FINAL
REPORT

La Crosse Regional
AIRPORT

Mead & Hunt

AIRPORT MASTER PLAN

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CHAPTER 1

Inventory

1.1 Introduction

The inventory chapter of a master plan is used to describe existing conditions at an airport and in its surrounding community and identify the parameters in which the airport functions. This information is then compared to anticipated aviation demand to determine how to best accommodate the future needs of the Airport. Information on the La Crosse Regional Airport (LSE) is presented in the following sections:

- Airport Background
- Federal, State, and Local Airport-Related Plans
- Airport Zoning
- Airside Facilities
- Landside Facilities
- Airspace
- Local Socioeconomic Trends
- Inventory Summary

1.2 Airport Background

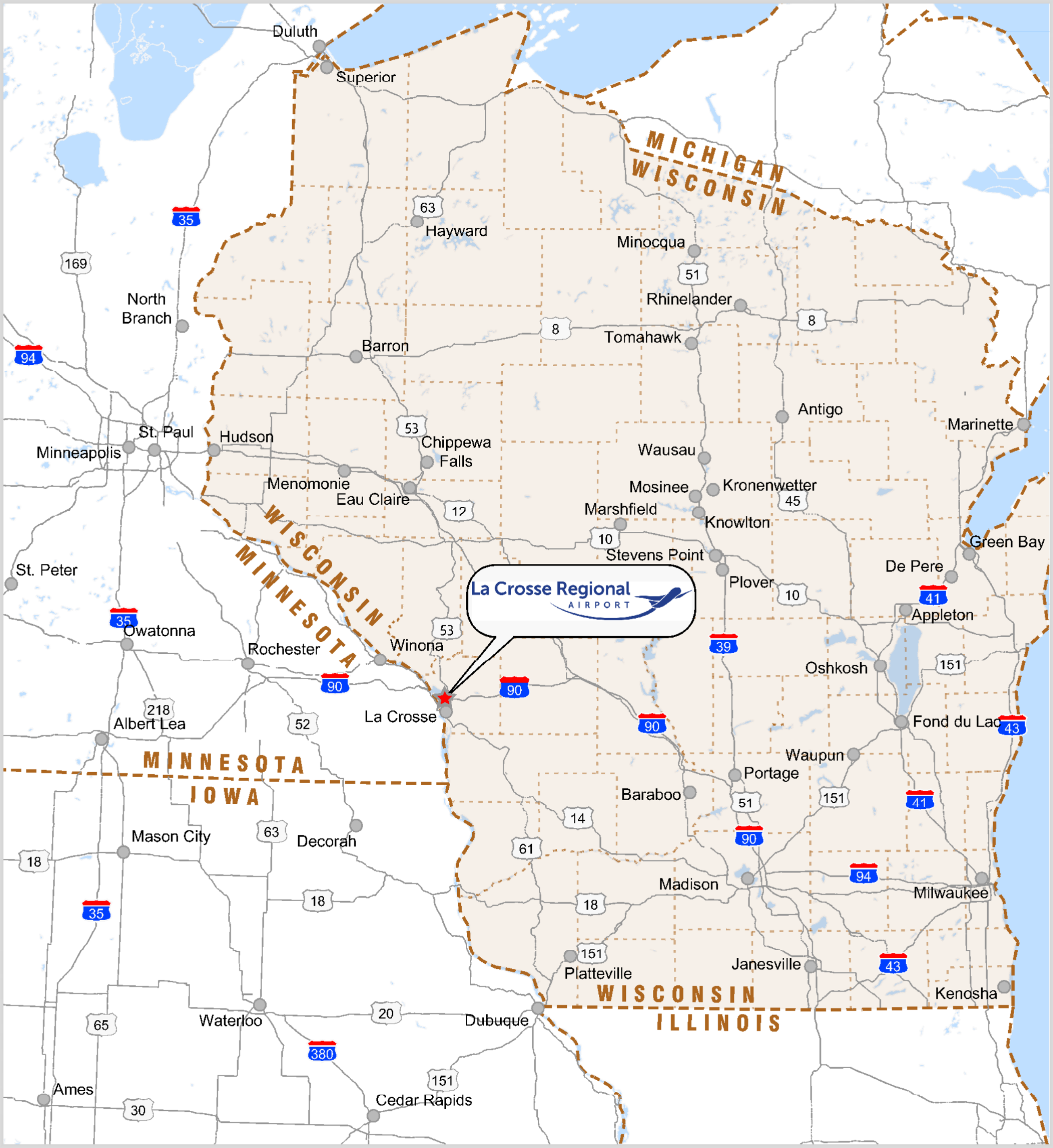
1.2.1 Airport Location and History

The Airport is located approximately five miles north of downtown La Crosse on French Island between the Mississippi River and the Black River, as shown in **Figure 1-1** and **Figure 1-2**. Several cities are located near the Airport. In addition to the City of La Crosse, Onalaska is located less than a mile from the Airport on the east bank of the Black River and La Crescent is located approximately four miles to the southwest on the west bank of the Mississippi River. The local region has a history of aviation dating back to 1911 when mail was first delivered to the area by aircraft. Although the first airport was constructed in the southern portion of the City of La Crosse, the Airport was eventually relocated and opened in its existing location in 1947. As of 2020, the Airport was served by two airlines. American Airlines, providing service to Chicago, and Delta Air Lines, with service to Minneapolis and to Detroit. Surrounding commercial airports may impact activity at LSE due to passenger preference or air carrier routes available nearby. Nearby airports that offer commercial service are shown below in **Table 1-1.** Locations of these airports are shown in **Figure 1-3.**

Table 1-1: Surrounding Commercial Service Airports

Airport	Distance (Miles)	Driving Time (Minutes)
Rochester International (RST)	76	70
Chippewa Valley Regional (EAU)	69	105
Dane County Regional (MSN)	109	123
Central Wisconsin Airport (CWA)	100	137
Minneapolis–Saint Paul International (MSP)	150	142
Mason City Municipal (MCW)	161	145
Waterloo Regional (ALO)	133	152
Dubuque Regional (DBQ)	125	154
Appleton International (ATW)	139	176
General Mitchell International (MKE)	181	193
Rhinelander/Oneida County (RHI)	150	199
Austin Straubel International (GRB)	161	201

Source: Google Earth, Google Maps



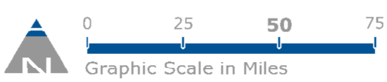


Figure 1-1: **Airport Location Map**

La Crosse Regional AIRPORT

Source: *ArcGIS*

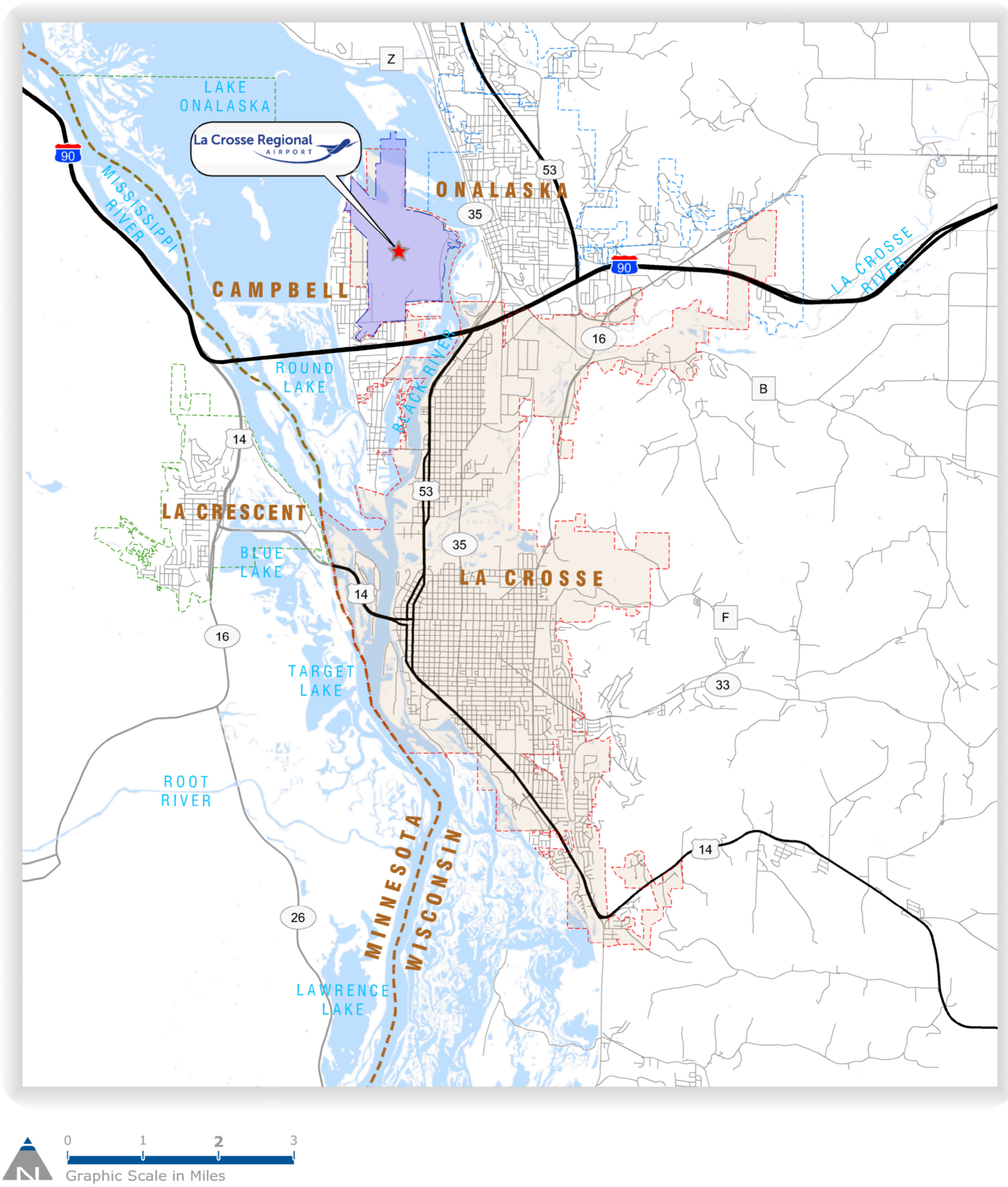


Figure 1-2: **Vicinity Map**

Source: *ArcGIS*

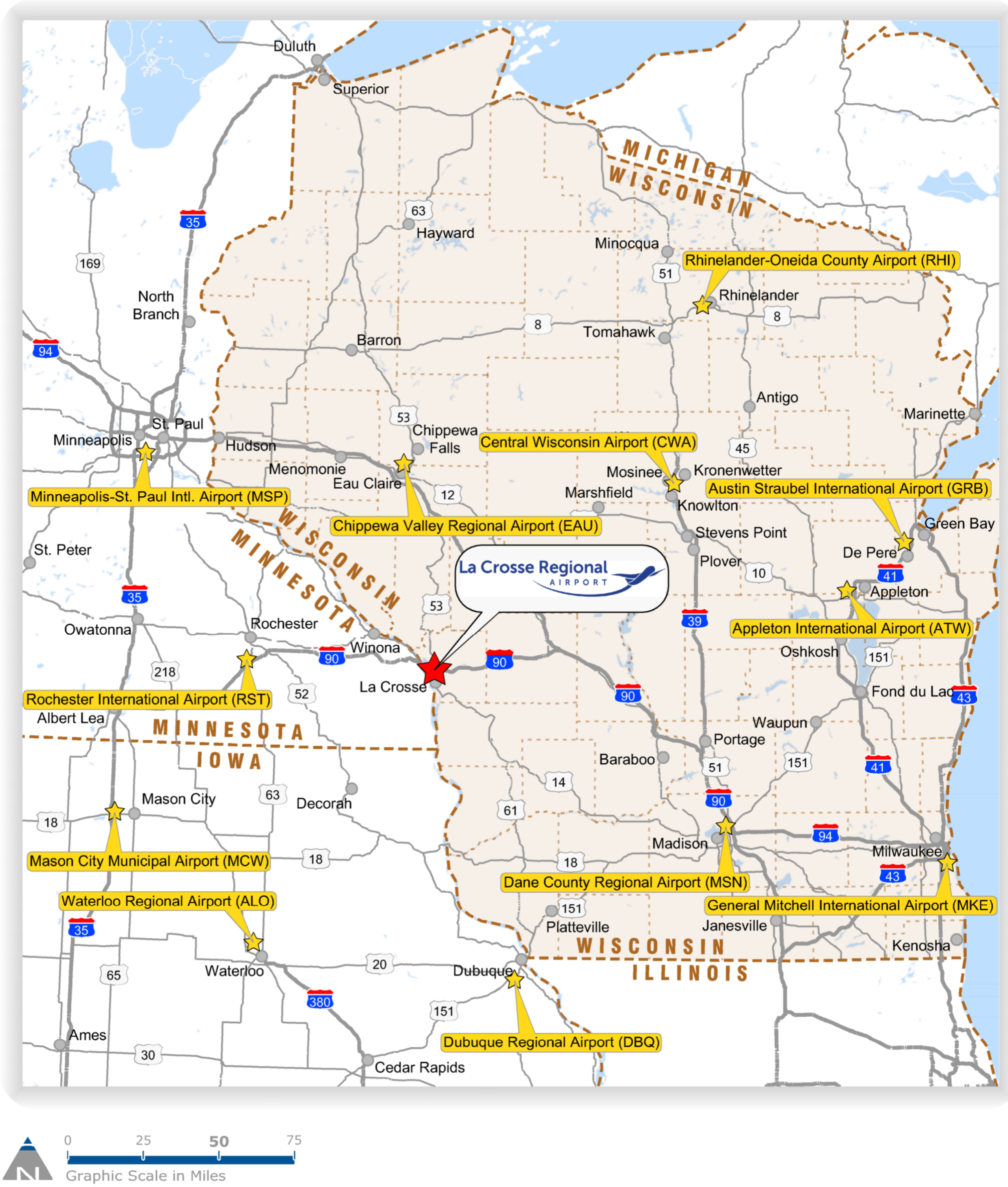


Figure 1-3: **Nearby Airports**

Source: *ArcGIS*

1.2.2 Climate, Topography and Soils

The La Crosse Airport averaged 35.9 inches of rain over the past five years with precipitation usually heaviest during the late spring and early summer. The field elevation at LSE is 656 feet which occurs at the Runway 13 threshold. The location of the Airport on French Island provides sufficient space from the surrounding topography to prevent some, but not all, interference with instrument approaches. Wetlands near the Airport are common, but most are located away from the Airport and do not border Airport property. However, the large collection of wetlands in the area and open waters of the Mississippi River, Black River, and Lake Onalaska provide notable wildlife attractants. The Airport Facility Directory indicates that wildlife is common in the area with heavy concentrations of waterfowl in the spring and fall. Due to the natural areas surrounding the Airport, deer and other mammals are also common in the area. To help mitigate these wildlife concerns a perimeter fence surrounds the entire Airport. As any fence constructed since 2001 includes a barrier of compacted asphalt millings, the majority of perimeter fencing has a barrier underneath to prevent animals from burrowing. Airport personnel monitor the fence to maintain its integrity.

1.2.3 Airport Management and Operations

The Airport is owned by the City of La Crosse and is governed by an Aviation Board of seven voting members and up to three non-voting members. Non-voting members may be part of the Board by merit of their other positions at the Airport or City and may be appointed and removed by the Mayor; terms of these non-voting members are for two years. The voting members are appointed by the mayor for three-year terms after confirmation of the City Council. At least four voting members must be residents of the City of La Crosse including one from the City Council and one from the member of the County Board of Supervisors. By default, the Aviation Board member from the City Council will serve as the Chair while the Vice-Chair is elected every twenty-four months by the members. Operations at the Airport are generally managed by the Airport Manager, Assistant Airport Director, and the Operations and Maintenance Supervisor, along with Airport employees.

1.3 Federal, State, and Local Airport-Related Plans

This section provides a summary of planning documents relevant to the Airport at a federal, state, and local level.

1.3.1 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS is a Federal Aviation Administration (FAA) report issued every two years that identifies airports that are integral to the national air transportation network. An airport must meet a set of criteria (such as based aircraft counts and locational requirements) to be included in the NPIAS. Airports in the NPIAS are eligible for development grants under the FAA's Airport Improvement Program (AIP). Of the 19,536 landing areas in the United States, 5,136 are publicly owned, and of those, only 3,332 are included in the NPIAS as of 2017. LSE is currently listed as a Primary Commercial Service airport in the NPIAS. Primary Commercial Service airports are defined as public airports receiving scheduled passenger service with 10,000 or more enplaned passengers per year. There are 382 airports nationwide that are categorized as Primary Commercial Service.

LSE is also currently listed as a Nonhub airport in the NPIAS. The determination of hub status for an airport is made by dividing the number of annual enplanements at the airport by the number of nationwide annual enplanements. Based on the resulting percentage, the airport may be categorized as a Large Hub, Medium Hub, Small Hub, or Nonhub. LSE is classified as Nonhub as its annual passenger enplanements comprise less than 0.05% of all U.S. enplanements. The NPIAS indicates that Primary Nonhub Commercial Service Airports are also heavily used by general aviation aircraft. Of the 382 nationwide Primary Commercial Service airports, 249 are considered Nonhub airports. Together, these airports account for 3% of nationwide passenger enplanements. Finally, the NPIAS provides five-year cost estimates for airport improvements eligible for Federal development grants under the Airport Improvement Program (AIP). The NPIAS lists an estimated five-year total development cost of approximately $12.7 million for LSE for fiscal years 2017-2021.

1.3.2 Wisconsin State Airport System Plan

The Wisconsin State Airport System Plan (SASP) is developed by the Wisconsin Department of Transportation (WisDOT) Bureau of Aeronautics (BOA). The current SASP was adopted on February 19, 2015 and provides an inventory and evaluation of the Wisconsin Airport System's 98 airports and implementation strategies to meet the goals and objectives established by the plan. The SASP classifies LSE as a commercial service airport. This is defined as an airport that supports regularly scheduled year-round commercial airline service and supports the full range of GA activity to domestic and international destinations. The SASP predicts modest growth in the La Crosse and surrounding counties, however, local socioeconomic conditions are examined in greater detail at the end of this chapter.

1.4 Airport Zoning

This section provides a summary of the various zoning and land use restrictions. Although the Airport's location on French Island partially insulates it from land use conflicts, there are various developed areas associated with surrounding cities and potential conflicts are addressed. The following zones are discussed below and shown in greater detail in **Figure 1-4.** Zoning on and in vicinity of the Airport is discussed in further detail in Chapter 5.

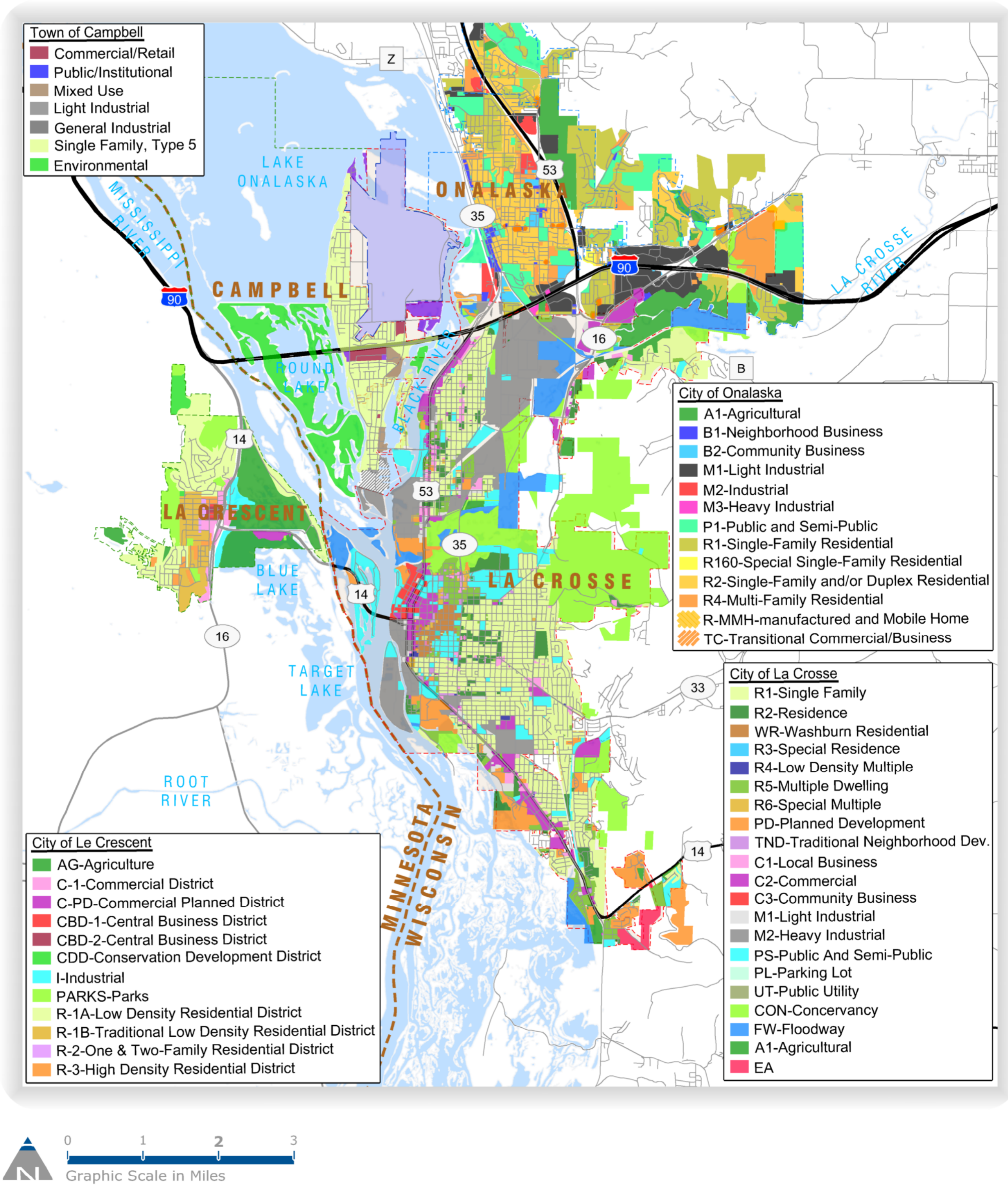


Figure 1-4: **Planned Land Use**

Source: *ArcGIS, City of Onalaska, City of La Crosse, Town of Campbell*

1.4.1 City of La Crosse

Because the Airport is owned by and located within the City of La Crosse much of the Airport's zoning regulation is contained within the City Ordinance, specifically, within Chapter 8 – *Aviation,* Article 4 – *Airport Zoning*. These zones are described below and shown in Chapter 5, Figure 5-3.

- Zone A – Runway Protection Zone: Zone A mimics the federal Runway Protection Zones (RPZ) that are designed to enhance the safety of the people and property on the ground.
- Zone B – Approach Surface: Zone B is divided into three subzones. Shown below, each of these subzones combine to form Zone B which has a 50:1 approach slope.
  - Zone B1 – Extends 3,750 feet long and begins at the end of Zone A.
  - Zone B2 – Extends 3,750 feet beyond B1.
  - Zone B3 – Extends from the end of Zone B2 and terminates at Zone D.
- Zone C – Transitional Surface: This surface extends 1,050 feet outward from the edge of the primary surface of the runways up to Zone A at a slope of 7:1.
- Zone D – Three-Mile Jurisdictional Boundary: This surface is formed by rotating a three-mile arc from the outermost property boundaries of the Airport.

Various portions of Zone B and Zone D overlay the City of Onalaska on the east bank of the Black River to the northeast and the City of La Crosse to the south. Potential land use conflicts and their impacts are discussed in detail in Chapter 5.

1.4.2 City of Onalaska

The City of Onalaska is located approximately half a mile east of the Airport. Most of the City near the river is zoned as Zone R2 (Single-Family and/or Duplex Residential District), Zone R4 (Multi-Family Residential District) and Zone P1 (Public and Semi-Public District). There are also intermittent areas of Zone R1 (Single-Family Residential district) and Zone M2 (Industrial District) further inland to the east. Due to the location of Black River these land uses are separated from the RPZ/Zone A but do exist under Zone B. Single-family and multifamily homes are permitted in these areas with a permit although high rise buildings (over 13 stories) are prohibited.

1.4.3 Town of Campbell

The Town of Campbell immediately surrounds the Airport to the west and south and occupies the majority of French Island. The town's Comprehensive Plan shows the future land use of the area around the Airport as primarily single family residential with isolated areas of mixed used, commercial and public or institutional land uses to the south. Together, the Airport and the Town of Campbell occupy nearly all of French Island.

1.4.4 County of La Crosse

Although most of the land surrounding the Airport is regulated by the City of La Crosse or Onalaska, or the Town of Campbell, there are some areas to the north of the Airport that are managed by the County. These lands are mostly unoccupied recreation and natural resource areas. While there are some residential areas adjacent to the City of Onalaska, similar to the residential areas in the City of Onalaska, these homes are not high rises and do not interfere with Airport zoning.

1.5 Airside Facilities

This section provides a discussion of the various airside facilities on the Airport. For reference, many of these items are presented in **Figure 1-5** and design surfaces are further explained in **Table 1-2**.

