snow removal activities is owned by the City and stored at the City's public works facility.

Fueling Facilities

A public self-service fueling facility offering 100 low-lead AVGAS is located on the northeast edge of the apron. The system was installed in 1987 and consists of a card reader, fuel pump and hose reel, and 10,000-gallon underground storage tank. Installment of a new fuel pump is planned for 2019. Currently, Jet A fuel is not available on the airfield. The airport should monitor requests, evaluate the need and analyze the cost-benefit for installing a Jet A fuel system in the future.

Fencing, Security & Wildlife

SECURITY & FENCING

Security is an important consideration when operating a safe airport. Transportation Security Administration (TSA) published a *Security Guidelines for General Aviation Airports* document in 2004 providing recommended airport design guidelines.

The airport does not have a complete perimeter fence system. A partial 4-foot chain link fence with manual vehicle and pedestrian gates is in place around the parking lot and the terminal building.

The installation of a complete perimeter fencing system would help prevent unauthorized persons from entering the airfield. A 6-foot high fence with added barbed wire is generally recommended at a minimum for security. Airfield access points should be minimized, but those that are needed should be controlled.

WILDLIFE CONTROL & MITIGATION

There is no wildlife fencing installed around the airport. There are no known wildlife hazards, but a Wildlife Hazard Assessment would identify any potential hazards. A complete perimeter fence is also a minimum service objective for a Key System Airport, which is triggered with a runway length of 5,000 feet or greater.

Landside Facilities

Ground Access, Circulation & Parking

GROUND ACCESS & CIRCULATION

The overall design objective is to provide ground vehicles with access to and from the terminal building and hangar facilities using a primary access road. The number of hangar access points should be limited to reduce the possibility of vehicle/aircraft incidents which improves safety. Fuel delivery trucks should have access to tanks without entering airside operations areas. Access roads should be paved to reduce the likelihood of foreign object debris (FOD) on the airside areas where it may become a hazard to aircraft.

Public airport access is provided via a paved access road from County Highway 80. There are no dedicated internal access or perimeter roadways located outside of runway and taxiway safety areas to access airport facilities. This is typical for a lower activity airport such as Perham.

The automobile parking lot is located directly adjacent to the arrival/departure building. This location is ideal to minimize passenger and visitor exposure to the outdoor elements.

AUTOMOBILE PARKING

Automobile parking at general aviation airports should accommodate landside access needed to serve aeronautical facilities. Facilities requiring automobile parking include the arrival/departure terminal building, aircraft storage hangars, administration, maintenance equipment storage buildings and FBOs. Vehicles should be discouraged from parking in airside areas. Automobile parking lots should be sized for the demand and have appropriate number of handicapped accessible spaces.

The parking lot at Perham, located adjacent to the terminal building, is approximately 600 square yds with asphalt paving. The parking stalls are not marked. Pavement markings are recommended to maximize capacity.

Public Transportation

There is no public transportation available at the Perham Municipal Airport.

Summary

This chapter identifies safety, capacity and development needs for the Perham Municipal Airport based on forecasted activity levels. These recommendations provide the basis for formulating development alternatives in **Chapter 5: Alternatives Analysis** to adequate address recommended improvements. The following summarizes the facility recommendations:

Airside Facilities

- Maintain Runway 13/31 to accommodate regular use of Beechcraft King Air B-200 aircraft with RDC B-II/Small standards.
- Evaluate the need to extend Runway 13/31 to 4300 feet to meet runway length requirements for design aircraft.
- Establish a plan for the replacement of the Medium Intensity Runway Lighting system.
- Work with MnDOT Aeronautics to install an AWOS system.

General Aviation Facilities

- Accommodate additional based aircraft hangar storage prior to PAL 1.
- Provide storage space for corporate and transient aircraft.
- Reconfigure or expand the apron to accommodate additional ADG-I and ADG-II parking and meet ADG-II maneuvering standards.
- Reconstruct the aircraft apron within the next five years.

Support Facilities

- Plan for an ultimate airport perimeter security and wildlife fence.