Table 1-2: Existing Runway Design Surfaces

RW	Surface	Dimensions	Description
18	Runway Safety Area	500' wide x 1,000' beyond departure end	D-IV-2400
	Runway Object Free Area	800' wide x 1,000' beyond departure end	D-IV-2400
	Part 77 Approach Surface	1,000' (inner width) x 50,000' (length) x 16,000' (outer width), 50:1/40:1 slope	Precision Instrument Runway
	Threshold Siting Surface	800' (inner width) x 10,000' (length) x 3,400' (outer width), 34:1 slope	EB 99A Type 5
	Runway Protection Zone	1,000 (inner width) x 2,500' (length) x 1,750 (outer width)	D-IV-2400
36	Runway Safety Area	500' wide x 1,000' beyond departure end	D-IV-5000
	Runway Object Free Area	800' wide x 1,000' beyond departure end	D-IV-5000
	Part 77 Approach Surface	1,000' (inner width) x 10,000' (length) x 3,500' (outer width), 34:1 slope	Non-utility runway with a non-precision approach and visibility minimums >3/4 mile (C)
	Threshold Siting Surface.	400' (inner width) x 10,000' (length) x 3,400' (outer width), 20:1 slope	EB 99A Type 4
	Runway Protection Zone	500' (inner width) x 1,700' (length) x 1,010 (outer width)	D-IV-5000
13	Runway Safety Area	500' wide x 1,000' beyond departure end	D-IV-5000
	Runway Object Free Area	800' wide x 1,000' beyond departure end	D-IV-5000
	Part 77 Approach Surface	500' (inner width) x 10,000' (length) x 3,500' (outer width), 34:1 slope	Non-utility runway with a non-precision approach and visibility minimums >3/4 mile (C)
	Threshold Siting Surface	400' (inner width) x 10,000' (length) x 3,400' (outer width), 20:1 slope	EB 99A Type 4
	Runway Protection Zone	500' (inner width) x 1,700' (length) x 1,010 (outer width)	D-IV-5000
31	Runway Safety Area	500' wide x 1,000' beyond departure end	D-IV-5000
	Runway Object Free Area	800' wide x 1,000' beyond departure end	D-IV-5000
	Part 77 Approach Surface	500' (inner width) x 10,000' (length) x 3,500' (outer width), 34:1 slope	Non-utility runway with a non-precision approach and visibility minimums >3/4 mile (C)
	Threshold Siting Surface	400' (inner width) x 10,000' (length) x 3,400' (outer width), 20:1 slope	EB 99A Type 4
	Runway Protection Zone	500' (inner width) x 1,700' (length) x 1,010 (outer width)	D-IV-5000

Table 1-2: Existing Runway Design Surfaces (Continued)			
RW	**Surface**	**Dimensions**	**Description**
04	Runway Safety Area	500' wide x 1,000' beyond departure end	C-III-5000
	Runway Object Free Area	800' wide x 1,000' beyond departure end	C-III-5000
	Part 77 Approach Surface	500' (inner width) x 10,000' (length) x 3,500' (outer width), 34:1 slope	Non-utility runway with a non-precision approach and visibility minimums >3/4 mile (C)
	Threshold Siting Surface	400' (inner width) x 10,000' (length) x 3,400' (outer width), 20:1 slope	EB 99A Type 4
	Runway Protection Zone	500' (inner width) x 1,700' (length) x 1,010 (outer width)	C-III-5000
22	Runway Safety Area	500' wide x 1,000' beyond departure end	C-III-5000
	Runway Object Free Area	800' wide x 1,000' beyond departure end	C-III-5000
	Part 77 Approach Surface	500' (inner width) x 10,000' (length) x 3,500' (outer width), 34:1 slope	Non-utility runway with a non-precision approach and visibility minimums >3/4 mile (C)
	Threshold Siting Surface	400' (inner width) x 10,000' (length) x 3,400' (outer width), 20:1 slope	EB 99A Type 4
	Runway Protection Zone	500' (inner width) x 1,700' (length) x 1,010 (outer width)	C-III-5000

Sources: Airport Layout Plan, Advisory Circular 150/5300-13A, FAR Part 77, FAA Engineering Brief 99A
Notes: Surfaces shown are based on the critical aircraft listed on the 2015 ALP. The critical aircraft are re-evaluated and appropriate adjustments to design surfaces are recommended in Chapter 3. Additional information is available runway categories in Section 1.5.2.

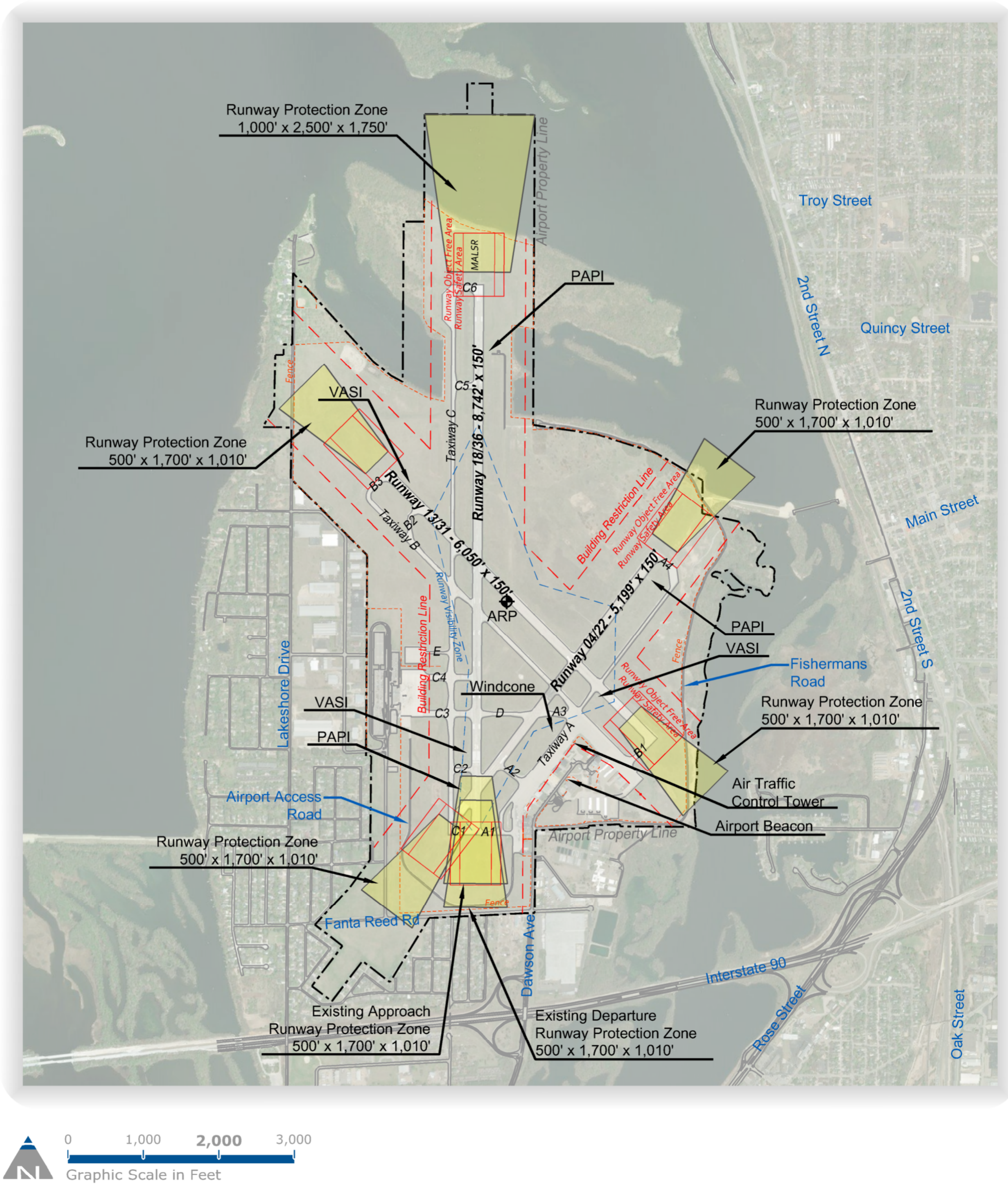


Figure 1-5: **Airport Facilities**

Source: *USGS Earthstar Geographics*

1.5.1 Design Surfaces

The most critical design standards to consider during design of airfield facilities include the Runway Safety Area (RSA), Runway Object Free Area (ROFA), Federal Aviation Regulations (FAR) Part 77 approach surface, and the Threshold Siting Surface. These design standards are applied to the runways at LSE based on existing critical design aircraft and approach capability in Table 1-2 and Figure 1-5, as identified by the 2015 Airport Layout Plan (ALP) and FAA terminal procedure publications. These surfaces are examined in greater detail in Chapter 3, once the critical aircraft is determined, to evaluate design standards and any necessary changes in dimensions.

1.5.2 Aircraft Categories

To identify the appropriate design parameters for a runway and many associated facilities, aircraft are categorized by dimensions and performance and categorized by the Runway Design Code (RDC). The RDC contains three separate parts that are shown in the order they are discussed below in **Table 1-3**. The first component is the Aircraft Approach Category (AAC) and is designated by a letter that corresponds to the approach speed of the critical aircraft. The second component is the Aircraft Design Group (ADG) and is represented by a Roman numeral based on the critical aircraft tail height and wingspan. When there is a conflict between the tail height and the wingspan, the more restrictive or higher group identifier is used. Finally, runway approach visibility minimums are expressed as the runway visual range (RVR) in feet equal to quarter mile increments: this last component is not descriptive of aircraft characteristics. These categories are used throughout this Master Plan when discussing existing restrictions and determining the future critical aircraft

Table 1-3: Runway Design Code Components

Aircraft Approach Category (AAC)		Airplane Design Groups (ADG)			Runway Visual Range (RVR)	
AAC	**Approach Speed**	**ADG**	**Tail Height**	**Wingspan**	**RVR**	**Visibility**
A	< 91 knots	I	< 20 feet	< 49 feet	1600	1/4
B	≥ 91 knots, < 121 knots	II	20 – 29 feet	49 – 78 feet	2400	1/2
C	≥ 121 knots, < 141 knots	III	30 – 44 feet	79 – 117 feet	3200	5/8
D	≥ 141 knots, < 166 knots	IV	45 – 59 feet	118 – 170 feet	4000	3/4
E	≥ 166 knots	V	60 – 65 feet	171 – 213 feet	4500	7/8
		VI	66 – 79 feet	214 – 261 feet	5000	1

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

1.5.3 Runways and Taxiways

LSE has three runways of various lengths supported by several taxiways. As many of the taxiways were renamed in a 2018 airfield electrical project, this Master Plan will use the new names. The primary runway, Runway 18/36, is 8,742 feet long, provides access to the passenger terminal, and is supported by Taxiway C which is a full parallel taxiway. Runway 04/22 is 5,199 feet long and supported by a nearly full parallel taxiway, Taxiway A. This runway and taxiway pair provides access to the GA hangars located to the east of the passenger terminal. Finally, Runway 13/31 intersects both runways and is supported by Taxiway B, a full parallel taxiway. Several airfield configuration issues exist including two FAA hot spots, one on Taxiway C due to the hold line for Runway 04/22 and one at the intersection of Taxiways A, A3, and B due to its complexity and proximity to two runways. The FAA defines hot spots as locations on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary. In addition, several taxiways offer direct connection from the runway to various aprons, which is discouraged in AC 150/5300-13A, *Airport Design*. Chapter 3 provides a more thorough discussion of these issues and prioritizes corrections based on future demand. Key information for each runway is summarized in **Table 1-4**.

Table 1-4: Existing Runway Data

Criteria	Runway					
	18/36		13/31		04/22	
Runway Length (feet)	8,742		6,050		5,199	
Runway Width (feet)	150		150		150	
Runway Lighting	MALSR PAPI	REIL VASI	REIL VASI	REIL VASI	PAPI	PAPI

MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)
REIL: Runway End Identifier Lights
PAPI: Precision Approach Path Indicator
VASI: Visual Approach Slope Indicator

Runways 36 and 31 employ displaced thresholds to maximize length for aircraft arrivals and departures. Runways with displaced thresholds use declared distances to represent the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine powered aircraft. For more information regarding declared distances on Runway 18/36 and Runway 13/31, see Chapter 3, Section 3.3.4, and Chapter 4, Section 4.3.

1.5.4 Approach and Departure Codes

The approach reference code (APRC) and departure reference code (DPRC) determine aircraft takeoff and landing restrictions for a specific runway. Both codes are shown for each runway on **Table 1-5**. Similar to the RDC, the APRC is composed of three components: AAC, ADG, and RVR. The DPRC is dependent on runway and taxiway separation and represents those aircraft that can take off from a runway while other aircraft are present on adjacent taxiways under certain meteorological conditions. The APRC determines the size of aircraft able to land on a runway while the DPRC determines what aircraft can takeoff when multiple aircraft are present. Due to the low visibility restrictions and large distances between the runways and associated parallel taxiways at LSE, there are very few restrictions on aircraft operations. Even though

Runway 18/36 is the longest runway on the Airport, the greater taxiway separation of Runway 13/31 permits larger aircraft operations.

Although unrestricted ADG VI operations are permitted on Runway 13/31 due to its taxiway and runway separation, these aircraft may also operate on Runway 18/36 if other ADG VI aircraft do not occupy the parallel taxiway beyond 1,500 feet of the point of the start of the takeoff roll. As operations by this size of aircraft are limited at LSE, this constraint is not considered overly burdensome and its impact on future demand is considered in later chapters.

Table 1-5: Existing APRC and DPRC

Runway	Approach/Departure Code	Rwy to Twy Separation	Visibility Minimums	Existing
Runway 18	APRC	400 feet	½ Mile	D/IV/2400, D/V/2400
	DPRC	400 feet	N/A	D/IV, D/V
Runway 36	APRC	400 feet	1 Mile	D/IV/5000, D/V/5000
	DPRC	400 feet	N/A	D/IV, D/V
Runway 13	APRC	512 feet	1 Mile	D/VI/5000
	DPRC	512 feet	N/A	D/VI
Runway 31	APRC	512 feet	1 ¼ Mile	D/VI/5000
	DPRC	512 feet	N/A	D/VI
Runway 04	APRC	525 feet	1 Mile	D/VI/5000
	DPRC	525 feet	N/A	D/VI
Runway 22	APRC	525 feet	1 ¼ Mile	D/VI/5000
	DPRC	525 feet	N/A	D/VI

1.5.5 Crosswind Coverage

Crosswinds directly impact aircraft performance and are a factor in determining which aircraft can operate on a given runway. Safety is also important as strong crosswinds make it difficult for aircraft to land or takeoff. Because GA aircraft have slower approach speeds and are lighter in weight than air carrier aircraft, they are particularly susceptible to crosswinds. To account for the variation in susceptibility to crosswinds, the FAA has assigned allowable crosswinds for each RDC. **Table 1-6** shows the allowable crosswind component for each RDC and **Table 1-7** below shows the crosswind coverage provided at each runway for corresponding aircraft and weather types.

Table 1-6: Crosswind Limitations per RDC

RDC	Allowable Crosswind Component
A-I and B-I	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III D-I through D-III	16 knots
A-IV and B-IV C-IV through C-VI D-IV through D-VI E-I through E-VI	20 knots

Source: AC 150/5300-13A

Table 1-7: Crosswind Coverage by Runway											
Crosswind Component	Rwy 18	***Rwy 18/36***	Rwy 36	Rwy 13	***Rwy 13/31***	Rwy 31	Rwy 04	***Rwy 04/22***	Rwy 22	Rwys 18/36 & 13/31 Only	All Combined
All Weather Conditions											
10.5 knots	57.54%	***92.74%***	46.72%	56.34%	***95.35%***	50.47%	45.37%	***87.05%***	53.34%	98.28%	99.29%
13 knots	58.30%	***96.10%***	49.32%	58.01%	***98.02%***	51.48%	48.16%	***92.74%***	56.26%	99.36%	99.81%
16 knots	58.96%	***98.82%***	51.40%	58.94%	***99.50%***	52.03%	50.88%	***97.71%***	58.55%	99.84%	99.95%
20 knots	59.15%	***99.72%***	52.11%	59.17%	***99.88%***	52.19%	51.90%	***99.46%***	59.30%	99.97%	99.99%
Visual Flight Rules (VFR)											
10.5 knots	57.40%	***92.34%***	45.26%	55.24%	***95.14%***	50.18%	43.11%	***86.47%***	53.83%	98.26%	99.27%
13 knots	58.25%	***95.90%***	48.00%	57.04%	***97.98%***	51.22%	45.92%	***92.49%***	57.07%	99.38%	99.82%
16 knots	58.97%	***98.82%***	50.21%	58.01%	***99.51%***	51.79%	48.66%	***97.71%***	59.59%	99.86%	99.96%
20 knots	59.17%	***99.74%***	50.94%	58.25%	***99.89%***	51.94%	49.66%	***99.50%***	60.40%	99.98%	100.00%
Instrument Flight Rules (IFR)											
10.5 knots	57.45%	***95.21%***	55.64%	62.26%	***96.69%***	52.27%	58.91%	***90.54%***	49.67%	98.43%	99.43%
13 knots	57.75%	***97.33%***	57.45%	63.16%	***98.35%***	53.03%	61.64%	***94.32%***	50.74%	99.27%	99.76%
16 knots	58.01%	***98.90%***	58.77%	63.82%	***99.44%***	53.47%	64.18%	***97.77%***	51.67%	99.71%	99.90%
20 knots	58.15%	***99.59%***	59.33%	64.01%	***99.80%***	53.64%	65.27%	***99.27%***	52.09%	99.90%	99.96%
Source: National Climatic Data Center, FAA Standard Wind Analysis Tool, Station LSE ASOS, Period of Record: 2007 – 2016.											

1.5.6 Airport Pavement Conditions

According to AC 150/5380-7A, *Airport Pavement Management Program,* maintaining a pavement in good condition over its life cycle is four to five time less expensive than periodically rehabilitating a pavement in poor condition. Based upon a visual inspection by experienced engineers, a pavement condition index (PCI) rating is assigned to a piece of pavement but does not necessarily reflect its structural integrity. The PCI rating is scored on a scale of 1-100. A score of 100 indicates the pavement is in perfect condition while a score of 60 or less indicates that rehabilitation is needed. All PCI scores at LSE as of 2015 are discussed below and can be seen in **Figure 1-6**.

A 2015 survey examined the pavement conditions at LSE. Pavements are generally in good condition although they vary by user type. Pavement 18/36, Taxiway C and other surfaces generally used by air carriers are in excellent condition with most PCIs above 90. Some taxiway connectors, such as Taxiway C3 (PCI 76) and Taxiway C2 (PCI 83), are rated lower but in good condition. Runway 13/31 varies in condition. Although the intersection with Runway 18/36 is in excellent condition, the northernmost section of the Runway, near the Runway 13 threshold, is in fair condition with a PCI of 70. The center and southern portions of the runway are in excellent condition although the parallel taxiway, Taxiway B, is in fair condition with a PCI in the 60s.

The poorest pavement conditions are associated with the small GA surfaces, such as Runway 04/22 and some apron sections near the T-hangars. The intersection of Runway 04/22 with Runway 18/36 is in excellent condition although the rest of the runway is only in fair condition with PCIs in the 50s and 60s. The center portion of the runway is poor condition with PCIs in the 20s. Aprons for the GA area are generally in fair condition along the taxiways although the apron sections near the T-hangars are in poorer condition. The worst sections have PCIs of 40, 20 and 11. Overall runway conditions and strengths are shown below in **Table 1-8** with additional information on PCN codes and definitions in **Table 1-9**.

Table 1-8: Airport Pavement Conditions

Criteria	Runway 18/36	Runway 13/31	Runway 04/22
Weight Bearing Capacity	S – 125,000 lbs D – 190,000 lbs 2S – 175,000 lbs 2D – 430,000 lbs 2D/2D2 – 850,000 lbs	S – 125,000 lbs D – 190,000 lbs 2S – 175,000 lbs 2D – 430,000 lbs	S – 65,000 lbs D – 110,000 lbs 2S – 139,000 lbs 2D – 190,000 lbs
PCN	62 R/B/W/T	73 R/B/W/T	47 F/C/W/T

Key:
S: Single wheel type landing gear
D: Dual wheel type landing gear
2S: Two single wheels in tandem type landing gear
2D: Dual Tandem
2D/2D2: Double Dual Tandem (B-747)

Notes:
PCN: Pavement Classification Number
See Table 1-9 for a full explanation of terms

Source: Airport/Facility Directory

Mead & Hunt

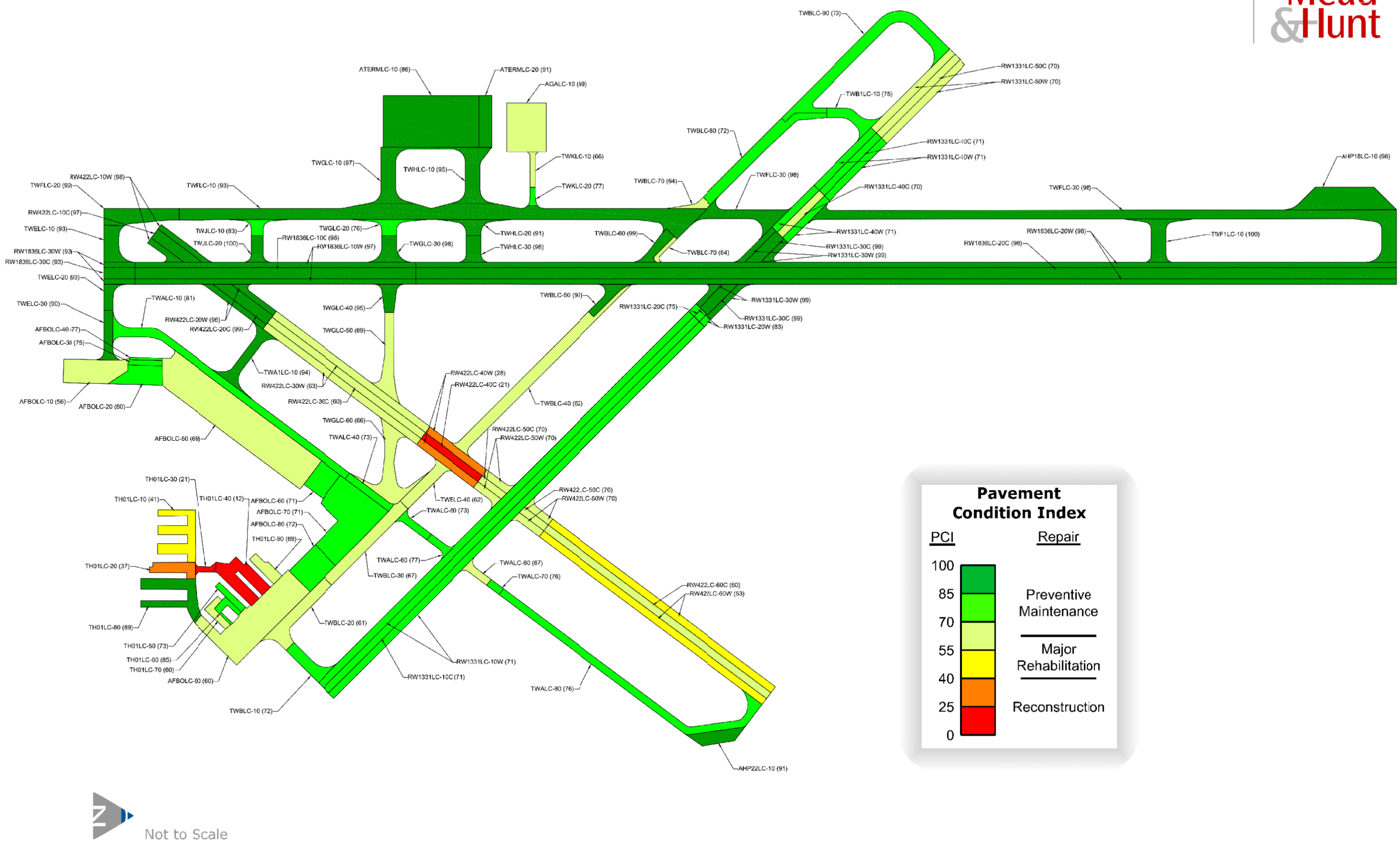


Figure 1-6: **Pavement Conditions**

La Crosse Regional AIRPORT

Source: *2015 Pavement Conditions Index Map by Applied Pavement Technology*

Table 1-9: PCN Codes and Definitions		
Category	**Codes**	**Explanation**
Pavement Type	R	Rigid Pavement
	F	Flexible Pavement
Pavement Subgrade Category	A	Indicates the strength of the subgrade used for a runway
	B	
	C	
	D	
Maximum Tire Pressure	W	High, no limit
	X	Medium, limited to 217 psi
	Y	Low, limited to 145 psi
	Z	Very low, limited to 73 psi
Evaluation Method	T	PCN has been obtained by a technical evaluation
	U	PCN obtained by experience of aircraft using the pavement

Sources: FAA Order 5300.7, Standard Naming Convention for Aircraft Landing Gear Configurations, Airport/Facility Directory

1.5.7 Navigational Aids

Visual Navigational Aids

Rotating Beacon – The rotating beacon helps pilots locate and identify the Airport during nighttime hours and poor visibility conditions, when the visibility is less than 3 miles and/or ceilings are less than 1,000 feet. The beacon alternates green and white in 360 degrees which is standard for civilian airports. The rotating beacon for LSE is mounted on top of the maintenance building in the southern portion of Airport property.

Visual Approach Path Indicators – There are two types of visual approach path indicators at LSE. Both lighting systems aid pilots in making necessary height corrections when on approach to a runway. Visual approach slope indicators (VASIs) at LSE are arranged in two set of two lights while precision approach light indicators (PAPIs) use four parallel lights. Both VASIs and PAPIs are intended to be seen up to five miles during the day and up to twenty miles at night. PAPIs are located adjacent to the threshold of Runways 04, 18, and 22 while Runways 13, 31, and 36 have VASIs. The PAPIs for Runways 04, 18, and 22 were last replaced in 2003 and are Airport-owned, while all the VASIs are older and are FAA-owned.

Runway Pavement Markings – Runway pavement markings provide orientation and identification of areas on a runway surface. Runways with precision instrument approaches have additional markings to serve as visual cues for pilots on approach. These markings include threshold, runway designation, touchdown zone, aiming point, centerline, and edge markings. Runway 18/36 is the only runway with precision markings due to the Runway 18 ILS approach.

MALSR – A Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) provides visual confirmation of the runway centerline for pilots on approach to the runway. MALSRs are typically equipped with a series of light bars preceded by a series of sequenced flashing lights. MALSRs are often used in poor visibility, such as at night and during inclement weather, to help pilots identify and align with the runway. LSE has a single MALSR to Runway 18 for use with the ILS approach. This system was commissioned in 2012.

Wind Indicators – Also known as wind socks or wind cones, wind indicators aid pilots by indicating surface wind strength and direction. Wind indicators are typically located approximately 1,000 feet from the end of runways if serving air carrier operations and lighted if an airport is open to commercial air carriers at night. The primary wind cone and a segmented circle is located near the GA apron approximately 400 feet to the southeast of Runway 04/22 while supplemental wind cones are recommended to be located within 1,000 feet of other runway thresholds. The Runway 36 wind cone is positioned approximately 250 feet to the west of the threshold and this same wind cone is approximately 900 feet north of the end of Runway 04. The Runway 31 wind cone is less than 400 feet to the left of the runway threshold while the Runway 22 wind cone is approximately 1,000 feet south-southwest of the threshold. Finally, the Runway 13 is wind cone is approximately 650 feet east-southeast from the runway end and the Runway 18 wind cone is approximately 1,000 feet southeast from the runway end.

Electronic Navigation Aids

Instrument Landing System – An instrument landing system (ILS) provides lateral and vertical guidance for landing aircraft. Although other types of approaches may offer vertical guidance, the ILS is often the only approach considered a true precision approach by the FAA. A list of the approaches at LSE is shown in **Table 1-10**. An ILS is comprised of four components: a localizer; glide slope antenna; marker beacon; and approach lights. The approach lights are discussed in the Visual NAVAIDs section above. Runway 18 has the sole ILS at LSE with 1/2-mile visibility minimums. The glide slope antenna is positioned to the west of Runway 18 and provides vertical guidance to align aircraft with the correct landing descent path, usually at a 3-degree slope, as at LSE. The marker beacon for the approach is located 6.6 nautical miles to the north of the airport and alerts pilots when they are on their approach to the Airport.

Global Positional System (GPS) – GPS is a satellite based navigational system that transmits location signals to properly equipped aircraft so that location, altitude, direction of travel, and speed can be determined. GPS offers the ability for aircraft to conduct non-precision approaches to runways not equipped with ground based navigational equipment. At LSE, Area Navigation (RNAV) GPS approaches can be conducted to all runways although visibility and ceiling limitations vary.

Very High Frequency Omni-directional Radio Range (VOR) – The VOR is the primary navigational aid used by civil aviation within the national airspace (NAS) other than GPS. The La Crosse VOR is in the center of the airfield approximately 700 feet to the east of Runway 18/36 and is used to conduct the 13 and 36 VOR approaches. However, VORs are being decommissioned in conjunction with the ongoing FAA NextGen effort to further modernize the NAS. The La Crosse VOR is scheduled to be decommissioned during phase 2 (2021 – 2025) of the FAA's transition to performance-based navigation proposed under 76 FAR 77939. Although the process is ongoing, the existing RNAV GPS approaches offer superior visibility minimums and decision heights and, in the event the VOR is removed, it is not expected to have a significant impact on the Airport.

Table 1-10: Instrument Approach Procedures				
Approach Name	**TCH (feet)**	**GSA (degrees)**	**Visibility Minimum (statute miles)**	**Decision Height (feet AGL)**
ILS or LOC RWY 18	55’	3.00°	1/2	200’
RNAV (GPS) RWY 04	40’	3.00°	1	546’
RNAV (GPS) RWY 13*	33’	3.00°	1	302’
RNAV (GPS) RWY 18	55’	3.00°	1/2	272’
RNAV (GPS) RWY 22	40’	3.04°	1 1/4	1,166’
RNAV (GPS) RWY 31	-	-	1 1/4	1,066’
RNAV (GPS) RWY 36	50’	3.00°	1	300’
VOR RWY 13	45’	2.99°	1	504’
VOR RWY 36	40’	3.03°	1	507’

Source: FAA Terminal Procedures October 12 – November 08, 2017.
Notes: Alternative minimums may apply under instrument meteorological conditions (IMC).
Instruments visibility minimums and decision heights are the minimums for each approach. Faster aircraft may have greater limitations.
**Visual glide slope and RNAV glide path are not coincident*
ILS: Instrument Landing System
LOC: Localizer
RNAV: Area Navigation
TCH: Threshold Crossing Height
GSA: Glideslope Angle
AGL: Above Ground Level

Weather Observation Equipment – LSE has an on-field Automated Surface Observing System (ASOS) that is operational 24 hours a day, 365 days a year. The ASOS is located approximately 850 feet north of the Runway 04/22 and Runway 13/31 intersection. The ASOS reports temperature, precipitation, dew point, wind speed and direction, visibility, cloud coverage and ceiling, and other information to the FAA Flight Service Station (FSS) and National Oceanic and Atmospheric Administration (NOAA). Real-time weather reports are available to the public via radio and telephone.

1.6 Landside Facilities

This section summarizes the landside facilities at the Airport. Many of these facilities are visually represented in **Figure 1-7.**

1.6.1 Passenger Terminal and offices

At the end of 2015, a full terminal renovation was undertaken to update and repurpose the majority of the terminal. This project included relocating the secure seating to the second floor, expanding capacity in the secure area to better accommodate passengers, connecting the secure and non-secure restaurant, and updating the interior of the building. Several improvements to the passenger boarding bridges (PBBs) were made without significant changes to their locations. Two jet bridges were moved to the second floor to permit service for larger aircraft while access to the third gate was improved by relocating the nearby security screening area. Although Chapter 3 examines the needs of the terminal to meet future demand, it is expected the recent renovation will be sufficient for the 20-year planning period. The renovated terminal layout can be seen in **Figure 1-8** and **Figure 1-9**.

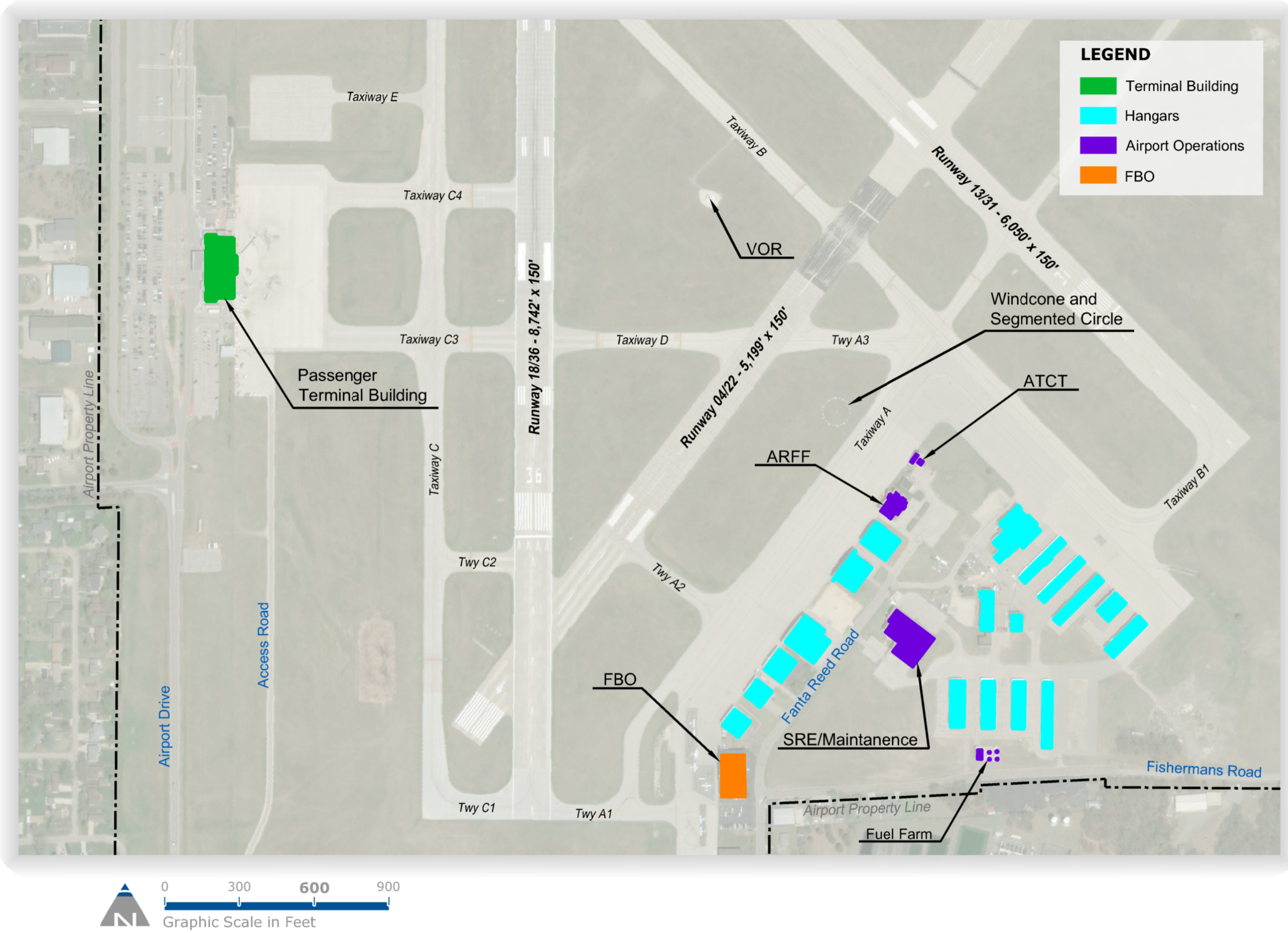


Figure 1-7: **General Aviation Area**

Source: *USGS Earthstar Geographics*

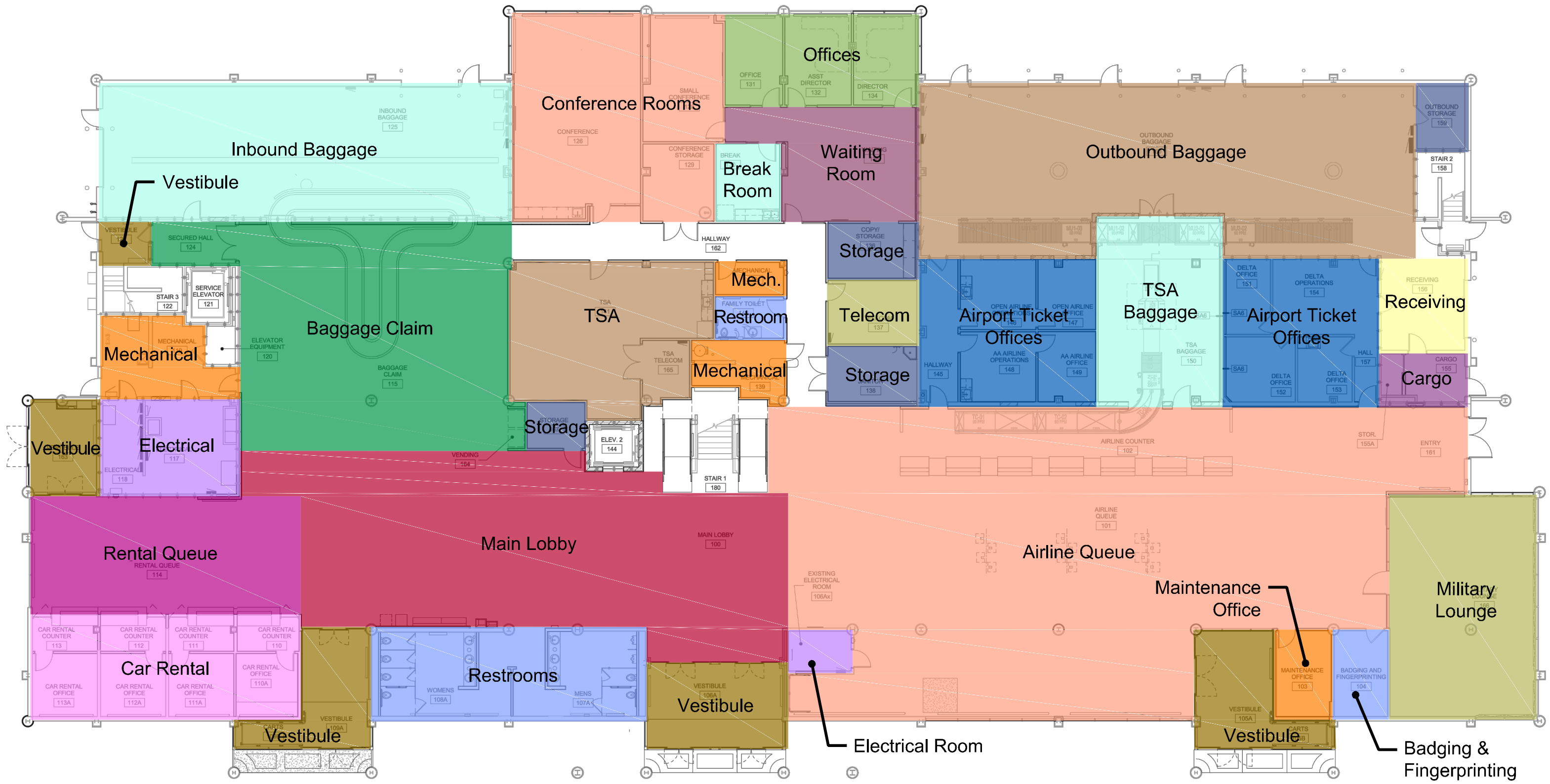


Figure 1-8: **Terminal First Floor Plan**

La Crosse Regional AIRPORT

Mead & Hunt

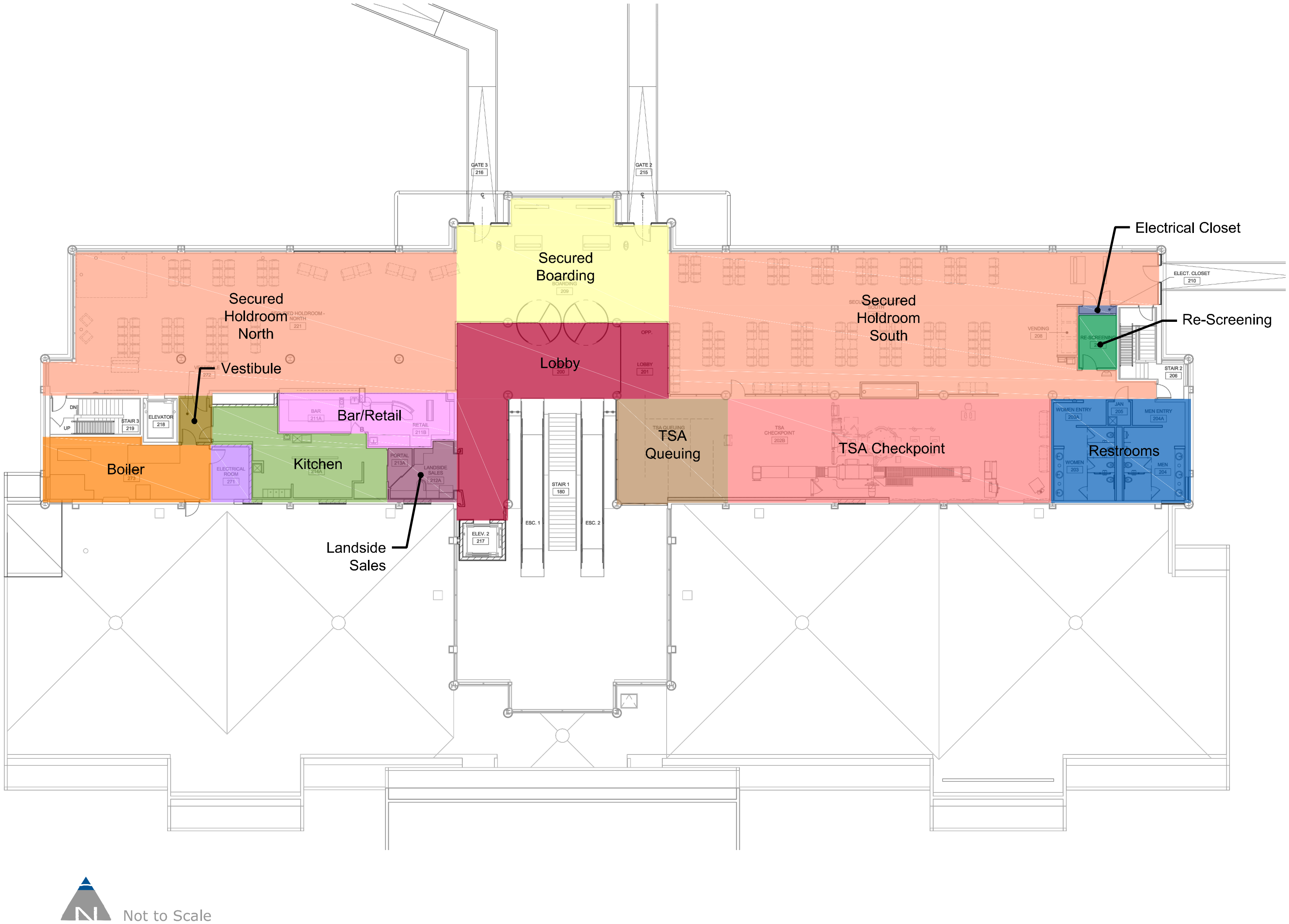


Figure 1-9: **Terminal Second Floor Plan**

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1.6.2 Maintenance Facilities and Snow Removal Equipment (SRE)

Snow removal equipment (SRE) and maintenance equipment are stored in a facility located in the GA area to the south of Runway 04/22 and Runway 13/31. This building has approximately 22,800 square feet and has immediate access to the unsecure landside through an access gate near the building. SRE vehicles can reach the runways and taxiways by transiting through the T-hangar area.

1.6.3 Air Rescue and Fire Fighting (ARFF) Facility

The Aircraft Rescue and Fire Fighting (ARFF) index at an airport is determined by the length of the largest air carrier aircraft with at least five average daily departures in a single index group. The ARFF Index is shown in **Table 1-11**. The largest aircraft that commonly serves LSE are the Boeing 757 and 767 aircraft that provide commercial charter services for military personnel during the summer. However, as these aircraft currently average less than five daily departures, LSE defaults to the next lower index group, Index B. This index aligns with the FAA's Part 139 certification status for LSE as of December 2017. Index B airports are obligated by CFR 139.317, *Aircraft rescue and firefighting: Equipment and agents*, to provide one vehicle carrying at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent, or 450 pounds of potassium-based dry chemical and water with a commensurate quantity of Aqueous Film-Forming Form (AFFF) to total 100 gallons for simultaneous dry chemical and AFFF application.

Table 1-11: ARFF Index Determination

Index	Aircraft Length
A	Less than 90 feet
B	At least 90 feet but less than 126 feet
C	At least 126 feet but less than 159 feet
D	At least 159 feet but less than 200 feet
E	At least 200 feet

Source: CFR 139.315

1.6.4 Air Traffic Control Tower

An Air Traffic Control Tower (ATCT) controls traffic on the airside or movement area which includes taxiways, runways, and some apron areas. Non-movement and movement areas are divided by a double line, dashed on one side and solid on the other. The LSE ATCT is located at the apex of the GA aprons approximately 800 feet from the Runway 04/22 centerline. The ATCT tower was constructed in the 1970's and is currently operated under contract with Midwest ATC.

1.6.5 General Aviation Hangars

General aviation hangars are located approximately one-half mile southeast of the terminal near the thresholds for Runway 04 and Runway 36. The western portion of the GA area is predominantly corporate box hangars, including the FBO, along with the Airport's SRE and ARFF buildings. The eastern and southern portions of this area are primarily occupied by T-hangars. Box hangars are currently at full capacity although there are several open areas available for construction near the ATCT and a vacant lot amid the other box hangars. Nine T-hangar buildings are located to the eastern side of the GA complex, and several are aging. The two northernmost T-hangars were constructed in the 1940s, are in poor condition, and are scheduled to be removed. More recently constructed hangars are located to the south. A comparison of hangar capacity to aviation demand and future hangar needs are examined in greater detail in later chapters.

1.6.6 Air Cargo

Air cargo at LSE is limited to cargo placed on scheduled air carriers and UPS feeders. While the total capacity of enplaned cargo is limited by the capacity on the air carriers and small feeder aircraft, current demand is apparently being met. The 2014 Terminal and General Aviation Development Concepts study pointed out that air cargo demand at LSE will likely only result from an overall growth in the local market instead of capturing additional market share. This demand would likely only be generated by local commercial or industrial business as growth in the local area continues. Future air cargo demand is reevaluated in later chapters.

1.6.7 Airport Access Roads

Two primary access roads serve the perimeter of the Airport. The shorter partial perimeter road is located to the south near the perimeter fence, links the passenger terminal and GA apron, was reconstructed around 2012, and is in fair condition. As the road is located beyond 1,000 feet from the end of the Runway 36 pavement, traffic may utilize the road without first contacting the LSE ATCT. The other primary road, known as Fishermans Road, is located on the outside of the perimeter fence and is partially publicly accessible during daytime hours. The public portion of the Fishermans Road provides access to a boat ramp and dam before terminating at a secure gate in the perimeter fence. Fishermans Road is in fair to poor condition.

1.6.8 Ground Access, Circulation, and Auto Parking

Airport Road is the main access point for air carrier passengers and provides circulation access through the terminal area, parking lots, and exits. Fanta Reed Road and Fishermans Road provide access to the general aviation area on the southern portion of Airport property and small parking lots are adjacent to buildings where needed. Parking lots and their respective capacities are shown in **Table 1-12**. All parking in the immediate vicinity of the passenger terminal is revenue producing. This includes the short-term and long-term lots for passenger parking, the employee lot and the rental car lot. Unpaid parking includes the cell phone waiting lot on Airport Drive and the miscellaneous parking areas on the Airport for tenants, the ATCT and near the maintenance/SRE building.

Table 1-12: Public Parking Spaces

Parking Lot	Parking Spaces
Employee	81
Hourly	46
Rental	199
Daily Parking	791
Total	**1,117**

1.6.9 Economic Development Zones

Airport property is primarily developed on the western portion, around the passenger terminal, and the southern portion, around the GA area. There are several areas on Airport property that are currently unoccupied. The areas to the north and south of the passenger terminal are undeveloped and the southern portion is shown as future hangar development on the 2015 ALP. The existing GA area east of the Runway 04 threshold is also shown as expanding to the south along the existing axis with additional T-hangars being added. The only greenfield site shown on the 2015 ALP for future development is the area to the north of the Runway 31 threshold. This area is shown as future GA development with T-hangars and box hangars accessed via a vehicle parking area which connects to Fishermans Road. Utilities currently only exist in the terminal area and southern GA area. There are other greenfield areas on Airport property; these areas may be developed for future aeronautical or non-aeronautical use. Future development based on anticipated conditions are further examined in Chapter 3.

1.7 Airspace

As surrounding structures or land uses may affect navigable airspace, it is important to consider how LSE operations may be impacted by such structures and uses. **Figure 1-10** shows airspace in the local region and this section describes each airspace classification.

1.7.1 Controlled Airspace

Controlled airspace is a term that applies to all airspace where FAA Air Traffic Control (ATC) service is provided. This does not mean, however, that controlled airspace must have a control tower in its immediate vicinity, but instead that some type of ATC authority is extended to the airspace.

Class A Airspace

Class A airspace generally begins at 18,000 feet mean sea level (MSL) up to 60,000 feet MSL throughout the United States and 12 nautical miles beyond each coast. This airspace requires an instrument flight rules (IFR) flight plan and ATC approval to enter. Class A airspace does not have a direct effect on LSE.

Class B Airspace

Class B airspace often surrounds the nation’s busiest airports and extends from the surface to 10,000 feet MSL in multiple tiers of various dimensions. This classification design is intended to incorporate all instrument approaches into an airport. Class B is one of the most restrictive airspace classifications, requiring additional equipment on the aircraft and express permission from ATC to enter. There is no Class B airspace near LSE.

Class C Airspace

Class C airspace is designed for airports with a control tower and radar approach control, but has fewer restrictions than Class B. This airspace generally extends from the surface to 4,000 feet above the airport elevation. The dimensions of Class C airspace are tailored to the specific airport but usually consist of an inner five-mile section surrounding the airport with an outer circle that begins at 1,200 feet above the airport elevation with a total diameter of 20 nautical miles. The nearest airport with Class C airspace is the Dane County Regional Airport (MSN); it is nearly 110 miles away.

Class D Airspace

Class D airspace generally extends from the surface to 2,500 feet above the airport elevation and is used for airports with a control tower but not necessarily radar capacity. Similar to other airspace classes, Class D airspace is usually tailored to accommodate published instrument approaches at an airport. Class D airspace with a radius of five statute miles surrounds LSE. To penetrate Class D airspace, the pilot must establish and maintain contact with the LSE ATCT.

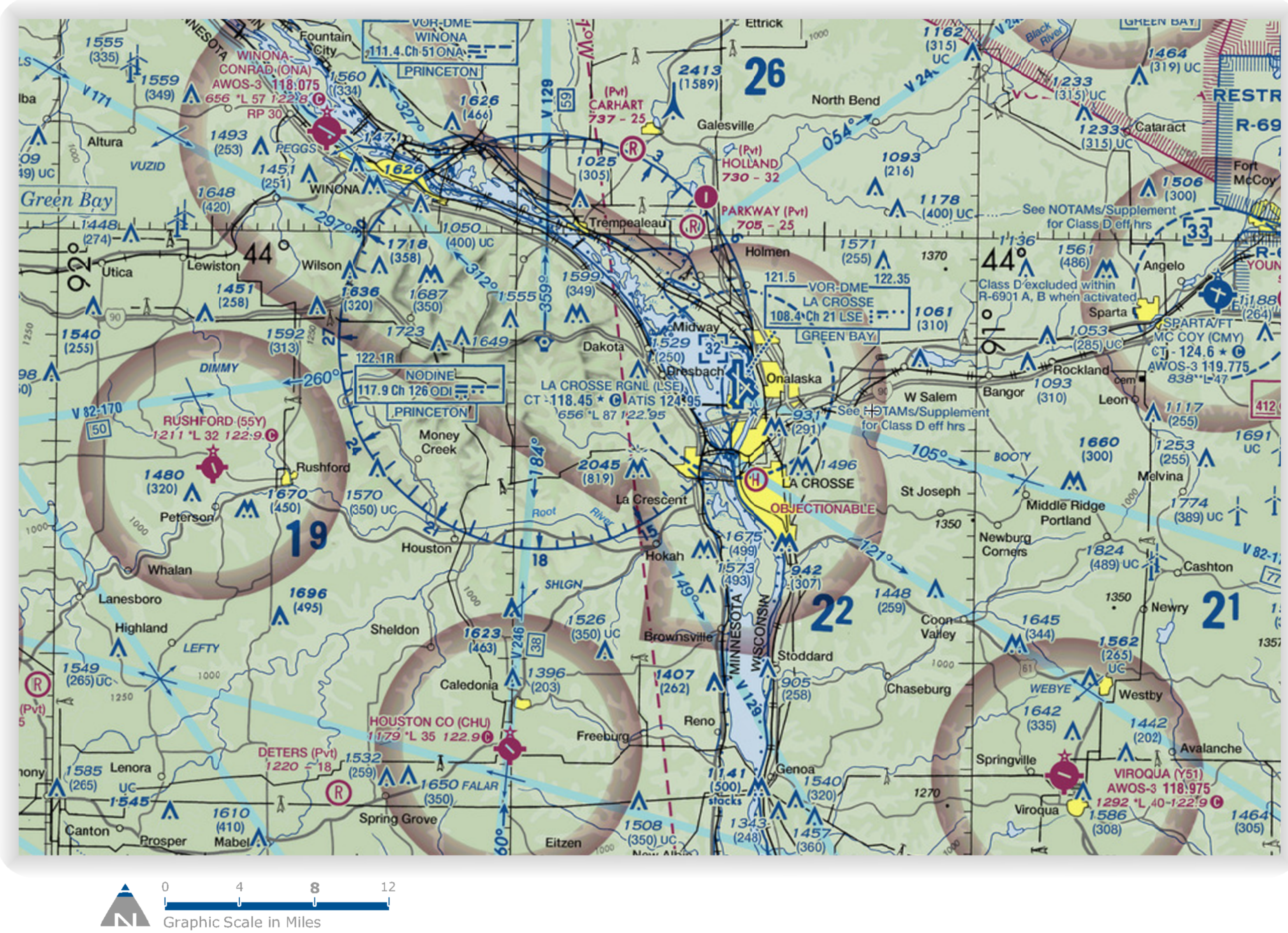


Figure 1-10: **Surrounding Airspace**

La Crosse Regional AIRPORT

Source: *Sky Vector Aeronautical Charts (https://skyvector.com/)*

Class E Airspace

By default, if airspace is controlled but not Class A, B, C, or D, then it is Class E airspace. Class E is unique in that it is a multifaceted airspace that is used in a variety of situations. Class E often begins at 1,200 feet above the airport elevation and is used at many of the smaller airports surrounding LSE. While the tower is in operation the Airport is Class D; however, the tower is closed from 9:00 P.M. to 6:00 A.M. and the Airport reverts to Class E airspace during that time.

1.7.2 Uncontrolled Airspace

Uncontrolled airspace is any airspace that is not class A, B, C, D, or E, and is known as Class G airspace. Class G airspace is the only uncontrolled airspace in the NAS. ATC does not possess responsibility or authority to control air traffic but there are VFR minimums which apply to pilots operating in this area. Class G is common in low population areas where air traffic is sparse.

1.7.3 Special Use Airspace

Special use airspace designates areas in which certain activities are confined and additional limitations may be imposed on entering aircraft. While restrictions in these areas vary according to their use, some present hazards and pilots are advised to maintain awareness. While there are several types of special use airspace types including prohibited, restricted, warning, military operations, alert, and controlled firing areas, only that airspace within 30 miles of LSE is discussed below. The restricted and military operations areas (MOAs) discussed below are generally associated with Fort McCoy and Volk Field, located approximately 25 and 45 miles, respectively, east of LSE.

Military Operations Area

MOAs are established to separate certain military training activities from IFR traffic. Examples of these activities are air combat tactics, air intercepts, aerobatics, formation training, and low-altitude tactics. When a MOA is active, IFR traffic may be cleared if separation can be provided. VFR pilots are advised to exercise extreme caution and contact any Flight Service Stations within 100 miles of the area to obtain accurate real-time information concerning the MOA hours of operation. The Volk Falls MOA and Volk South each begin at 500 above ground level (AGL) and extend to 17,999 feet mean sea level (MSL). Volk East begins at 8,000 feet and also extends to 17,999 MSL. Each of these MOAs activate intermittently with four hours' notice. Due to their distance from the Airport and allowable IFR traffic routing, these areas do not have a significant impact on Airport operations.

Restricted Airspace

Although flight within restricted areas is not expressly prohibited, hazards often invisible to aircraft are present in these areas. Restricted areas R-6901A and R-6901B are each located approximately 25 miles to the east of LSE and both extend to an altitude of 20,000 MSL. R-6901A is active on a regular schedule based on the seasons while R-6901B is active based on notice. Each of these restricted airspaces provides twenty-four hours' notice before activating. Due to the distance from the Airport these areas are not expected to have any noticeable impacts to operations at LSE.

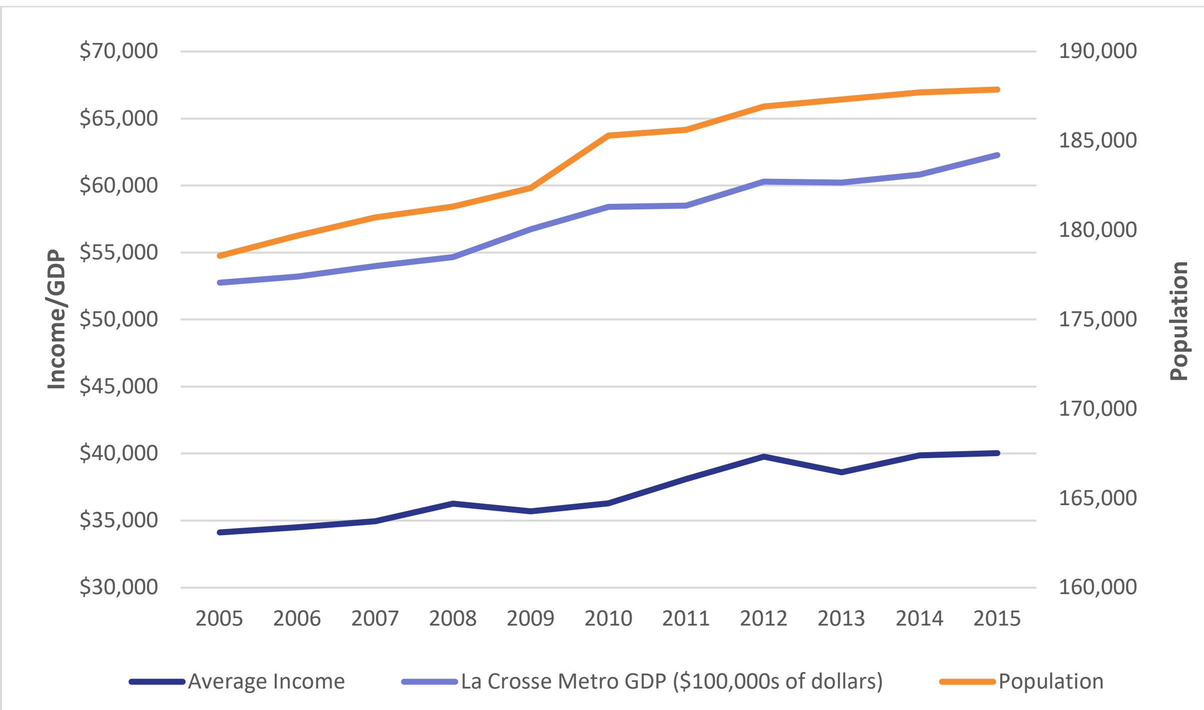
1.7.4 Other Airspace

Most airspace not covered by the above three sections includes military training routes (MTR), parachute jump aircraft operations, and other similar areas. No airspace under this classification exists within 30 miles of LSE. Temporary Flight Restrictions may be enacted to keep traffic out of the area in the event of emergency.

1.8 Local Socioeconomic Trends

The socioeconomic conditions in the vicinity of the Airport often play an active role in influencing Airport activity. The Airport is in the western portion of La Crosse County and draws passengers and business from the surrounding counties of Winona and Houston as well. Therefore, population and income are shown for all three counties while the GDP was restricted to the La Crosse Metro area (La Crosse and Houston Counties). These trends are shown in **Chart 1-1** and **Table 1-13**. The scale in **Chart 1-1** has been restricted to make trends more visible. All socioeconomic trends have experienced slow but steady growth since the 2008 recession.

Chart 1-1: Demographics



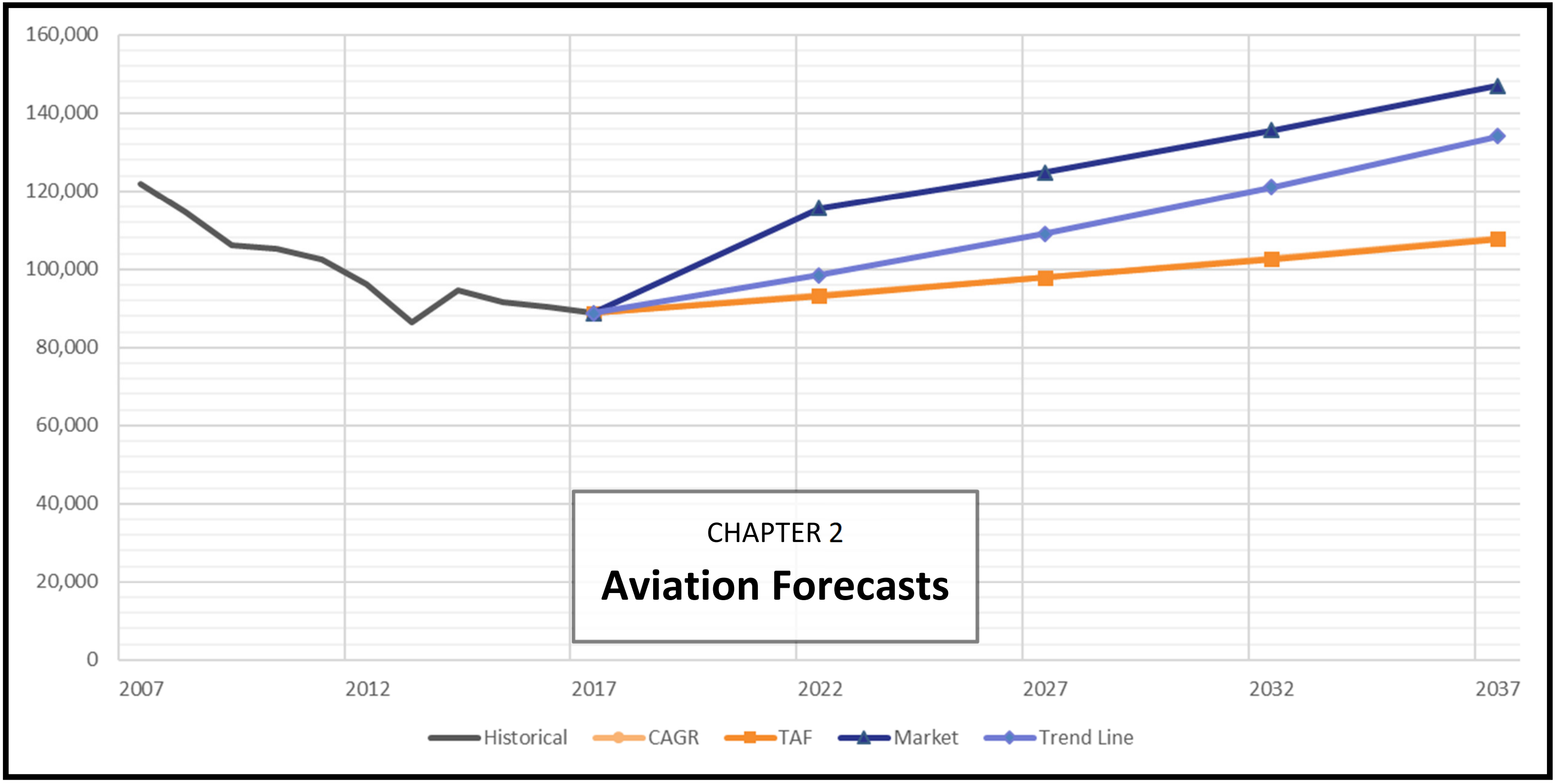
Source: Bureau of Economic Analysis, Woods and Poole, Inc.

Table 1-13: Local Socioeconomic Trends			
Year	**Population**	**Average Income**	**La Cross Metro GDP**
2005	178,574	$34,126	$5,276,510,094
2006	179,699	$34,480	$5,319,476,137
2007	180,709	$34,952	$5,397,623,317
2008	181,318	$36,262	$5,465,522,627
2009	182,359	$35,676	$5,673,000,000
2010	185,299	$36,279	$5,840,429,164
2011	185,617	$38,087	$5,848,964,335
2012	186,920	$39,755	$6,028,761,741
2013	187,308	$38,593	$6,020,651,550
2014	187,702	$39,867	$6,081,294,770
2015	187,870	$40,037	$6,229,010,682

Source: Bureau of Economic Analysis, Woods and Poole, Inc.

1.9 Inventory Summary

The goal of this chapter is to develop an understanding of existing facilities at the Airport. Subsequent chapters will present information to help determine potential changes needed to meet future demand over the next 20 years. This Master Plan will serve as a guide for LSE to provide consistent passenger, cargo, and general aviation service so that it may continue to be an economic driver for the region.



CHAPTER 2

Aviation Forecasts

2.1 Introduction

Aviation forecasts are an important part of the Master Planning process, as the need for Airport facilities is largely based on future activity. Local studies often consider airport Master Plan forecasts to assess related effects, such as local traffic and business trends. This chapter will present forecasts of aviation activity for the 20-year period starting in 2017, in the following sections:

- Passenger Demand Analysis
- Passenger Enplanement
- Commercial Operations
- General Aviation Trends
- Based Aircraft
- General Aviation Operations
- Military Operations
- Peak Activity
- Forecasts Summary and TAF Comparison

Although forecasting is often done by projecting activity based on five-year increments, actual activity growth rates may vary due to unpredictable or uncontrollable events such as national economic shifts or regulation changes. Therefore, to extend the useful life of this Master Plan each five-year increment of the forecasts has been assigned a Planning Activity Level (PAL). Assigning a PAL to each of the activity levels provides a clear planning threshold for facilities to meet the future needs of the Airport, regardless of the year in which it occurs. Each of the PALs can be seen below in **Table 2-1**. This chapter will establish the activity level associated with each PAL, which will then be used in the following chapters to determine facility requirements and project phasing during the alternatives chapter.

Table 2-1: Planning Activity Levels	
Year	**PAL**
2017	N/A
2022	I
2027	II
2032	III
2037	IV

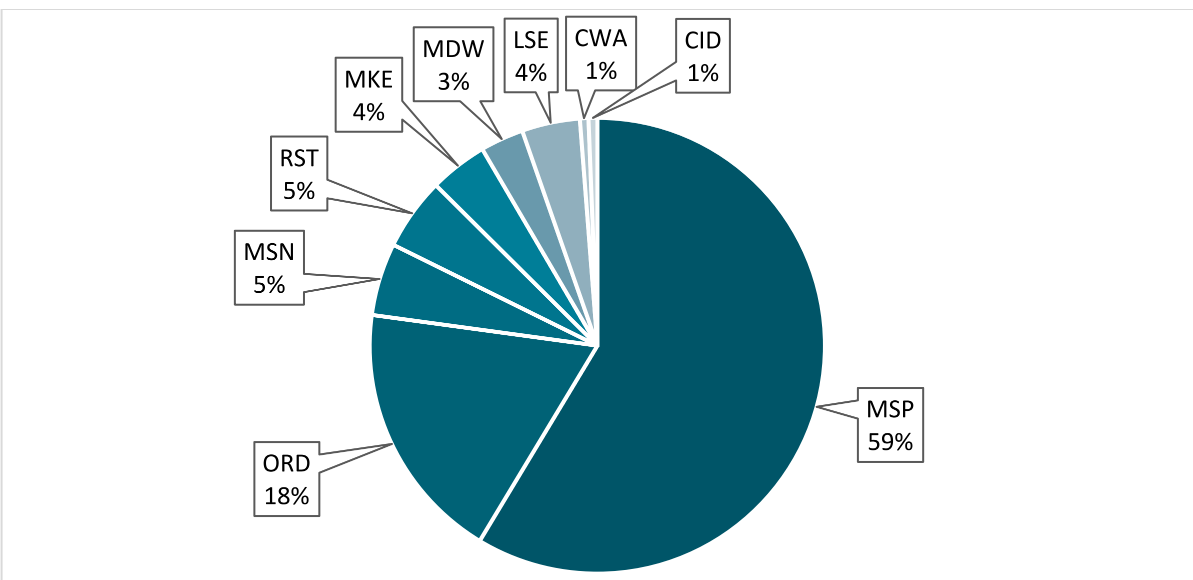
2.2 Passenger Demand Analysis

In 2017 an Airport Catchment Analysis was completed to study the trends of the traveling public around LSE. This report examined common destinations originating from a 90-mile radius around the Airport and determined leakage rates to other airports. This information is presented in the following subsections.

2.2.1 Airport Use

Within the 90-mile catchment radius, four percent of total passengers utilize LSE while 59 percent, the largest share of passengers, use MSP. The catchment rates for each commercial airport utilized by airports within this area are shown below in **Chart 2-1**. The general trend is that the highest rate of passenger catchment occurs in the counties immediately around LSE. La Crosse, Houston, Vernon and Monroe Counties together account for 54.1 percent of the travelers using LSE.

Chart 2-1: 90-mile Catchment Rate



Source: 2018 ASM Airport Catchment Analysis
Notes: MSP: Minneapolis–Saint Paul International Airport; ORD: Chicago O'Hare International Airport; MSN: Dane County Regional Airport; RST: Rochester International Airport; MKE: General Mitchell International Airport; MDW: Chicago Midway International Airport.
Due to rounding and leakage to additional airports the percentages do not total 100%

2.2.2 True Market

Only a portion of the flying public generally use the closest airport to them while others may travel some distance due to cost or air carrier preference. The total number of passengers traveling to a given destination is known as the true market, but these passengers are usually divided among several airports. The 90-mile circle surrounding LSE generated 3.8 million total annual passengers in 2017. The most popular destination within the 90-mile radius was Chicago with a true market of 206,680 passengers, with 5 percent retained at LSE. By comparison, the true market for Chicago within a 20-mile radius is 31,620 passengers and 27 percent is retained at LSE. Of the top five true market destinations, the share utilizing LSE tends to be at its highest within 20 miles of the Airport and gradually decreases towards the fringes of the catchment area. This trend persists for many of the top destinations in the catchment area. Many of the top international destinations are common leisure destinations, such as number one, Cancun, with a true market of 6,060 within 20 miles and 11 percent retention at LSE. Other leisure destinations in the top five include Mexico City and Punta Cana.

2.2.3 Summary

The other large airports in the greater vicinity, such as MSP and ORD, capture a considerable number of passengers from outer edges of the catchment area. The 2017 Airport Catchment Analysis found that, because the zip code containing the City of La Crosse only has a retention rate of 22 percent, there is room to improve locally. Focus on increasing the local retention rate near the Airport would be a logical target as it benefits from proximity to LSE and a healthy local demographic. The City of La Crosse zip code has 58,900 residents with an average income of over $44,000 and an average age of over 30 years old and continued efforts to promote LSE service in the local area are encouraged.

2.3 Industry Trends

Enplanements at LSE have seen generally steady growth over the past several decades and the recent decrease in enplanements from 2007-2017 largely overlaps with the recession that began in 2008 and the following impacts. Therefore, the initial decrease and later plateau of activity at LSE should not be considered a trend, but a prolonged recovery following these events. Although the peak of the recession occurred in 2008 the ripple effects continue to shift the industry.

The *2017 – 2037 FAA Aerospace Forecast* used in this document was selected as it was relevant when the forecast chapter was written. The updated *2019 – 2039 FAA Aerospace Forecast,* shows similar trends to the older document, though states air carrier capacity is increasing more optimistically, both in the capacity of individual aircraft and in the total number of Available Seat Miles (ASMs). As the *2017 – 2037 FAA Aerospace Forecast* is more conservative compared to the updated document and it was released at the time the forecast chapter was written it will be used to summarize trends relevant to the forecasts in the LSE master plan. The *2017 – 2037 FAA Aerospace Forecast* states that impacts continue to be felt in 2016 as airlines continue to consolidate. That document summarizes post-recession air carrier trends as three distinct aspects: 1) Industry Consolidation and Restructuring, 2) Capacity Discipline, and 3) Ancillary Revenues.

While industry consolidation and ancillary revenue factors have had some impacts to LSE, the most pertinent to local operations is capacity discipline. The *Aerospace Forecast* records that ASMs for domestic operations grew every year, except two, from 1978 to 2000 at an average rate of 4 percent annually. Since 2007, only 2 percent average annual growth has been observed nationally, as air carriers have attempted to limit empty seats. The regional airlines have been even more impacted by these trends due to contracts with the larger air carriers and the ongoing pilot shortage. At LSE, flights for American Airlines and Delta Air Lines are operated by SkyWest Airlines and Envoy Air. These regional carriers are also hampered by the fleet transition to larger aircraft, which will have long-term benefits by using more fuel-efficient aircraft, but temporarily restrict operating capital. Both SkyWest Airlines and Envoy Air have ordered several Embraer E175 aircraft as of 2019 that are intended to replace the aging Bombardier CRJ models and smaller Embraer aircraft currently used. These industry trends have in turn restricted the number of air carrier operations at LSE. However, this decrease in operations is not an indicator of a decrease in local demand for air service but instead is an indicator of capacity discipline.

These restricted operations by regional carriers has driven up passenger load factors both locally and nationally. Nationally, domestic load factors hit a historic high of 84.7 percent in 2016. At LSE, enplanements have remained steady since 2014 and although load factors decreased following the recession they have increased steadily since. While air carrier operations have plateaued in recent years, it is evident in **Table 2-2** that it is not due to a trend of declining passenger demand, but is again indicative of capacity discipline. Load factors and enplanements both recovered from a recent low in 2013 and load factors have since grown to remain above 80 percent.

Table 2-2: Historical Load Factors

Year	Load Factor	Enplanements[1]
2007	65.70	121,822
2008	59.63	114,648
2009	59.56	106,082
2010	57.54	105,301
2011	61.88	102,644
2012	67.94	96,200
2013	64.82	86,379
2014	77.26	94,631
2015	83.03	91,460
2016	81.18	90,377
2017	81.95	92,951[2]
2018*	80.13	100,086[3]

Sources :[1]2017 TAF used for 2007 – 2016, [2]2018 TAF, [3]DOT T100 Database
Notes: 2017 uses June 2017 – May 2018 due to information available when this chapter was written.

Both national and local load factors indicate that enplanements have not been in a downward trend in recent years. Since 2013, enplanements at LSE have hovered near 90,000 and preliminary enplanement numbers from the WI Bureau of Aeronautics for 2018 are reported as 98,744, as sourced from the FAA Air Carrier Activity Information System (ACAIS) database and Airport records. When the DOT T100 Database is sampled, however, 100,086 enplanements are reported for that year

The increase of enplanements, both in 2018 and as projected by the forecast chapter, follows national trends of forecasted enplanement growth. The 6.2 percent increase in enplanements from 2017 to 2018 at LSE is above the 4.8 percent forecasted national growth for that period, as reported by the *FAA TAF Summary 2017 – 2045*. That document estimates that national enplanements will increase 1.9 percent over the planning period, which is similar to the 2.2 percent enplanement growth projected for LSE by the master plan.

The *2017 – 2037 FAA Aerospace Forecast* projects 1.7 percent domestic enplanement growth for the twenty-year planning period but noted that domestic enplanements increased 5.8 percent in 2018 from 2017. That document noted that this marks the sixth consecutive year of passenger growth for the first time since 2000. The health of the air carrier industry has also improved based on fuel prices and increasing passenger numbers:

> *"Solid increases in passenger volume and traffic offset lower yields and along with higher ancillary revenues and falling fuel prices resulted in U.S. carriers finishing up 2016 with record profits."*

Although the period from 2007 through 2013 saw a decrease in enplanements at LSE due to a national economic crisis, this was preceded by two decades of stable growth from 1987 to 2007. Small, temporary decreases in passenger activity occurred sporadically during this time but two consecutive years of negative year-to-year activity occurred only once.

In summary, recovery from the recession era trends at LSE began in 2014 and continues today. Enplanement growth at LSE is already occurring and the preferred enplanement forecast selected by the master plan projects 99,288 enplanements in 2022. However, the estimated activity reported by the WI Bureau of Aeronautics in 2018 has nearly met that projection.

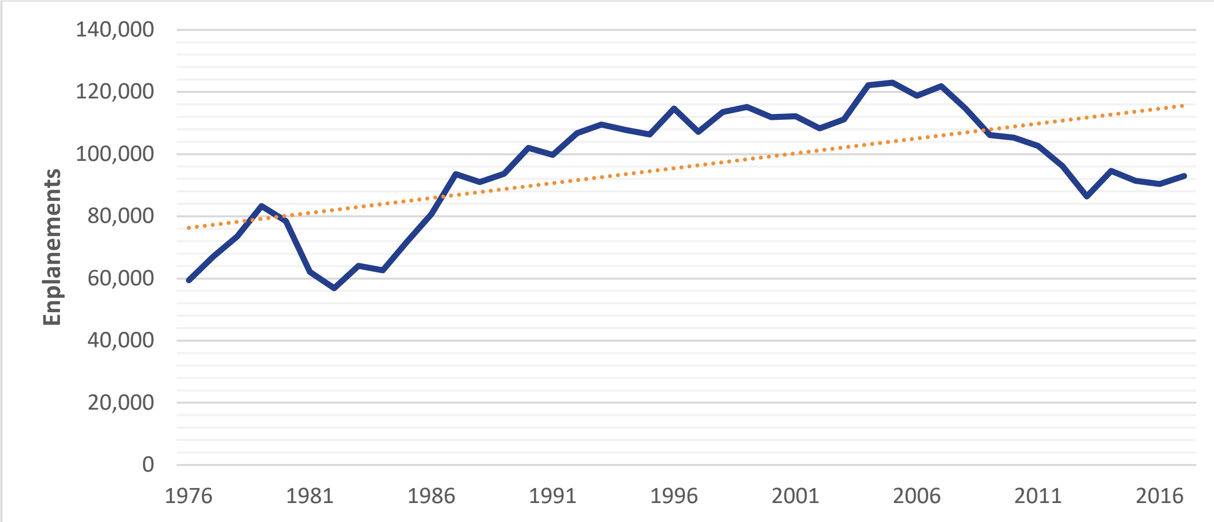
2.4 Passenger Enplanement Forecasts

Enplanement forecasts are a cornerstone of the master planning process as the number of passengers at an airport also influence operations, peak activity and other facility needs. This section summarizes historical enplanements at LSE and uses several industry standard methodologies to determine a future enplanement forecast. The final part of this section will provide a discussion of the strengths and weaknesses of the various forecasts and a preferred forecast will be selected for the twenty-year planning period.

2.4.1 Historical Enplanements and Trends

Historical enplanements at LSE have grown steadily since the early 1980s and the only significant decreases in enplanements occurred in the late 1970s and after the 2008 recession. Enplanements declined from 2007 to 2013 but has since stabilized although pre-recession trends have not fully resumed. However, the overall trend from the past several decades is overall steady growth with an average compound average ground rate (CAGR) of 1.09 percent. A record of enplanements since 1976 is shown in **Chart 2-2** while **Table 2-3** shows the enplanements from the last decade in greater detail. It should be noted that as enplanements trends are increasing, as of this writing, that the last available 12 months of data was used for the base year of 2017 in order to depict current trends more accurately. This includes data from June 2017 through May 2018.

Chart 2-2: Enplanements Historical Trend



Source: FAA TAF, Mead & Hunt

Table 2-3: Enplanement History	
Year	**Enplanements**
2007	121,822
2008	114,648
2009	106,082
2010	105,301
2011	102,644
2012	96,200
2013	86,379
2014	94,631
2015	91,460
2016	90,377
2017*	92,951
CAGR (2007 – 2017)	-2.67%

Source: 2017 FAA TAF
Notes: 2017 uses June 2017 – May 2018.

2.4.2 Federal Aviation Administration (FAA) Terminal Area Forecast (TAF)

The FAA records passenger enplanements for all commercial service airports and releases this data annually in the Terminal Area Forecast (TAF). It should be noted that annual TAF data is based on the federal fiscal year (October through September) rather than the calendar year. The 2017 TAF passenger enplanement forecast is shown in **Table 2-4**. The TAF projects modest but steady growth to 107,697 enplanements in 2037, a compound annual growth rate (CAGR) of 0.74 percent.

Table 2-4: Enplanement Forecast - TAF	
Year	**Enplanements**
2017	92,951
2022	93,225
2027	97,812
2032	102,631
2037	107,697
CAGR (2017 – 2037)	*0.74%*

Source: 2017 FAA TAF (published January 2018)

2.4.3 Market Share Forecast

This methodology measures local activity as part of the state-wide whole. In **Table 2-5** below the percentage of enplanements at LSE are compared to the total enplanements at other commercial airports in Wisconsin. While market share forecasts are an industry standard method of projecting aviation demand, the recognized drawback is that it does not account for local conditions. To better refine this forecast, the General Mitchell International Airport (MKE) has been exempted from this analysis due to its dominant role in Wisconsin enplanements and the Rochester International Airport (RST) and Eastern Iowa Airport (CID) have been included due to their proximity and nearby catchment area. Although the LSE market share has changed over time, it is expected that future growth would eventually stabilize the market share to near prerecession trends. Therefore, future enplanements have been projected using the average market share from 2007 to 2017. This methodology projects a growth to 155,753 enplanements by 2037 and exhibits a strong CAGR growth of 2.61 percent.

Table 2-5: Enplanement Forecast – Market Share			
Year	**Enplanements**	**Total Market Enplanements***	**Market Share**
Historical			
2007	121,822	2,549,668	4.8%
2008	114,648	2,429,959	4.7%
2009	106,082	2,278,435	4.7%
2010	105,301	2,267,208	4.6%
2011	102,644	2,188,869	4.7%
2012	96,200	2,139,005	4.5%
2013	86,379	2,216,403	3.9%
2014	94,631	2,319,562	4.1%
2015	91,460	2,319,976	3.9%
2016	90,377	2,335,056	3.9%
2017	92,951	2,453,315	3.8%

Table 2-5: Enplanement Forecast – Market Share (continued)			
Year	**Year**	**Year**	**Year**
CAGR (2007 – 2017)	*-2.67%*	*-0.63%*	4.3%
Forecast			
2022	122,256	2,843,174	4.3%
2027	132,188	3,074,151	
2032	143,652	3,340,739	
2037	155,753	3,622,173	
CAGR (2017 – 2037)	*2.61%*	*2.22%*	*4.3%*

Source: 2017 FAA TAF
Notes: Total market enplanements includes enplanements at all Wisconsin commercial service airports (except MKE), RST, and CID.

2.4.4 Regression Analysis Forecast

Regression analysis derives the relationship between several independent variables based on their historic changes. If there is a high correlation between variables, then a forecast can be created which utilizes this relationship. The prediction ability of a given forecast is measured by the R^2 value, where 0 indicates no relationship and 1 indicates a perfect relationship. The historical passenger enplanements at LSE were compared to the population and income of the La Crosse, Houston and Winona Counties in addition to the gross regional product (GRP) of the La-Crosse metro area. These variables can be seen in **Table 2-6** and the years 2005 to 2015 was used due to socioeconomic reporting times. However, none of these models produced reliable results that could be used to forecast future activity. Attempting to forecast enplanements with unreliable variables will produce results that do not correspond with local or national trends and do not align with the Airport's historical relationship with the community. Therefore, this methodology was dismissed from consideration.

Table 2-6: Enplanement Forecast – Regression Analysis Variables

Year	Enplanements	Population	Income
2005	122,973	178,574	$34,126
2006	118,411	179,699	$34,480
2007	121,761	180,709	$34,952
2008	114,577	181,318	$36,262
2009	106,075	182,359	$35,676
2010	105,278	185,299	$36,279
2011	102,620	185,617	$38,087
2012	96,169	186,920	$39,755
2013	86,298	187,308	$38,593
2014	94,592	187,702	$39,867
2015	91,368	187,870	$40,037
CAGR	-2.93%	0.51%	1.61%
R^2 Value	N/A	-0.91	-0.82

Source: Woods and Poole, Mead & Hunt.

2.4.5 Trend Analysis Forecast

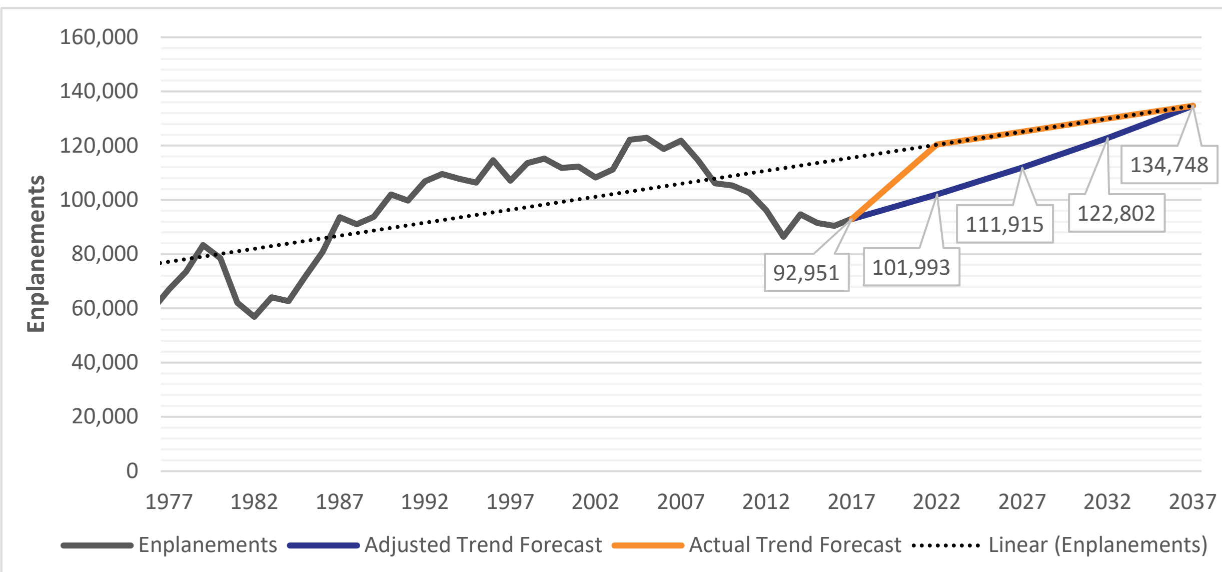
This method is similar to regression analysis except it uses growth over time to predict future activity. This is visually represented previously in **Chart 2-3,** as this methodology establishes a trendline for the past activity at the Airport and then extends that trendline over the planning period. As this methodology benefits from a long duration of historical data, enplanements from 1976 are shown below. The trend line in this chart shows steady growth although actual enplanements are punctuated by periods of recession and recovery. Therefore, while the actual trend line forecast would project an immediate recovery to the trend, due to the 2008 recession's impact on enplanements it is not realistic to expect that enplanements would "snap back" to the indicated trend line. Therefore, the growth rate projected by the trendline shown in **Chart 2-3**, has instead been applied to the 2017 enplanements and is shown in **Table 2-7** to allow for steady growth that will eventually match historical trends.

Table 2-7: Enplanements – Trend Analysis

Year	Enplanements
2017	92,951
2022	101,993
2027	111,915
2032	122,802
2037	134,748
CAGR (2017 – 2037)	*1.87%*

Source: 2017 FAA TAF

Chart 2-3: Enplanements – Trend Analysis



Source: FAA TAF, Mead & Hunt

2.4.6 Compound Annual Growth Rate (CAGR) Forecast

This methodology also examines the growth rate of historical enplanements to project future activity. The CAGR rate from 1987 to 2007 was sampled to yield a growth rate of 1.33 percent. This growth rate was selected to capture sustained trends while avoiding periods of sharp growth or declines in enplanements. This growth rate is then applied to 2017 enplanements to project future activity in **Table 2-8** and projects a modest growth to 121,012 enplanements.

Table 2-8: Enplanements - CAGR	
Year	**Enplanements**
2017	92,951
2022	99,288
2027	106,058
2032	113,288
2037	121,012
CAGR (2017 – 2037)	*1.33%*

Source: 2017 FAA TAF

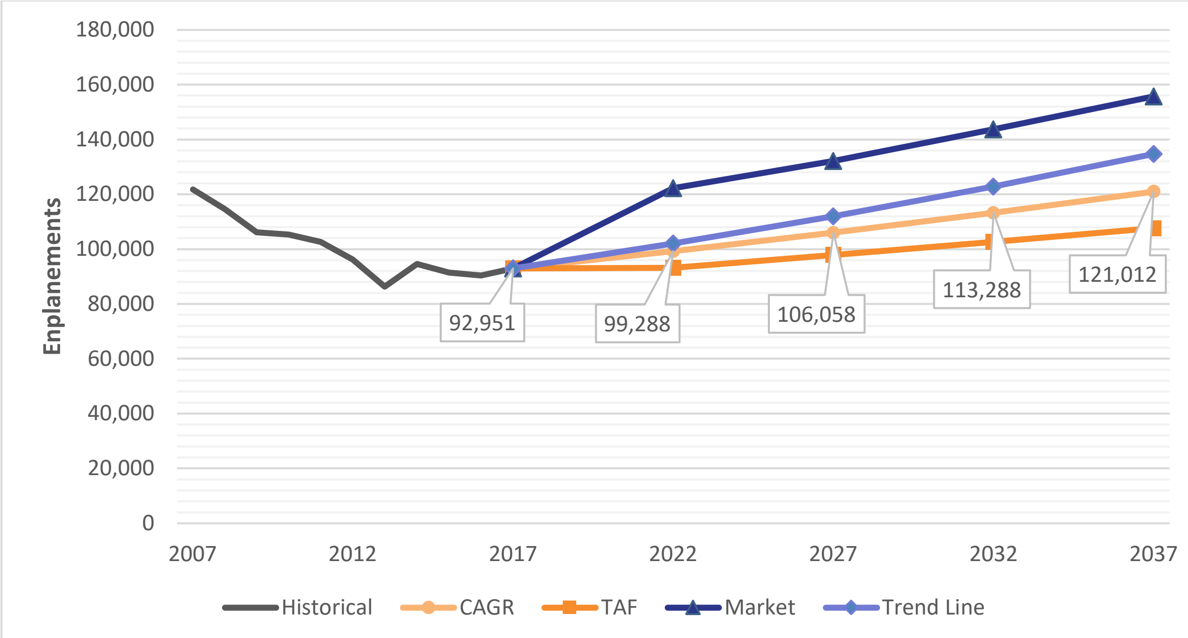
2.4.7 Preferred Forecast Methodology

The enplanement forecasts associated with the various methodologies are compared in **Table 2-9** and **Chart 2-4**. The strengths and weaknesses of these forecasts are discussed in this section and a preferred methodology is selected. The market share forecast relies on historical growth rates to project future activity. While this is generally reliable if trends are relatively consistent, this method is not sensitive to changes in market conditions, major legislative impacts and changing socioeconomic conditions. The growing economy in the La Crosse area and ongoing recovery from the 2008 recession indicates few similarities to the recent downturn in enplanements and this methodology is not considered further. Although the TAF is often produced by utilizing historical trends and regression analysis, the modest growth projected by the TAF does not align with the growing economy or long-term historical growth of LSE enplanements. Enplanements have increased annually by an average of 1.09 percent since 1976, which increases to 1.33 percent if excluding data during and immediately following the 2008 recession. Due to the historical growth rate at LSE and the growing local economy it is reasonable to conclude that LSE will eventually return to this growth rate. For these reasons the CAGR forecast is selected as the preferred methodology.

Table 2-9: Preferred Enplanement Forecast				
Year	**CAGR**	**TAF**	**Market**	**Trend Line**
2017	**92,951**	92,951	92,951	92,951
2022	**99,288**	93,225	122,256	101,993
2027	**106,058**	97,812	132,188	111,915
2032	**113,288**	102,631	143,652	122,802
2037	**121,012**	107,697	155,753	134,748
CAGR	***1.33%***	*0.74%*	*2.61%*	*1.87%*

Source: 2017 FAA TAF, Mead & Hunt

Chart 2-4: Enplanement Forecast Comparison



Source: 2017 FAA TAF, Mead & Hunt

2.5 Commercial Operations

Commercial operations consist of aircraft takeoffs and landings by airport users engaged in the carriage of passengers or property for compensation or hire. Commercial operations are a major driver of economic activity at most airports and the number and type of operations are largely dependent on passengers and local businesses. The numbers and type of commercial operations are examined in the following subsections to forecast future growth.

2.5.1 Fleet Mix Trends and Forecast

The FAA TAF separates commercial operations into three distinct categories: air carrier operations, commuter operations, and air taxi operations, as defined in **Table 2-10**. The first category, air carrier operations, is defined by the TAF as any operation by a commercial aircraft with a seating capacity of more than 60 seats or a maximum payload of more than 18,000 pounds. Although both commuter and air taxi operations each consist of aircraft below this threshold, commuter operations are scheduled while air taxi operations are unscheduled, on-demand flights. Air taxi operations are typically conducted by charter companies such as local fixed based operators (FBO) and fractional ownership aircraft operators. Large charter operations, such as flights to Las Vegas or to transport military personnel, would usually count as air carrier traffic due to the size of the aircraft. Cargo operations may also be classified as either air carrier or air taxi operations depending on the type of aircraft utilized. At LSE, air cargo is usually carried on air carrier aircraft in conjunction with scheduled passenger flights.

Table 2-10: FAA Commercial Operator Classification				
Operation Categories	**Commercial**	**Aircraft Capacity**	**Scheduled**	**Do Passengers Count as Enplanements**
Air Carrier	Yes	More than 60	Typically Yes	Yes
Commuter	Yes	60 or Less	Yes	Yes
Air Taxi	Yes	60 or Less	Typically No	No

As air taxi operations may be either passenger or cargo operations, are generally unscheduled, and use similar aircraft to GA operations, establishing an accurate count of air taxi operations can be challenging. To divide operations into these three categories several databases were reviewed. The Traffic Flow Management System Counts Database (TFMSC) records flight plans filed by pilots. Since most air carrier and commuter traffic file flight plans, this database accounts for nearly all air carrier and commuter operations. These operations were then manually divided into the commuter and air carrier categories based on the number of seats per aircraft. To determine air taxi operations, the Operations Network (OPSNET) database was reviewed. This database records the number of operations at towered airports by each category, although the commuter and air taxi operations are grouped together. The known number of commuter operations, determined by reviewing the TFMSC data, was then subtracted from the OPSNET air taxi/commuter category. This revealed that air taxi operations make up an average of 4.9 percent of total annual operations, once the maximum high and low years of 2007 and 2014 were removed. This percentage was then applied to historical annual operations to determine air taxi traffic counts.

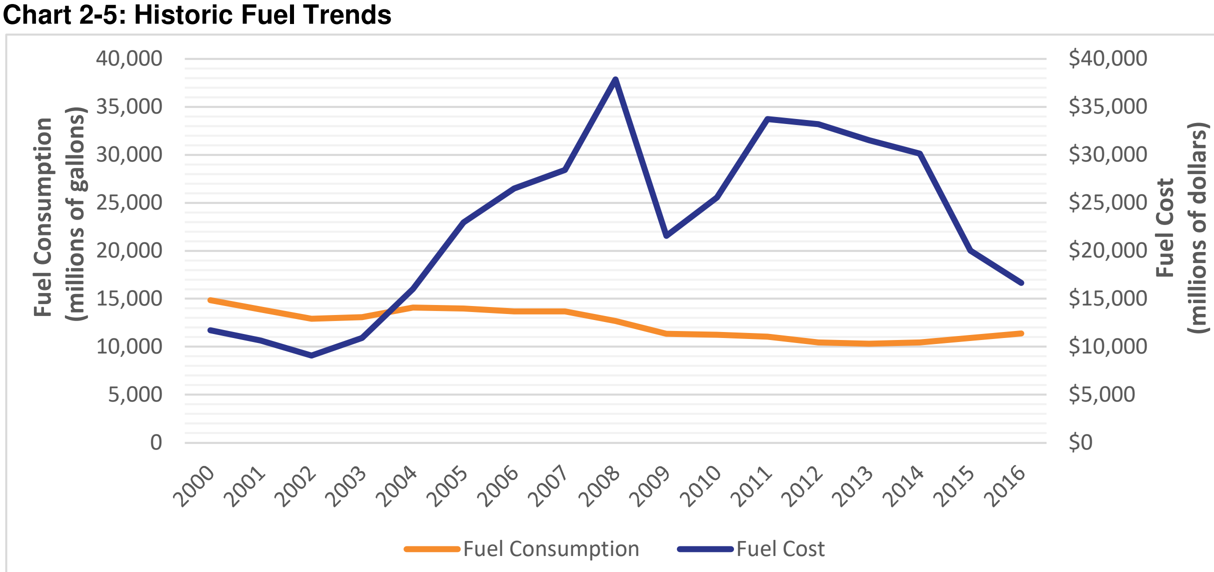
Commercial operations have steadily decreased at LSE since 2010, as shown in **Table 2-11**. Before 2010, scheduled air carriers primarily used the 34-seat SAAB 340, 50-seat CRJ 200, and the 100-seat DC-9. Since that time, the fleet has become more homogeneous and in 2017 the CRJ 200 conducted approximately 83 percent of commercial operations at LSE. However, air carriers continue to shift to larger aircraft as technologies and increased seating capacity allow passengers to be carried to their destination with less fuel per seat. This is already occurring at LSE, as American Airlines began using CRJ700 aircraft in early 2018.

Table 2-11: Commercial Trends							
Year	Operations				Supporting Information		
	Air Carrier	Commuter	Air Taxi	Total	Enplanements	Load Factor	Average Seats per Flight
2007	1,332	5,497	1,459	8,288	121,822	65.7%	57.7
2008	1,702	5,487	1,231	8,420	114,648	59.6%	56.2
2009	917	6,336	1,273	8,526	106,082	59.6%	52.9
2010	394	7,360	1,261	9,015	105,301	57.5%	51.3
2011	266	6,681	1,114	8,061	102,644	61.9%	47.1
2012	248	5,857	1,119	7,224	96,200	67.9%	47.0
2013	286	5,584	953	6,823	86,379	64.8%	46.9
2014	311	6,784	959	8,054	94,631	77.3%	43.7
2015	358	4,156	1,124	5,638	91,460	83.0%	55.6
2016	414	4,297	947	5,658	90,377	81.2%	54.3
2017	378	4,088	902	5,368	92,951	82.0%	56.5
CAGR	*-11.83%*	*-2.92%*	*-4.69%*	*-4.25%*	-2.67%	1.69%	*-0.21%*

Source: OPSNET database, TFMSC database

The desire for larger, more fuel-efficient aircraft is also illustrated in **Chart 2-5**, which shows recent trends in fuel consumption and cost. Although fuel consumption has remained steady over the past decade, fuel cost has fluctuated significantly. Although fuel cost has decreased recently, its volatile nature continues to push airlines to find more efficient ways of transporting passengers.

Chart 2-5: Historic Fuel Trends



Source: Bureau of Transportation Statistics

The trend of air carrier converting their fleets to larger aircraft is expected to continue throughout the planning period, resulting in modest increases in the number of commercial operations. Because air carriers are expected to use larger aircraft, passengers can be transported more efficiently, and operations are therefore anticipated to grow at a slower rate than enplanements. The 2017 FAA Aerospace Forecast projects that domestic revenue passenger miles will grow two percent per year through the planning period. As air taxi and commuter aircraft are projected together, forecasted air taxi operations were determined by examining the year in which declining commuter/air taxi operations reach their minimum count, 5.26 million operations in 2023, before increasing to 6.11 million operations in 2037. This translates to an annual growth of 1.08 percent. This trend reversal aligns with the transition to larger air carrier aircraft and therefore growth in this category after 2023 will largely consist of air taxi operations. Each of these growth rates have been applied to their respective categories while accounting for the transition from 50 seat aircraft over time in **Table 2-12.** This fleet mix has been further broken down by the number of seats per aircraft in **Table 2-13**.

Table 2-12: Commercial Operations Forecast

Year	Air Carrier	Commuter	Air Taxi	Total
2017	378	4,088	902	5,368
2022	3,099	1,412	952	5,463
2027	4,342	214	1,004	5,560
2032	4,602	0	1,060	5,662
2037	4,648	0	1,118	5,766
CAGR	*13.37%*	*-100.00%*	*1.08%*	*0.36%*

Sources: Mead & Hunt, OPSNET database, TFMSC database

Table 2-13 Passenger Aircraft Trends					
Year	**< 40**	**40 - 60**	**61 - 100**	**101 - 150**	**> 150**
Historical					
2007	43.5%	26.7%	12.5%	16.8%	0.5%
2008	36.9%	24.7%	35.9%	2.0%	0.5%
2009	24.0%	52.1%	23.0%	0.3%	0.6%
2010	0.8%	94.4%	3.7%	0.3%	0.8%
2011	0.1%	98.0%	0.9%	0.0%	0.9%
2012	0.0%	98.0%	0.7%	0.2%	1.1%
2013	0.0%	98.2%	0.5%	0.3%	1.0%
2014	0.0%	98.4%	1.3%	0.1%	0.2%
2015	0.0%	94.7%	4.7%	0.0%	0.5%
2016	0.0%	95.0%	4.4%	0.4%	0.2%
2017	0.0%	95.2%	4.6%	0.0%	0.2%
Forecast					
2022	0.0%	31.3%	66.7%	1.0%	1.0%
2027	0.0%	4.7%	92.8%	1.2%	1.3%
2032	0.0%	0.0%	97.0%	1.4%	1.6%
2037	0.0%	0.0%	96.2%	1.8%	2.0%

Sources: DOT T100 Data, Mead & Hunt

As air carriers switch to larger aircraft the average number of seats per operation will increase. Load factors are expected to grow more slowly as aircraft size increases. Based on the fleet mix shown above, it is estimated that the average number of seats per flight will correspond, as shown in **Table 2-14**. The 2017 FAA Aerospace Forecast anticipates an increase in national load factor by 2.3 percent during the planning period. This same growth rate is anticipated at LSE but has been modified to show slow increase at first, as aircraft size increases, before growing more rapidly towards the end of the planning period.

Table 2-14: Fleet Trends		
Year	**Average Seats**	**Load Factor**
2017	56.8	82.0%
2022	63.9	82.3%
2027	70.2	82.7%
2032	71.6	83.5%
2037	72.4	84.3%

2.5.2 Air Cargo Operations Forecast

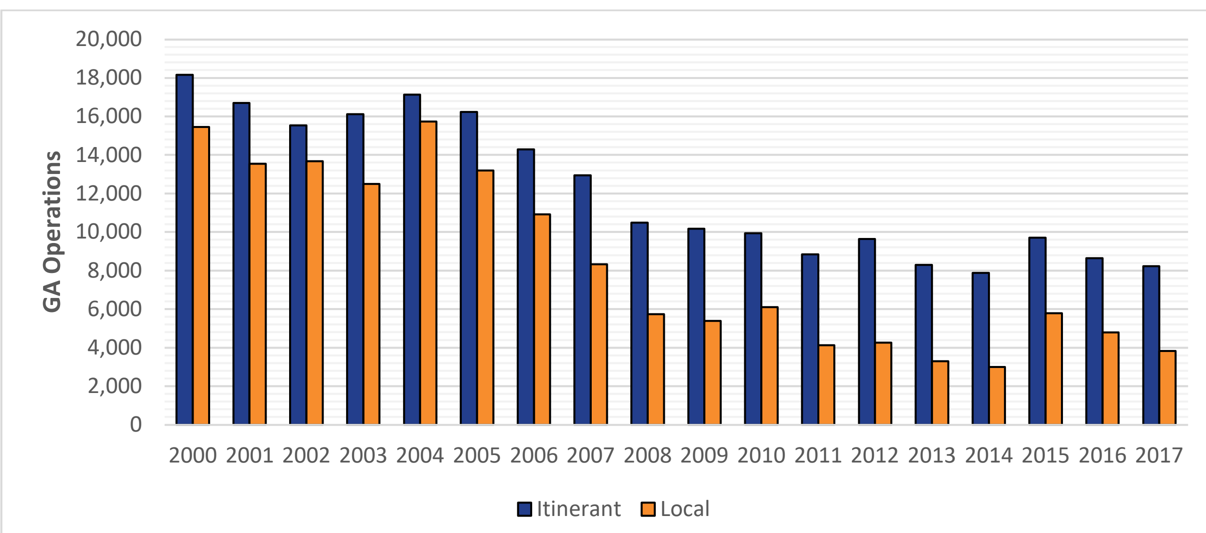
Before 2010 cargo operations were conducted at LSE by Mesaba Airlines and Northwest Airlines aircraft that would carry some freight in addition to scheduled passengers. However, this practice virtually ended with the termination of service by these two air carriers. Since 2010, a small amount of freight has been carried by air carriers. In 2014, a study was completed that reviewed various GA activities at LSE which included revisiting the air cargo market and potential for future activity at LSE. This report concluded that it is unlikely that local demand would sustain a dedicated air cargo facility in the near future. From a national perspective, air cargo is slated to grow. According to 2018 FAA data, domestic air cargo is slated to grow at an annual rate of 1.9%.

LSE currently does support air cargo. Bemidji Aviation flies air cargo to Minneapolis International Airport under a contract with United Parcel Service. This operation is conducted primarily with Swearingen Metroliner aircraft. While it is outside the scope of this master planning effort for the reasons identified in the previous paragraph, an investment into air cargo could change this outlook. An investment into a small intermodal facility of 20,000 square feet could accommodate several daily cargo flights on Swearingen Metroliners, Cessna Caravans, or ATR 42/72 aircraft. A facility of this nature is estimated to cost approximately $4,000,000 in 2018 and may attract interested partner airlines, particularly with the strong manufacturing industry located within the La Crosse area economy. Since such a development would likely not be eligible for grant money, it is not included in other areas of this airport master plan or in the capital improvement program. Other outside sources of funding would need to be identified to construct any air cargo facility.

2.6 General Aviation Trends

General aviation (GA) represents all civil aviation activity not defined as commercial. GA includes a variety of users and activities, including corporate and business operators, recreational users, flight training, agricultural applications, and law enforcement and other government uses. The most recent state impact economic study by the FAA occurred in 2012 and estimated that GA has a total impact within Wisconsin of $814 million while providing, or contributing to, 7,793 jobs. LSE is one of eight commercial service airports in Wisconsin, out of a total of 98 public use airports. As a commercial service airport, GA operations at LSE represent a secondary yet important priority for facility planning. As shown in **Chart 2-6**, GA activity has declined since the turn of the millennium. Itinerant operations have consistently been more numerous than local operations, although the gap has widened in the years following the recession.

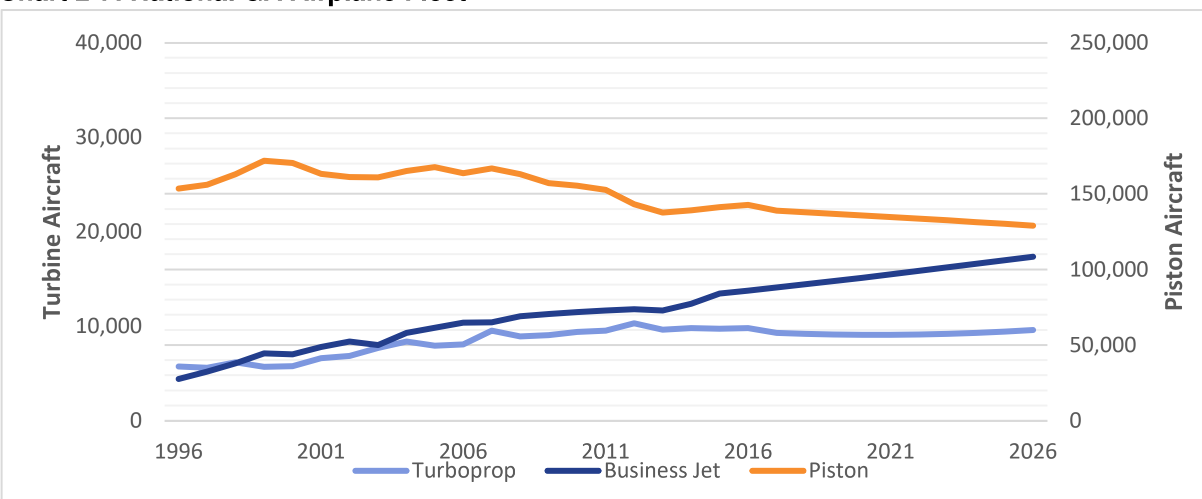
Chart 2-6: General Aviation Trends



Source: 2017 FAA TAF

Since 2007, an average of 66 percent and 34 percent of national GA operations are itinerant and local operations, respectively. Hours flown by the national GA fleet are anticipated to increase from 24.8 million hours in 2017 to 26.5 million hours in 2026. The majority of this increase is expected to consist of turbine aircraft hours. In 2017, turbine aircraft flew an average of 299 hours each, and this is anticipated to increase to 325 hours by 2026. It is expected that turbine aircraft will be responsible for 33.1 percent of all GA flight time by 2026, compared to 28.2 percent in 2017. By comparison, piston aircraft activity has been declining, as shown in **Chart 2-7**. Although piston activity made up 74.7 percent of hours flown in 1996, that has fallen to 50.9 percent in 2017 and is expected to decrease to 42.9 percent in 2026. In summary, the GA fleet is beginning to see more business-oriented aircraft as the cost to own and operate an aircraft increases, and as recreational flying is becoming less common. This decrease is paralleled by a decrease in private and commercial pilot categories. However, this is not simply a decrease in all GA activity but is instead indicative of a shift in the GA industry, as other aspects increase.

Chart 2-7: National GA Airplane Fleet



Source: GAMA 2017 Annual Report
Note: Post-2016 fleet numbers are projected.

Commercial pilot decreases were also influenced by the 2010 decision that all scheduled airline flight crew members must hold an ATP certificate by August 2013, which created an additional drop in commercial pilots. However, student pilot counts have been increasing since 2011 and reached 128,501 in 2016. This will contribute to replacement of the traditional piston aircraft and their associated private and commercial pilots.

Growth in the GA fleet is projected to be modest but steady by the *2017 – 2037 FAA Aerospace Forecast*, with a 0.1 percent growth over the forecast period. Two categories of aircraft are expected to be the prime driver of this modest growth. Light-sport-aircraft are a small portion of the fleet but are expected to grow at 4.1 percent annually and contribute to LSE single engine growth. The national turbine powered fleet is expected to grow at a rate of 1.9 percent and turbojet fleet at 2.3 percent. LSE has 8 jets currently and the strong business presence at the airport is expected to follow national trends as the GA fleet continues its transition.

2.7 Based Aircraft Forecast

Based aircraft are those housed at an Airport for the majority of the year that the FAA deems operational and airworthy. Based aircraft drive several types of facility needs on the Airport such as hangars, tie-downs, and fixed based operator services. There are currently 74 based aircraft at LSE, which and are primarily comprised of single engine piston aircraft, as is common at airports with a GA presence. Based aircraft trends at LSE have mirrored national trends, as piston engine aircraft have decreased within the past ten years while jet and helicopters have growth slightly in the past three years, as shown in **Table 2-15**.

Table 2-15: Historical Based Aircraft

Year	Single	Jet	Multiengine	Helicopter	Total
2007	73	9	8	1	91
2008	73	9	8	1	91
2009	73	9	8	1	91
2010	68	9	6	1	84
2011	68	9	6	1	84
2012	73	7	4	1	85
2013	73	7	4	1	85
2014	73	7	4	1	85
2015	73	7	4	1	85
2016	60	8	4	2	74
2017*	60	8	4	2	74

Sources: 2017 TAF and 5010
*Notes: *5010 was used for 2017 aircraft data.*

2.7.1 FAA TAF

The 2017 TAF indicates that based aircraft at LSE will increase from a total of 74, as currently indicated by the 5010 record, to 99 by the end of the planning period, a compound annual growth rate (CAGR) of 1.47 percent, as shown in **Table 2-16**. This modest growth aligns with the reduction of piston aircraft, which tend to be more numerous, and the slower growth of turbine aircraft.

Table 2-16: Based Aircraft Forecast – FAA TAF

Year	Total
2017	74
2022	82
2027	89
2032	94
2037	99
CAGR (2007 – 2017)	*1.47%*

Sources: 5010 and 2017 FAA Terminal Area Forecast

2.7.2 Regression Analysis

A regression analysis was conducted to examine the relationship between based aircraft and local socioeconomic factors. Due to the delay in reporting socioeconomic data by the US Census Bureau and the Bureau of Economic Analysis (BEA), data from 2005 – 2016 was used as available. Based aircraft generally have higher correlation levels with socioeconomic factors than enplanements. However, the local population (including La Crosse, Winona and Houston Counties) and gross regional product (GRP) per capita of the La Crosse BEA Metropolitan Statistical Area (including La Crosse and Houston County) had a R^2 value of near .6, a moderate relationship. Variables and their respective R^2 values are shown in **Table 2-17**. A value of at least .9 is usually desired before using this method to forecast future activity, therefore this method was not considered further.

Table 2-17: Based Aircraft Forecast – Regression Analysis Variables

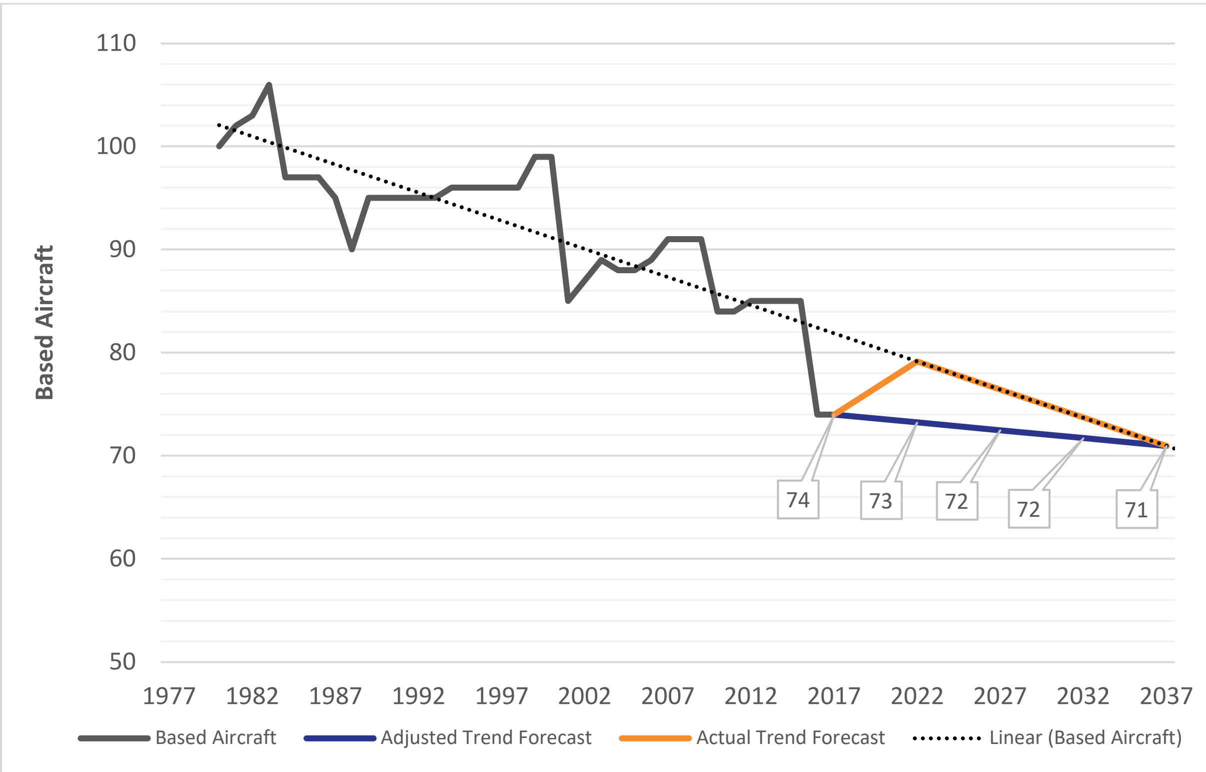
Year	Based Aircraft	Population	Income	GRP per Capita
2005	88	178,574	$34,126	$40,819
2006	89	179,699	$34,480	$40,856
2007	91	180,709	$34,952	$41,200
2008	91	181,318	$36,262	$41,491
2009	91	182,359	$35,676	$42,679
2010	84	185,299	$36,279	$43,624
2011	84	185,617	$38,087	$43,569
2012	85	186,920	$39,755	$44,474
2013	85	187,308	$38,593	$44,280
2014	85	187,702	$39,867	$44,521
2015	85	187,870	$40,037	$45,472
CAGR	*-0.35%*	*0.51%*	*1.61%*	*1.09%*
R^2 Value	N/A	.62	.49	.60

Source: Woods and Poole, Mead & Hunt.

2.7.3 Trend Analysis

Like its corresponding passenger enplanement forecast, this trend analysis forecast uses the changes in based aircraft over time to project future growth. Based aircraft at LSE have experienced a slow decline over the past several decades punctuated by periods of growth. Similar to the enplanements trend analysis forecast, the growth rate projected by the trend line is applied to current based aircraft to correct the "snap back" to the trend line in 2022. The resulting CAGR of -0.21 percent has been applied to the current aircraft total and is shown in **Chart 2-8**.

Chart 2-8: Based Aircraft – Trend Analysis



Source: FAA TAF, Mead & Hunt

2.7.4 Market Share

Based aircraft at LSE have accounted for an average of 17 percent of total based aircraft at commercial airports in Wisconsin for the past decade, with the exception of Dane County Regional Airport (MSN) which was not included in this analysis due to its unusually high number of based aircraft. Shown in **Table 2-18**, this methodology assumes relatively consistent statewide market share in based aircraft throughout the planning period and projects growth to 102 based aircraft by the end of the planning period.

Table 2-18: Based Aircraft Forecast – Market Share

Year	LSE	WI Total (without MSN)	LSE Market Percentage
Historical			
2007	91	597	15.2%
2008	91	536	17.0%
2009	91	485	18.8%
2010	84	456	18.4%
2011	84	460	18.3%
2012	85	504	16.9%
2013	85	479	17.7%
2014	85	503	16.9%
2015	85	492	17.3%
2016	74	489	15.1%
2017	74	491	15.1%
CAGR / Average	*-2.05%*	*-1.94%*	*17.0%*
Forecast			
2022	87	515	17.0%
2027	92	543	
2032	97	573	
2037	102	603	
CAGR / Average	*1.62%*	*1.03%*	*17.0%*

Sources: 2017 TAF and 5010

2.7.5 Preferred Forecast Methodology

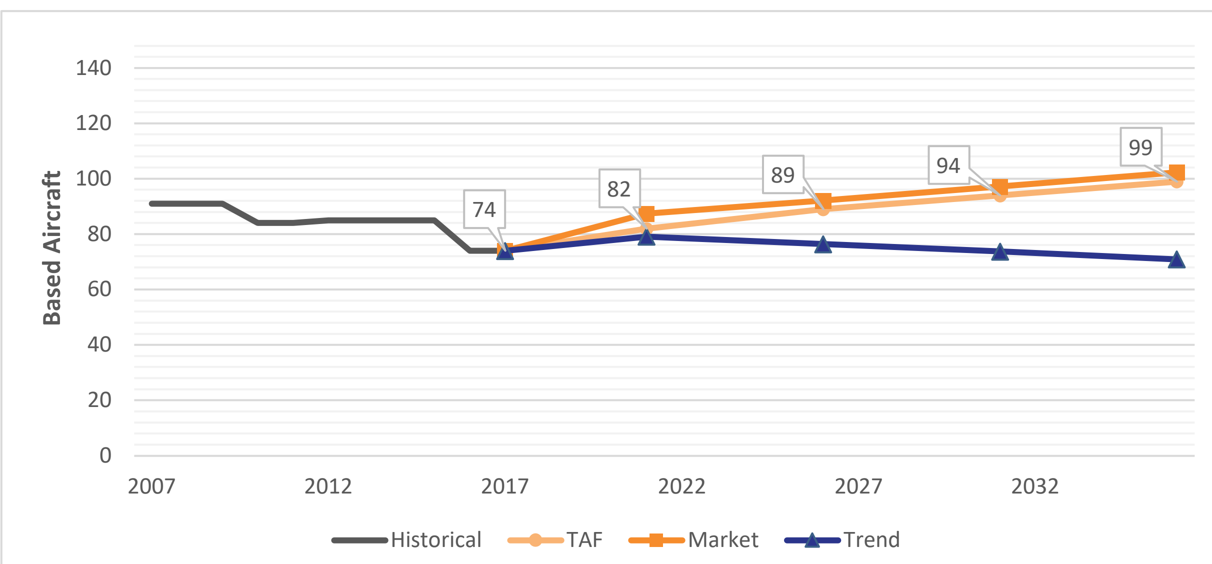
The based aircraft forecasts are compared in **Table 2-19** and **Chart 2-9**. Although the market share forecast shows steady growth, LSE's share of the region's GA market has fluctuated over the years and does not appear to be a good predictor of future activity. Similarly, the GA market within the state has also changed significantly in the past decade. Therefore, this methodology was dismissed from consideration. The trend analysis forecast is the only forecast that projects a decline in based aircraft and assumes future trends will mirror past trends. However, the City of La Crosse has experienced an influx of business activity in the past decade, particularly in the downtown district, and business aviation is growing. For these reasons, past conditions are not expected to reflect future conditions and the trend forecast was dismissed from consideration. Finally, the TAF projects steady growth over the duration of the planning period. As stated in Section 2.3.7, the TAF draws on a combination of recent national trends while considering local factors and is therefore selected as the preferred methodology.

Table 2-19: Preferred Based Aircraft Forecast

Year	TAF	Market Share	Trend
2017	**74**	74	74
2022	**82**	87	73
2027	**89**	92	72
2032	**94**	97	72
2037	**99**	102	71
CAGR	***1.47%***	*1.60%*	*-0.21%*

Source: 2017 FAA TAF, Mead & Hunt and 5010

Chart 2-9: Based Aircraft Comparison



Sources: Mead & Hunt, 2017 FAA TAF and 5010

2.7.6 Fleet Mix

Expected additions to the piston and turbine fleets are shown in **Table 2-20**. Historical aircraft data is derived from the 2017 TAF while the forecasted fleet mix growth follows national and local trends as the share of piston engine fixed wing aircraft declines while the shares of jet and helicopter aircraft increase proportionally. Turboprop aircraft are counted as either single or multiengine aircraft, depending on the model, and it is anticipated that these aircraft will form the majority of multiengine growth at the Airport.

Table 2-20: Based Aircraft Fleet Mix

Year	Single		Jet		Multiengine		Helicopter		Total
	#	%	#	%	#	%	#	%	
Historical									
2007	73	80.2%	9	9.9%	8	8.8%	1	1.1%	91
2008	73	80.2%	9	9.9%	8	8.8%	1	1.1%	91
2009	73	80.2%	9	9.9%	8	8.8%	1	1.1%	91
2010	68	81.0%	9	10.7%	6	7.1%	1	1.2%	84
2011	68	81.0%	9	10.7%	6	7.1%	1	1.2%	84
2012	73	85.9%	7	8.2%	4	4.7%	1	1.2%	85
2013	73	85.9%	7	8.2%	4	4.7%	1	1.2%	85
2014	73	85.9%	7	8.2%	4	4.7%	1	1.2%	85
2015	73	85.9%	7	8.2%	4	4.7%	1	1.2%	85
2016	60	81.1%	8	10.8%	4	5.4%	2	2.7%	74
2017	60	81.1%	8	10.8%	4	5.4%	2	2.7%	74
Table 2-20: Based Aircraft Fleet Mix (continued)									
Year	**Single**		**Jet**		**Multiengine**		**Helicopter**		**Total**
	#	**%**	**#**	**%**	**#**	**%**	**#**	**%**	
Forecast									
2022	66	80.5%	9	11.0%	5	6.1%	2	2.44%	82
2027	70	78.7%	9	10.1%	7	7.9%	3	3.37%	89
2032	74	78.7%	10	10.6%	7	7.4%	3	3.19%	94
2037	76	76.8%	11	11.1%	8	8.1%	4	4.04%	99

Source: 2017 FAA TAF, Mead & Hunt, 5010

2.8 General Aviation Operations

GA operations are important to consider as they make up an average of 62 percent of operations at LSE. GA operations forecasts were prepared by referencing the FAA TAF and utilizing two forecasting methodologies, the market share and operations per based aircraft (OPBA) methodologies.

2.8.1 FAA TAF

The TAF historical and forecast operations are shown in **Table 2-21**. The TAF expects that itinerant operations will remain constant, but local operations will gradually decrease. Combined, this results in a total of 11,605 annual GA operations by the end of the planning period, or a CAGR of -0.19 percent. This gradual decrease is consistent with national trends discussed in Section 2.5 due to piston aircraft becoming less common.

Table 2-21: General Aviation Forecast – FAA TAF

Year	Itinerant	Local	Total
2007	12,944	8,320	21,264
2008	10,478	5,732	16,210
2009	10,169	5,396	15,565
2010	9,943	6,097	16,040
2011	8,840	4,126	12,966
2012	9,644	4,260	13,904
2013	8,288	3,292	11,580
2014	7,875	3,003	10,878
2015	9,712	5,792	15,504
2016	8,647	4,786	13,433
2017	8,220	3,829	12,049
CAGR	*-4.44%*	*-7.47%*	*-5.52%*
2022	7,821	3,619	11,440
2027	7,821	3,674	11,495
2032	7,821	3,729	11,550
2037	7,821	3,784	11,605
CAGR	*-0.25%*	*-0.06%*	*-0.19%*

Source: 2017 FAA Terminal Area Forecast

2.8.2 Market Share

The market share forecast projects growth at LSE as a portion of the total projected GA growth in Wisconsin. As scheduled air service tends to change the dynamic and number of GA operations, only other commercial service airports in Wisconsin were selected for comparison, as this better reflects the operating conditions at LSE. As shown in **Table 2-22,** this methodology projects modest growth of 0.40 percent to 13,057 operations by the end of the planning period.

Table 2-22: GA Operations – Market Share

Year	LSE	Total WI	Percentage
Historical			
2007	21,264	268,979	7.9%
2008	16,210	248,214	6.5%
2009	15,565	212,483	7.3%
2010	16,040	217,332	7.4%
2011	12,966	188,550	6.9%
2012	13,904	195,718	7.1%
2013	11,580	172,636	6.7%
2014	10,878	158,071	6.9%
2015	15,504	164,991	9.4%
2016	13,433	175,009	7.7%
2017	12,049	168,027	7.2%
CAGR / Average	*-5.52%*	*-4.60%*	*7.4%*
Forecast			
2022	12,554	169,655	7.4%
2027	12,717	171,856	
2032	12,885	174,116	
2037	13,057	176,446	
CAGR / Average	*0.40%*	*0.24%*	*7.4%*

Source: 2017 FAA TAF

2.8.3 Operations per Based Aircraft

The number of GA operations at an airport is partially influenced by the number of based aircraft. As shown below in **Table 2-23**, operations per based aircraft at LSE have decreased from a recent high of 234 before the 2008 recession to 182 in 2017. The average operations per based aircraft (OPBA) of 163 was taken from 2009 to 2017 to reflect recent conditions and this ratio was applied to the preferred based aircraft forecast to determine future GA operations. Using this methodology, a total of 16,180 operations are estimated to occur annually by the end of a planning period.

Table 2-23: GA Operations – OPBA			
Year	**Total**	**Based Aircraft**	**OPBA**
Historical			
2007	21,264	91	234
2008	16,210	91	178
2009	15,565	91	171
2010	16,040	84	191
2011	12,966	84	154
2012	13,904	85	164
2013	11,580	85	136
2014	10,878	85	128
2015	15,504	85	182
2016	13,433	74	182
2017	12,049	74	163
CAGR	*-5.52%*	*-2.05%*	*163*
Forecast			
2022	13,401	82	163
2027	14,545	89	
2032	15,363	94	
2037	16,180	99	
CAGR	*1.48%*	*1.47%*	*163*

Sources: 2017 FAA TAF, 5010 and Mead & Hunt

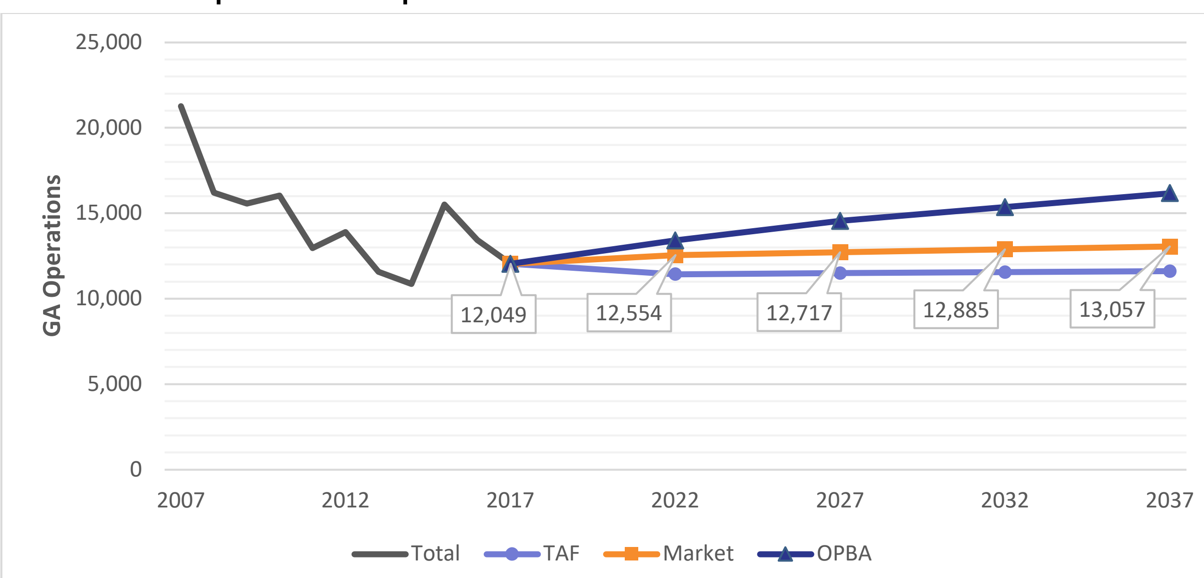
2.8.4 Preferred GA Operations Forecast.

The forecasts described above are compared in **Table 2-24** and **Chart 2-10**. Although based piston aircraft have decreased at the Airport for the past decade, turbine aircraft have remained and business activity in La Crosse is strong. Several local businesses store turbine aircraft at LSE and it is unlikely that their operations will decrease over time. Due to the businesses present at LSE, the TAF was removed from consideration. However, due to decreases in piston aircraft it is unlikely that LSE will see a significant increase in GA operations, but will support business aircraft on longer and more frequent trips. For this reason, the OPBA was dismissed from consideration. The Market Share forecast exhibits modest growth over the planning period which reflects expected increasing turbine activity and decreasing piston activity. For these reasons the Market Share forecast is selected as the preferred forecast.

Table 2-24: Preferred GA Operations Forecast			
Year	**TAF**	**Market**	**OPBA**
2017	12,049	**12,049**	12,049
2022	11,440	**12,554**	13,401
2027	11,495	**12,717**	14,545
2032	11,550	**12,885**	15,363
2037	11,605	**13,057**	16,180
CAGR	*-0.19%*	***0.40%***	*1.48%*

Sources: 2017 FAA TAF, 5010 and Mead & Hunt

Chart 2-10: GA Operations Comparison



Sources: 2017 FAA TAF, 5010 and Mead & Hunt

The proportion of itinerant versus local GA operations has remained relatively consistent over the years and is expected to remain near a 67/33 split as shown in **Table 2-25** below.

Table 2-25: Itinerant/Local GA Operations Split Forecast

Year	Total GA Operations	Itinerant		Local	
2017	12,049	8,220	68%	3,829	32%
2022	12,554	8,411	67%	4,143	33%
2027	12,717	8,520	67%	4,197	33%
2032	12,885	8,633	67%	4,252	33%
2037	13,057	8,748	67%	4,309	33%

2.9 Military Operations

There is a small but consistent military presence at LSE. In the past decade, military operations have made up between 3.4 percent and 9.3 percent of total Airport operations, with an average of 5.9 percent. Aircraft type can vary but usually consists of medium sized turbine jets, such as the Cessna Citation, military helicopters and large cargo aircraft, such as the C130 Hercules. Historical military operations are shown in **Table 2-26** for reference. The FAA TAF projects 307 itinerant and 310 local military operations per year through 2037, a total of 617 operations and just under 5 percent of total LSE operations for the duration of the planning period. Although this is slightly below recent historic data, the preferred forecast methodology for military operations is the FAA TAF as military operations are driven more by federal policy decisions than local conditions.

Table 2-26: Historical Military Operations

Year	Itinerant	Local	Total
2007	890	1,109	1,999
2008	787	1,210	1,997
2009	739	642	1,381
2010	718	872	1,590
2011	654	1,190	1,844
2012	795	1,408	2,203
2013	670	663	1,333
2014	655	926	1,581
2015	637	1,077	1,714
2016	428	690	1,118
2017	307	310	617

Sources: 2017 FAA TAF

2.10 Peak Activity Forecasts

Annual forecasts of passenger activity and aircraft operations may not adequately describe the complex needs of airport facilities. Annual metrics are only useful when activity tends to be evenly distributed over the hours, days, and months of the year. However, most airports have peak periods when demand surpasses annual averages. As a result, it is important to identify and forecast peak period activity levels.

Peak activity forecasts are presented in the following sections so that Chapter 3, *Facility Requirements*, can determine what facilities will be required to accommodate the peak demand. However, if planning is contingent on the absolute busiest periods of activity, it can lead to overestimation, overspending, and inefficiencies. As a result, these peak activity forecasts focus on the average day during the peak months for passenger and aircraft activity, rather than the absolute peak day. It should also be noted that analysis of peak enplanements should not be contingent on charter activity due to the less predictable nature of charter operations and associated enplanements.

2.10.1 Peak Passenger Activity

Peak activity forecasts should identify the "design hour" flow of passengers and aircraft. The design hour is an estimate of the peak hour of the average day of the busiest month. This approach provides sufficient facility capacity for most days of the year. The first step in this process is to determine the peak month. During the previous decade, August was most frequently the peak month with an average of 9.7 percent of annual enplanements, as shown in **Table 2-27**.

Table 2-27: Historic Monthly Passenger Enplanements

Month	Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	8.1%	8.1%	7.3%	7.2%	8.1%	7.2%	7.2%	6.8%	7.5%	7.9%	6.9%
February	7.4%	8.5%	7.3%	7.4%	7.6%	7.6%	7.0%	6.7%	7.4%	7.4%	7.2%
March	8.7%	9.5%	8.4%	8.5%	8.9%	8.9%	7.5%	8.1%	8.8%	8.3%	8.4%
April	8.5%	8.5%	8.2%	8.1%	8.2%	8.7%	8.4%	8.4%	8.6%	8.2%	8.4%
May	8.8%	9.4%	8.4%	8.0%	8.6%	9.3%	9.0%	8.4%	9.3%	9.0%	8.5%
June	8.8%	9.3%	10.3%	9.5%	9.4%	10.8%	8.7%	9.3%	8.8%	9.2%	8.9%
July	8.8%	8.9%	9.6%	9.1%	8.5%	9.1%	9.0%	9.6%	9.0%	8.9%	8.5%
August	**9.1%**	**8.5%**	**10.5%**	**9.9%**	**10.4%**	**9.1%**	**10.7%**	**10.4%**	**9.2%**	**9.6%**	**9.8%**
September	8.6%	7.2%	7.8%	8.2%	7.8%	7.5%	8.1%	9.0%	7.8%	8.0%	7.9%
October	8.5%	8.5%	8.4%	9.0%	8.3%	8.3%	8.7%	8.5%	8.5%	8.8%	8.5%
November	7.8%	6.6%	6.9%	8.0%	7.5%	7.3%	8.0%	7.3%	7.5%	7.7%	8.1%
December	7.0%	7.0%	6.9%	7.3%	6.8%	6.1%	7.8%	7.6%	7.6%	7.1%	7.6%

Peak activity forecasts should include both enplanements and deplanements to account for the total number of passengers in the terminal during the design hour. For the purpose of this forecast, it is assumed that enplanements and deplanements are equal during the peak month. The estimated 9.7 percent peak month percentage is applied to the preferred enplanement forecast in **Table 2-28**. A steady increase in peak month activity is expected throughout the planning period, from 9,016 passengers in 2017 to 11,738 passengers in 2037.

Table 2-28: Peak Month Passenger Activity Forecast

Year	Annual Enplanements	Peak Month % of Total	Peak Month		
			Enplanements	Deplanements	Total Monthly
2017	92,951	9.7%	4,508	4,508	9,016
2022	99,288	9.7%	4,815	4,815	9,631
2027	106,058	9.7%	5,144	5,144	10,288
2032	113,288	9.7%	5,494	5,494	10,989
2037	121,012	9.7%	5,869	5,869	11,738

The peak month forecast can be further divided into days. Peak month activity is divided by 31 to determine the average number of daily passengers. As approximately 30% of airline departures at LSE occur during the peak hour, this percentage was used to determine the peak hour number of passengers at LSE. By 2037, 114 passengers are projected during the peak hour, as shown in **Table 2-29**.

Table 2-29: Peak Day & Peak Hour Passenger Activity Forecast

Year	Peak Month Passengers	Average Day Passengers	Peak Hour %	Peak Hour Passengers
2017	9,016	291	30%	87
2022	9,631	311	30%	93
2027	10,288	332	30%	100
2032	10,989	354	30%	106
2037	11,738	379	30%	114

2.10.2 Peak Aircraft Operations

Similar to peak enplanements, the peak aircraft operations forecast identifies expected operations within the peak hour. Data from the FAA TFMSC database over the past decade was analyzed to determine the peak month for operations. Peak operations usually occurred in August with an average of 9.9 percent of annual operations, as shown in **Table 2-30.**

Table 2-30: Historic Monthly Operations

Month	Year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
January	7.4%	7.4%	7.6%	7.0%	8.3%	6.8%	6.7%	6.6%	6.8%	7.3%	6.3%
February	7.0%	7.0%	7.2%	6.5%	7.0%	6.9%	6.2%	6.6%	6.6%	7.5%	7.0%
March	8.2%	8.2%	8.0%	7.6%	8.4%	8.4%	6.8%	7.7%	8.0%	8.5%	8.2%
April	8.5%	8.5%	8.3%	8.1%	7.4%	8.9%	7.9%	8.8%	9.6%	8.1%	8.3%
May	8.8%	8.8%	9.0%	8.1%	8.6%	9.1%	9.1%	9.2%	9.8%	8.7%	8.6%
June	9.1%	9.1%	8.9%	9.6%	9.6%	10.1%	9.4%	9.3%	9.2%	8.8%	9.7%
July	8.8%	8.8%	9.0%	9.8%	9.4%	9.5%	10.2%	9.5%	9.6%	9.8%	9.3%
August	**9.2%**	**9.2%**	**9.2%**	**9.8%**	**9.8%**	**9.8%**	**11.0%**	**10.1%**	**9.6%**	**10.3%**	**10.7%**
September	9.3%	9.3%	8.5%	9.0%	9.0%	8.8%	9.2%	9.0%	8.3%	8.3%	8.6%
October	9.6%	9.6%	8.9%	8.8%	8.3%	8.4%	8.9%	8.7%	8.0%	8.6%	8.5%
November	7.3%	7.3%	8.5%	8.2%	7.7%	7.4%	7.7%	7.1%	7.2%	7.3%	7.3%
December	6.8%	6.8%	6.9%	7.5%	6.6%	6.0%	6.9%	7.5%	7.3%	6.8%	7.4%

The peak month percentage share of operations was applied to the total annual operations expected at the Airport through 2037. Takeoffs and landings, each of which represent one operation, were derived by dividing peak month operations by two. The peak month operations forecast is shown in **Table 2-31**. Peak month operations are projected to increase to a total of 1,925 operations by 2037.

Table 2-31: Peak Month Operations Forecast

Year	Total Annual Operations	Peak Month % of Total	Peak Month Operations		
			Takeoffs	Landings	Total
2017	18,034	9.9%	893	893	1,785
2022	18,634	9.9%	922	922	1,845
2027	18,894	9.9%	935	935	1,871
2032	19,164	9.9%	949	949	1,897
2037	19,440	9.9%	962	962	1,925

Peak month operations were divided by 31, the number of days in the peak month, to derive peak month average day operations. Like the passenger forecast, 30% of daily operations are believed to occur within the peak hour, as shown in **Table 2-32**.

Table 2-32: Peak Day & Peak Hour Operations Forecast				
Year	**Peak Month Operations**	**Average Day Operations**	**Peak Hour %**	**Peak Hour Operations**
2017	1,785	58	30%	17
2022	1,845	60	30%	18
2027	1,871	60	30%	18
2032	1,897	61	30%	18
2037	1,925	62	30%	19

2.11 Forecasts Summary and TAF Comparison

Below, **Table 2-33** shows each of the selected forecasts along with the projected year and associated PAL. These PALs will be used in the following chapters to provide phasing thresholds for facility improvements and alternatives. This will aid future planning efforts regardless of the year in which they occur and should increase the longevity of this master plan.

Table 2-33: PALs Summary							
PAL	**Projected Year**	**Enplanements**	**Peak Hour Enplanements**	**Based Aircraft**	**Commercial Operations**	**GA Operations**	**Peak Hour Operations**
Current	2017	92,951	87	74	5,368	12,049	17
I	2022	99,288	93	82	5,463	12,554	18
II	2027	106,058	100	89	5,560	12,717	18
III	2032	113,288	106	94	5,662	12,885	18
IV	2037	121,012	114	99	5,766	13,057	19

Finally, the FAA templates for summarizing and documenting airport planning forecasts, and for comparing forecasts with the FAA TAF, are presented in **Table 2-34** and **Table 2-35**. The forecasts presented in this chapter will be used in combination with findings in the first chapter to determine facility requirements at the Airport in Chapter 3.

Table 2-34: LSE TAF and Master Plan Forecast Comparison

Year	Master Plan	TAF	% Difference
Passenger Enplanements			
2017	92,951	88,862	4.60%
2022	99,288	93,225	6.50%
2027	106,058	97,812	8.43%
2032	113,288	102,631	10.38%
Commercial Operations			
2017	5,368	5,199	3.25%
2022	5,463	5,345	2.21%
2027	5,560	5,495	1.18%
2032	5,662	5,645	0.30%
Total Operations			
2017	18,034	17,865	0.95%
2022	18,634	17,402	7.08%
2027	18,894	17,607	7.31%
2032	19,164	17,812	7.59%

Table 2-35: LSE Forecast Summary

	Year					Average Annual Compound Growth Rates			
	2017	**2022**	**2027**	**2032**	**2037**	**Base Yr. to +5**	**Base Yr. to +10**	**Base Yr. to +15**	**Base Yr. to +20**
Passenger Enplanements									
TOTAL Air Carrier & Commuter	92,951	99,288	106,058	113,288	121,012	1.33%	1.33%	1.33%	1.33%
Operations									
Itinerant									
Air carrier	378	3,099	4,342	4,602	4,648	52.32%	27.65%	18.13%	13.37%
Commuter/Air Taxi	4,990	2,364	1,218	1,060	1,118	-13.88%	-13.15%	-9.81%	-7.21%
Total Commercial	5,368	5,463	5,560	5,662	5,766	0.35%	0.35%	0.36%	0.36%
General aviation	8,220	8,411	8,520	8,633	8,748	0.46%	0.36%	0.33%	0.31%
Military	307	307	307	307	307	0.00%	0.00%	0.00%	0.00%
Local									
General aviation	3,829	4,143	4,197	4,252	4,309	1.59%	0.92%	0.70%	0.59%
Military	310	310	310	310	310	0.00%	0.00%	0.00%	0.00%
TOTAL OPERATIONS	18,034	18,634	18,894	19,164	19,440	0.66%	0.47%	0.41%	0.38%
Peak Hour									
Operations	17	18	18	18	19	1.15%	0.57%	0.38%	0.56%
Enplanements	87	93	100	106	114	1.34%	1.40%	1.33%	1.36%
Based Aircraft									
Single Engine (Nonjet)	60	66	70	74	76	1.92%	1.55%	1.41%	1.19%
Multi Engine (Nonjet)	4	5	7	7	8	4.56%	5.76%	3.80%	3.53%
Jet Engine	8	9	9	10	11	2.38%	1.18%	1.50%	1.61%
Helicopter	2	2	3	3	4	0.00%	4.14%	2.74%	3.53%
Other	0	0	0	0	0	-	-	-	-
TOTAL	74	82	89	94	99	2.07%	1.86%	1.61%	1.47%
Operations Factors									
Average aircraft size (seats)	56.8	63.9	70.2	71.6	72.4				
Average enplaning load factor	82.0%	82.3%	82.7%	83.5%	84.3%				
GA OPBA	163	153	143	137	132				

CHAPTER 3

Facility Requirements

3.1 Introduction

This chapter evaluates existing facilities at the La Crosse Regional Airport (LSE) to determine their ability to accommodate forecasted activity and demand. Alternatives for addressing shortfalls identified in this chapter will be presented and compared in Chapter 4, *Alternatives*. The following sections address in detail the items listed below:

- Airfield Capacity Analysis
- Runways
- Taxiway Geometry
- Instrument Approach Procedures
- Air Traffic Control Tower (ATCT)
- General Aviation User Survey
- General Aviation Facilities
- Terminal Area
- SRE and Maintenance Facilities
- ARFF Facilities
- Summary

3.2 Airfield Capacity Analysis

Long-term planning requires the Airport to assess its ability to meet forecasted demand. Annual Service Volume (ASV) is a metric commonly used to identify deficiencies in airfield capacity. Once the ASV has been calculated and compared to the forecasts of future demand, capital improvement needs such as land acquisition and operational capacity expansion, including additional runways or the extension and improvement of existing runways, can be determined. The Federal Aviation Administration (FAA) defines airfield capacity in Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay,* as the maximum number of aircraft operations that a given airport configuration can accommodate during a given time interval of continuous demand. Several factors affect this derived level of capacity, including weather conditions, runways and their configuration, exit taxiways and their configuration, types of aircraft utilizing a facility, time of day, and the air traffic control facilities handling the procedures.

The analysis summarized in this section was conducted using the FAA guidelines contained in AC 150/5060-5 to estimate and evaluate the following airfield capacity metrics:

- **Peak hourly capacity** – The maximum number of aircraft operations that can occur on an airport in an hour, given specified weather conditions.
- **Annual Service Volume (ASV) –** An estimate of an airport's annual capacity that accounts for runway use, aircraft mix, weather conditions, and other factors that would be encountered over the course of a year. The ASV also assumes an acceptable level of aircraft delay as described in FAA AC 150/5060-5, which is used in this analysis.

The full analysis is available in **Appendix G** while the remainder of this section provides a summary of the estimate for LSE's annual operational capacity, compares it to forecasted growth, and determines whether capacity improvements are needed to accommodate forecasted growth. The capacity analysis only considers the combined capacity of Runway 18/36 and Runway 13/31 and does not consider Runway 04/22. Based on this analysis, the combined ASV for Runway 18/36 and Runway 13/31 is 150,651 annual operations. The AC does not provide guidance for estimating change in ASV over time. Therefore, a typical airfield capacity analysis fixes ASV at a given number (such as 150,651 operations) throughout the planning period, instead of flexing with operational demand. **Table 3-1** shows the results for comparison of aircraft operations forecasts to the ASV to determine if and when LSE will need additional airfield capacity.

Table 3-1: Forecasted Operations as a Percentage of ASV

Year	Operations	Percentage of ASV
2017	18,034	12.0%
2022	18,634	12.4%
2027	18,894	12.5%
2032	19,164	12.7%
2037	19,440	12.9%

ASV = Annual Service Volume
Source: Mead & Hunt, Inc.

Current guidelines from the FAA National Plan of Integrated Airport Systems (NPIAS) direct airport sponsors to consider airfield capacity improvements when activity reaches 60 percent to 75 percent of the airport's ASV. This guidance is conservative and allows adequate lead time for environmental reviews, land purchases, and other necessary actions that can take up to 10 or more years to complete and could theoretically place activity at 80 percent of the ASV by the time improvements are implemented.

The preferred forecasts presented in Chapter 2 result in 12.9 percent of ASV being reached by the end of the planning period. The airfield is expected to provide adequate capacity because aircraft operations are not forecasted to reach 60 percent of ASV by the end of the planning period. Therefore, planning for additional airfield capacity is not necessary. Furthermore, because the analysis only considers the capacity of Runways 18/36 and 13/31, the results of this analysis indicate that Runway 04/22 is not a necessary runway based on current and forecasted capacity needs.

In addition to determining the need for Runway 04/22 from an airfield capacity standpoint, a similar analysis was conducted to determine whether Runway 13/31 plays an important airfield capacity role. Runway 13/31 serves as a crosswind runway based on the analysis conducted in this Master Plan; however, it should also be determined whether this runway is needed from a capacity standpoint. The same process as above was conducted for Runway 18/36 as if it were the only runway at the Airport. The full details of this analysis are also available in **Appendix G**.

Runway 18/36 alone has an ASV of 107,016 annual operations. This is 16.9 percent of ASV in the base year and would reach 18.2 percent of ASV by the end of the planning period. This means that Runway 13/31 is not currently needed from a capacity standpoint but these findings will need to be revisited periodically as the Airport continues to evolve.

As the planning period extends out, recommended actions and level of certainty tend to decrease. In general, facility requirements that are forecasted to occur within one to five years should result in immediate action. For facility requirements forecasted between five and ten years in the future, such improvements should be seriously considered and integrated with initial designs. Finally, for requirements forecasted between 10 and 20 years, there should be an integration of needs into the general planning framework. Planning beyond 20 years makes valid conclusions difficult when considering capacity-related needs.

3.3 Runways

This section discusses runway requirements at LSE including:

- AIP runway classifications
- Design aircraft
- Wind coverage
- Runway length
- Runway design standards

3.3.1 AIP Runway Classifications and Eligibility

Each runway at a federally eligible airport has a designated critical aircraft and classification. The role and selection process for critical aircraft has been previously discussed and is applied to each runway in the following sections. However, runway classification should also be considered.

The FAA and local Airport District Office (ADO) fund runway projects based on the runway classification. Because a runway's classification is a dominant influence in its eligibility for federal funding, the classification of each runway at LSE should be considered and determined. The current runway definitions, as defined by FAA Order 5100.38D, *Airport Improvement Program (AIP) Handbook*, are shown in **Table 3-2**. All runway types except additional runways may be eligible for AIP funding if the particular needs of an Airport are supported by the FAA.

Table 3-2: AIP Runway Types and Eligibility

Runway Type	Criteria	Federal Funding
Primary	A single runway is eligible for development consistent with FAA design and engineering standards	Eligible
Crosswind	Either the primary runway crosswind coverage is less than 95 percent and/or the primary runway is operating at 60 percent of more of ASV	Eligible if justified
Secondary	The primary runway is operating at 60 percent or more Annual Service Volume (ASV) and/or it has been determined that the runway is required for airfield operation	Eligible if justified
Additional	This runway does not meet any of the above criteria	Ineligible

Source: FAA Order 5100.38D, Airport Improvement Program (AIP) Handbook

- **Runway 18/36** supports the greatest spectrum of aircraft at LSE due its greater length and the Instrument Landing System (ILS) approach to Runway 18. Runway 18/36 is therefore classified as the primary runway at LSE.
- **Runway 13/31** currently plays the role of a secondary runway, as it commonly used for its length and not only its crosswind coverage. However, Runway 18/36 does not currently operate at greater than 60 percent of its ASV (Section 3.2). Therefore, Runway 13/31 is currently categorized by the FAA as a crosswind runway. More information on crosswind coverage is provided in Section 3.3.3.
- **Runway 04/22** is categorized as an additional runway since it is not required from a capacity or crosswind standpoint.

3.3.2 Design Aircraft

Facilities at an airport should be designed to accommodate the most demanding aircraft expected to use the facility (e.g. runway or taxiway) on a regular basis. According to AC 150/5000-17, *Critical Aircraft and Regular Use Determination,* regular use is defined as 500 annual operations, including both itinerant and local operations, but not touch-and-go operations. In the AC, this aircraft is referred to as the design aircraft, and it is crucial to identify during the planning process. If no single aircraft is the most demanding aircraft, a grouping of aircraft with similar characteristics that make regular use of the airport can be used. Design aircraft within a specific grouping include those with comparable operational performance characteristics and/or physical dimensions. According to the AC, a separate design aircraft determination should be made for each runway.

Design aircraft are categorized according to Runway Design Code (RDC), which signifies the design standards to which a runway is to be built. The RDC is a combination of an Approach Aircraft Category (AAC), an Aircraft Design Group (ADG), and the approach visibility minimums of the runway in question. The AAC relates to aircraft approach speed, while ADG is based on aircraft wingspan and tail height. The AAC and ADG are based on the fastest and largest aircraft, respectively, that are expected to operate on the runway and adjacent taxiways on a regular basis (500 operations per year). **Table 3-3** defines AAC parameters and **Table 3-4** defines ADG parameters. Visibility minimums are expressed by runway visual range (RVR) values in increments of 1,200, 1,600, 2,400, 4,000, and 5,000 feet.

Table 3-3: Aircraft Approach Category (AAC)

AAC	Vref / Approach Speed
A	Approach speed less than 91 knots
B	Approach speed 91 knots or more but less than 121 knots
C	Approach speed 121 knots or more but less than 141 knots
D	Approach speed 141 knots or more but less than 166 knots
E	Approach speed 166 knots or more

Source: FAA Advisory Circular 150/5300-13A, Airport Design.

Table 3-4 Airplane Design Groups

Group	Tail Height	Wingspan
I	Less than 20 feet	Less than 49 feet
II	20 feet to less than 30 feet	49 feet to less than 79 feet
III	30 feet to less than 45 feet	79 feet to less than 118 feet
IV	45 feet to less than 60 feet	118 feet to less than 171 feet
V	60 feet to less than 66 feet	171 feet to less than 214 feet
VI	66 feet to less than 80 feet	214 feet to less than 262 feet

Source: FAA Advisory Circular 150/5300-13A, Airport Design.

According to the Traffic Flow Management System Count (TFMSC) database there were a combined 3,769 operations at LSE by the 50-seat CRJ200 and the 70-seat CRJ700 in 2018, both of which are C-II aircraft. The 50-seat Embraer 145, also a C-II aircraft, and the 184-seat Boeing 737, a D-III aircraft, conducted most of the remaining commercial passenger operations. Air carriers are shifting toward larger aircraft as technological advances allow for increased seating capacity while burning less fuel per seat, following the industry trends discussed in Chapter 2. This is already occurring at LSE as American Airlines began using the CRJ700 for its Chicago service in early 2018. Air carriers are expected to complete the transition away from 50-seat aircraft by the mid-2020s. Therefore, it is wise to plan beyond the CRJ200 to consider other aircraft with a greater than a 50-seat capacity. **Table 3-5** shows the existing commercial fleet and possible future replacement aircraft for the CRJ200 at LSE.

Table 3-5: Existing and Potential Commercial Fleet Mix

Aircraft Type	Maximum Seating	Runway Design Code	Approach Speed (knots)	Wingspan (feet, inches)	Tail Height (feet, inches)
Existing					
Bombardier CRJ200	50	C-II	135	69’	20’
Bombardier CRJ700	70	C-II	137	76’	24’
Embraer 145	50	C-II	135	65’	22’
Boeing 737-800	184	D-III	141	113’	41’
Potential					
Airbus A220-100	133	C-III	129	115’ 1”	37’ 9”
Airbus A319	156	C-III	126	112’	38‘ 7”
Airbus A320	180	C-III	136	117‘ 5”	38‘ 7”
Boeing 717	134	D-III	143	93‘ 4”	28‘ 9”
Bombardier CRJ900	86	C-III	140	81’	24’
Embraer 170	78	C-III	124	85’	32’
Embraer 175	86	C-III	124	85’	31’
Embraer 175-E2	114	C-III	124	101’ 8”	36’ 8”
Mitsubishi MRJ70[1]	80	Unknown	Unknown	95’ 10”	34’ 2”
Mitsubishi MRJ90[1]	92	Unknown	Unknown	95’ 10”	34’ 2”

1 The Mitsubishi MRJ70 and MRJ90 are still in testing. At this time the performance characteristics of these aircraft are unknown.
Source: Airport Planning Manuals, Aircraft Manufacturers.

Runway 18/36

As the primary runway, Runway 18/36 supports the most demanding aircraft at LSE, offers superior instrument approaches, and provides a convenient taxi route to terminal. For these reasons, Runway 18/36 supported 98.5 percent of all operations by aircraft classified as large commuter or large jet during a five-month survey conducted by the local ATCT in late 2018. Large commuter include any large non-jet or regional jets that weigh more than 41,000 pounds and up to 255,000 pounds, while the "large jet" category includes any other jet aircraft of this same weight and is intended to account for narrow-body jet aircraft such as the Boeing 737 or Airbus A320. All of the existing commercial fleet aircraft shown in Table 3-5 fall within these two categories. As these aircraft favor Runway 18/36 and most operations in these categories are C-II operations conducted by regional jets, C-II is the applicable current critical aircraft for this runway. Because Runway 18/36 is the primary runway, this is also selected as the existing critical aircraft for the Airport.

As previously stated, the design aircraft is likely to change during the planning period as larger aircraft with more than 60 seats, such as the CRJ900 and similar sized aircraft, are operated in smaller markets like LSE on a more regular basis. This transition is illustrated by the introduction of CRJ700 aircraft to replace some of the CRJ200 operations at LSE. Since air carrier aircraft, by definition, have more than 60 seats, this transition from C-II aircraft, such as the CRJ200, to C-III aircraft, such as the CRJ900, can clearly be seen in the commercial forecast from the previous chapter, shown in **Table 3-6**.

Table 3-6: Commercial Operations Forecast

Year	Air Carrier	Commuter	Air Taxi	Total
2017	378	4,088	902	5,368
2022	3,099	1,412	952	5,463
2027	4,342	214	1,004	5,560
2032	4,602	0	1,060	5,662
2037	4,648	0	1,118	5,766

Sources: Mead & Hunt, OPSNET database, TFMSC database

Air carrier aircraft have an existing, but not overwhelming presence at LSE. However, as the fleet mix continues to evolve following national trends, this category is expected to become the dominant share of commercial operations at the Airport. Aircraft larger than the existing commuter aircraft like the CRJ200 or ERJ145 are expected to be used for all scheduled passenger operations by 2032. Expected replacements for these aircraft are the CRJ900, ERJ170 and ERJ 175, all of which fall in the C-III category. Therefore C-III is selected as the future design aircraft family for this runway. Because Runway 18/36 is the primary runway, this is also selected as the future critical aircraft for the Airport.

Runway 13/31

Although regional air carriers and business jets will most often utilize Runway 18/36, these aircraft also use Runway 13/31. During the five months of activity sampling in 2018, 453 aircraft in the medium commuter category (aircraft weighing more than 12,500 pounds and up to 41,000 pounds) arrived at the Airport under an Instrument Flight Rules (IFR) flight plan. Most of these aircraft use Runway 18/36 but a significant portion use Runway 13/31, which has slightly better wind coverage and a shorter taxi distance to the GA facilities than Runway 18/36. ATCT staff recorded 45 IFR operations by medium commuter aircraft and 16 IFR operations by large commuter aircraft on Runway 13/31 during this five-month period. Small aircraft (aircraft weighing less than 12,500 pounds) use Runway 13/31 more frequently and 72 IFR small aircraft operations were recorded on Runway 13/31 during this period. Business aircraft may fall in the small aircraft category although the medium commuter category is more common. These aircraft have a strong presence at LSE, can utilize Runway 18/36 or Runway 13/31, and a representative sample of these aircraft is shown in **Table 3-7**.

Table 3-7: Business Aircraft Fleet Mix at LSE

Aircraft Type	Maximum Seating	Runway Design Code	Approach Speed (knots)	Wingspan (feet, inches)	Tail Height (feet, inches)
Pilatus PC-12	11	A-II	121	52’ 2”	15’ 0”
Cessna 501 Citation	7	B-I	109	46‘ 11”	13‘ 9”
Challenger 300	9	C-II	125	63‘ 10”	20’
Challenger 350	9	C-II	125	69’ 0”	20’
Challenger 600	19	C-II	125	64‘ 4”	20‘ 9”
Gulfstream IV	26	C-II	125	77‘ 10”	24‘ 5”

As the ATCT sample only considered instrument operations, it is reasonable to expect that most operations during this sample occurred on Runway 18, as it has the sole Instrument Landing System (ILS) approach on the Airport. Due to the nature of this instrument-only sample, it can be safely assumed that a higher percentage of operations would be conducted to other runway ends during visual flight conditions due to the presence of the ILS on Runway 18 and better crosswind coverage on Runway 13/31. Due to the strong presence of business aircraft at LSE and some utilization of Runway 13/31 by regional air carriers, the current design aircraft family for this runway should be C-II. As air carriers increase their use of larger aircraft this runway is expected to change to C-III by the end of the planning period.

Runway 04/22

Runway 04/22 serves a variety of primarily GA aircraft that will be discussed further in Sections 3.7 and 3.8. **Table 3-8** outlines the representative fleet mix for Runway 04/22.

Table 3-8: Existing Small GA Fleet Mix for Runway 04/22

Aircraft Type	Maximum Seating	Runway Design Code	Approach Speed (knots)	Wingspan (feet, inches)	Tail Height (feet, inches)	Maximum Takeoff Weight (pounds)
Taylorcraft BC-12-D	2	A-I	39	36’	6.5’	1,200
Cessna 170B	4	A-I	61	36’	6’ 7”	2,200
Cessna 172M Skyhawk	4	A-I	65	36’	8‘ 10”	2,300
Cessna 205 Stationair	6	A-I	78	36’	9‘ 4”	3,300
Cessna 310	6	A-I	89	36’ 11”	11’	5,300
Piper PA28 Archer	4	A-I	66	35’	7’ 6”	2,550
Piper PA28 Cherokee	4	A-I	56	30’	8’ 4”	2,150
Piper PA30B Twin Comanche	6	A-I	83	36’	8’ 3”	3,600
Vans RV-4	2	A-I	60	23’	5’ 5”	1,550
Vans RV-6A	2	A-I	70	23’	6’ 8”	1,650
Zenith Zodiac	2	A-I	55	27’	6’ 5”	1,322
Cessna 421 Golden Eagle	6	B-I	100	41‘ 1.5”	12‘ 11”	7,450

Nearly all aircraft that use Runway 04/22 have a maximum gross weight of 12,500 pounds or less. An aircraft with this weight or less is categorized by FAA as a *small aircraft*. For planning purposes, the design aircraft for Runway 04/22 should be small aircraft exclusively. Therefore, Runway 04/22 should be designated as a “utility runway,” which the FAA defines as a runway designed for propeller driven aircraft with a maximum gross weight of 12,500 pounds or less. While there are significant jet and turboprop operations at LSE**,** the GA user survey results indicate that jets and other larger aircraft almost always use either Runway 18/36 or Runway 13/31 due to the poor pavement condition on Runway 04/22.

Design Aircraft Summary

Table 3-9 summarizes the existing and ultimate design aircraft and RDC for each runway at LSE. Runway 13/31 may be designed to a higher standard than currently justified by regular use (500 aircraft operations), although this is difficult to establish based on the limited IFR-only operations sample provided by the ATCT. In this instance, federal funding eligibility would likely only be justified for the RDC designation based on regular use, despite the runway currently meeting more demanding runway design standards. Additional discussion on design standards for each runway can be found in Section 3.3.5.

Table 3-9: Existing and Ultimate RDC by Runway

Runway	Design Aircraft	RDC
Existing		
Runway 18/36	Bombardier CRJ200	C-II-2400
Runway 13/31	Bombardier CRJ200 and Business Jets	C-II-5000
Runway 04/22	Cessna 421 Golden Eagle	B-I-5000
Ultimate		
Runway 18/36	Bombardier CRJ900	C-III[1]
Runway 13/31	Bombardier CRJ900	C-III[1]
Runway 04/22	Cessna 421 Golden Eagle	B-I-5000

1 The RVR components of the ultimate RDCs will be dependent on achievable approach visibility minimums for each runway, which will be studied further in Chapter 4.

Source: Mead & Hunt, Inc.

3.3.3 Wind Coverage

Aircraft typically take off and land into the wind and strong crosswinds can make takeoff and landing more difficult. Consequently, aircraft performance is directly impacted by crosswinds because they affect whether an aircraft can use a specific runway. In general, GA aircraft are more susceptible to crosswinds as they often operate at slower approach speeds and weigh less than their commercial counterparts.

The FAA has designated allowable crosswinds for each RDC to account for the variation in crosswind capabilities. **Table 3-10** shows each RDC and its allowable crosswind component. The FAA recommends that an airport provide 95 percent wind coverage for the aircraft that are expected to use it. If a single runway cannot meet this standard, a crosswind runway should be provided.

Table 3-10: Crosswind Limitations per RDC

RDC	Allowable Crosswind Component
A-I and B-I	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III D-I through D-III	16 knots
A-IV and B-IV C-IV through C-VI D-IV through D-VI E-I through E-VI	20 knots

Source: AC 150/5300-13A

Table 3-11 shows that Runway 13/31 is the only runway at LSE that provides 95 percent wind coverage at 10.5 knots in all weather, IFR, and VFR conditions. Runway 18/36 only meets the 95 percent threshold at 10.5 knots during IFR conditions and therefore Runway 13/31 is a necessary runway for small aircraft at LSE from a wind coverage standpoint. Runway 04/22 has the least crosswind coverage generally. When all three runways are considered together, the 95 percent recommendation is met for all crosswind components in all weather, IFR, and VFR conditions. Runway 18/36 and Runway 13/31, when combined and excluding Runway 04/22, also meet the 95 percent recommendation for all crosswind components in all weather, IFR, and VFR conditions. Therefore, Runway 04/22 is not a necessary runway at LSE from a wind coverage standpoint.

Table 3-11: Runway Wind Coverage

Weather Conditions	Crosswind Component			
	10.5 knots (kts)	13 kts	16 kts	20 kts
Runway 18/36				
All Weather	92.74%	96.10%	98.82%	99.72%
VFR	92.34%	95.90%	98.82%	99.74%
IFR	95.21%	97.33%	98.90%	99.59%
Runway 13/31				
All Weather	95.35%	98.02%	99.50%	99.88%
VFR	95.14%	97.98%	99.51%	99.89%
IFR	96.69%	98.35%	99.44%	99.80%
Runway 4/22				
All Weather	87.05%	92.74%	97.71%	99.46%
VFR	86.47%	92.49%	97.71%	99.50%
IFR	90.54%	94.32%	97.77%	99.27%
All Runways				
All Weather	99.29%	99.81%	99.95%	99.99%
VFR	99.27%	99.82%	99.96%	100.00%
IFR	99.43%	99.76%	99.90%	99.96%
W/O Runway 4/22				
All Weather	98.28%	99.36%	99.84%	99.97%
VFR	98.26%	99.38%	99.86%	99.98%
IFR	98.43%	99.27%	99.71%	99.90%

Source: National Climatic Data Center, FAA Standard Wind Analysis Tool, Station LSE ASOS, Period of Record: 2007 – 2016.

3.3.4 Runway Length

Runway length requirements at an airport are determined by the specific operational requirements of the aircraft serving it. Furthermore, runway length requirements for a specific aircraft directly relate to the aircraft's unique performance characteristics. Aircraft performance is further affected by factors such as airport elevation, temperature, and air density. Air density affects aircraft performance through both thrust and airflow over the wing. Thinner air does not produce as much forward aircraft momentum and decreases air movement over the wing, requiring increased airspeed to produce the same amount of lift. Therefore, the thrust and airflow required to depart the runway when the air is less dense will increase an aircraft's takeoff distance as elevation and temperature increase.

AC 150/5235-4B, *Runway Length Recommendations for Airport Design,* states that aircraft performance should be evaluated using the mean daily maximum temperature of the hottest month of the year at the airport elevation. Based on temperature data measured by equipment on the airfield at LSE, the average maximum temperature of the hottest month is 86.1° F, or 28.9° C (2012-2021 Climate Normals, National Climate Data Center) and usually occurs in July. The airport elevation at LSE is 655.6 feet above mean sea level (MSL), which occurs at the Runway 13 end.

In an ideal operating environment, aircraft can operate at maximum useful load to and from the airfield in all scenarios. Maximum useful load is defined as the maximum takeoff weight of the aircraft minus the operating empty weight. Operating at or near maximum useful load allows air carriers to maximize the utility of their aircraft by carrying as many passengers, as much cargo, and as much fuel as possible. However, as runway length decreases, or as temperature and elevation increase, greater demand is placed on the aircraft and, as a result, useful load is often reduced to compensate and ensure safe operating performance on the available runway length.

Existing Routes

When determining the required runway lengths for an airport, AC 150/5325-4B states the more demanding of the takeoff or landing lengths should be used to determine runway length. As takeoff lengths are commonly more demanding than landing lengths, due to the additional fuel weight of the aircraft combined with the need to build up the required airspeed for takeoff, this section focuses on required takeoff length. The appropriate operating takeoff weight for short-haul routes, where neither payload nor fuel must be reduced to reach the destination, is the "actual operating takeoff weight". As of 2020, there air service was provided to the following locations from LSE:

- Minneapolis−Saint Paul International Airport (MSP): 104 nautical miles
- Chicago O'Hare International Airport (ORD): 187 nautical miles
- Detroit Metropolitan Wayne County Airport (DTW): 362 nautical miles

The short haul limit for the current critical aircraft, the CRJ200, while operating at long range cruise is approximately 550 nautical miles. As flights to these destinations are not considered long haul flights, the guidance dictates that the "actual operating takeoff weight" should be used to determine required runway length at an airport. Fuel is often one of the main weight considerations during flight planning, and the CRJ200 generally requires less than its 1,400-gallon fuel capacity at takeoff from LSE. However, aircraft operating weights are very context dependent as the air carriers take into consideration payload, winds, turbulence, convective activity, air traffic congestion, anticipated delays, and other factors when determining how much fuel to carry. Therefore, “actual takeoff operating weight” can vary widely based on the circumstances of a specific operation. Furthermore, Federal Aviation Regulations Part 121 states that domestic air carriers may not take off unless the aircraft has enough fuel (a) to fly to the airport to which it is dispatched; (b) thereafter, to fly to and land at the most distant alternate airport for the airport to which dispatched; and (c) thereafter, to fly for 45 minutes at normal cruising fuel consumption. Based on a sampling of routes conducted by Jeppesen and presented in the *Aircraft Commerce* publication, average hourly fuel burn for the CRJ200 is approximately 358 gallons, or 2,434 pounds, per hour.

Based on the DOT T100 database, the CRJ200 usually takes approximately 1 hour of airtime from LSE to DTW. Because the weather at DTW and other airports near the Great Lakes are often affected by the same weather systems, when flights must divert due to weather at DTW, ORD, and other Great Lakes destination airports, the closest alternate airport with acceptable weather is often quite some distance away, such as Kansas City, St. Louis, or Indianapolis. For this analysis, a 30-minute diversion time is considered, but this assumption is likely conservative for this reason. Finally, an additional 45 minutes of fuel would be required to meet Part 121 standards. This conservative estimate, as taxi time is not included, amounts to a total of 2 hours and 15 minutes of fuel that must be on board when departing LSE for DTW. For a CRJ200 this is 865 gallons or 5,880 pounds of fuel.

The CRJ200 has an empty weight of 30,500 pounds. If the aircraft uses its full payload (13,500 pounds) for passengers and baggage this brings the aircraft to the maximum zero fuel weight of 44,000 pounds. When the required fuel for departure to DTW is added, the “actual operating takeoff weight” of the CRJ200 is 49,880 pounds. This exceeds the maximum certificated takeoff weight (MTOW) for the base model CRJ200, is 97 percent of the extended range variant (ER) MTOW, and 93 percent of the 53,000-pound MTOW for the long-range (LR) variant. The LR model regularly operates from LSE and, due to the greater weight, is a more demanding aircraft than the base CRJ200. As the maximum zero fuel weight is the same for both the LR and ER variants, the CRJ200LR is also the most conservative choice for this analysis and is used in the following runway length discussion. Based on CRJ200 airport planning manual performance charts, just over 6,200 feet of runway length is required at this takeoff weight when considering the mean maximum temperature of the hottest month at LSE.

This same process can be followed for the other passenger aircraft that already have 500 annual operations at LSE, as well as those that could meet the regular use threshold during the planning period. If an aircraft commonly flies two routes from LSE, the longer route was selected for analysis. Each of these aircraft are shown with their required takeoff runway length below in **Table 3-12** with inputs for “actual operating takeoff weight” determinations for these aircraft in **Table 3-13**. Based on existing conditions and routes, the ERJ145LR is the most demanding aircraft that currently has at least 500 annual operations at LSE.

Table 3-12: Required Runway Length for Selected Aircraft							
Design Aircraft	RDC	Seats	2019 Operations	Route	MTOW	"Actual Operating Takeoff Weight"	Takeoff Length Required at "Actual Operating Takeoff Weight"
CRJ200LR	C-II	50	2,070	Detroit, MI - DTW	53,000	49,880	6,200 feet
ERJ145LR	C-II	50	1,096	Chicago, IL - ORD	48,502	48,259	7,800 feet
CRJ700	C-II	70	1,098	Chicago, IL - ORD	72,750	70,049	5,300 feet
B737-800	D-III	184	40	Bullhead City, AZ - IFP	174,700	166,237	7,400 feet
CRJ900	C-III	86	22	Detroit, MI - DTW	82,500	79,874	6,600 feet
ERJ175	C-III	86	2	Chicago, IL - ORD	82,673	80,795	6,300 feet
Notes: Takeoff requirements were determined based on ISA +15 conditions, a dry runway at 655' MSL.							

Table 3-13: Takeoff Weight Determination for Selected Aircraft								
Design Aircraft	Fuel Burn Per Hour (pounds)	Scheduled Flight Time (Minutes)	Trip Fuel Burn (pounds)	30-minute Diversion Fuel Burn (pounds)	45-minute Hold Fuel Burn (pounds)	Total Fuel Required (pounds)	Max Zero Fuel Weight (pounds)	"Actual Operating Takeoff Weight" (pounds)
CRJ200LR	2,693	56	2,513	1,347	2,020	5,880	44,000	49,880
ERJ145LR	3,427	79	4,512	1,714	2,570	8,796	39,463	48,259
CRJ700	3,019	79	3,975	1,510	2,264	7,749	62,300	70,049
B737-800	5,780	215	20,712	2,890	4,335	27,937	138,300	166,237
CRJ900	4,522	56	4,221	2,261	3,392	9,874	70,000	79,874
ERJ175	4,250	79	5,596	2,125	3,188	10,909	69,886	80,795

The weather conditions used to determine runway length in aircraft planning manuals relate to the temperature compared to ISA, or International Standard Atmosphere, is generally considered to be 15 degrees Celsius or 59 degrees Fahrenheit at sea level. Based on existing passenger air carrier needs, a runway length of at least 6,200 feet is needed for CRJ200 operations. This is based on the ISA standard day +15 C (86 degrees Fahrenheit) with required fuel and maximum payload to its currently scheduled destination. Any change from these circumstances, such as a hotter day or a more distant location, would require additional runway length to support. The most demanding aircraft currently using the Airport is the B737-800, although it only conducted 40 operations at LSE in 2019. As the CRJ900 or ERJ175 are the likely replacements for the existing regularly scheduled aircraft, these aircraft are expected to conduct at least 500 annual operations further into the planning period. Of these, the CRJ900 requires a longer runway, at 6,300 feet.

However, evaluating runway length needs in this manner does not adequately consider the Airport's overall needs. Planning solely for the immediate needs of a single aircraft in a contrived set of circumstances can lead to incompatible land uses, inefficient airfield layouts, and inadequate facilities. Instead, the needs of the entire planning period and various operating scenarios should be considered if the Airport is to plan judiciously. Existing routes to LSE tend to be shorter connections to larger hubs, such as to Chicago and Minneapolis. Planning only for these operations limits the Airport's functionality and creates hub dependency instead of allowing growth to future markets. The most recent Airport Catchment Analysis, completed in 2017, shows that of the top five destinations from the Airport, only one is currently served directly (Chicago, IL). Two of the other top five Airports are recreational destinations (Phoenix, AZ and Orlando, FL) and the remaining two are more distant large hubs (Denver, CO and New York, NY). Each of these locations are significantly more distant than existing routes and planning solely based on existing operations and routes introduces needless limitations on potential future demand. Additional examination of the runway length determination is needed.

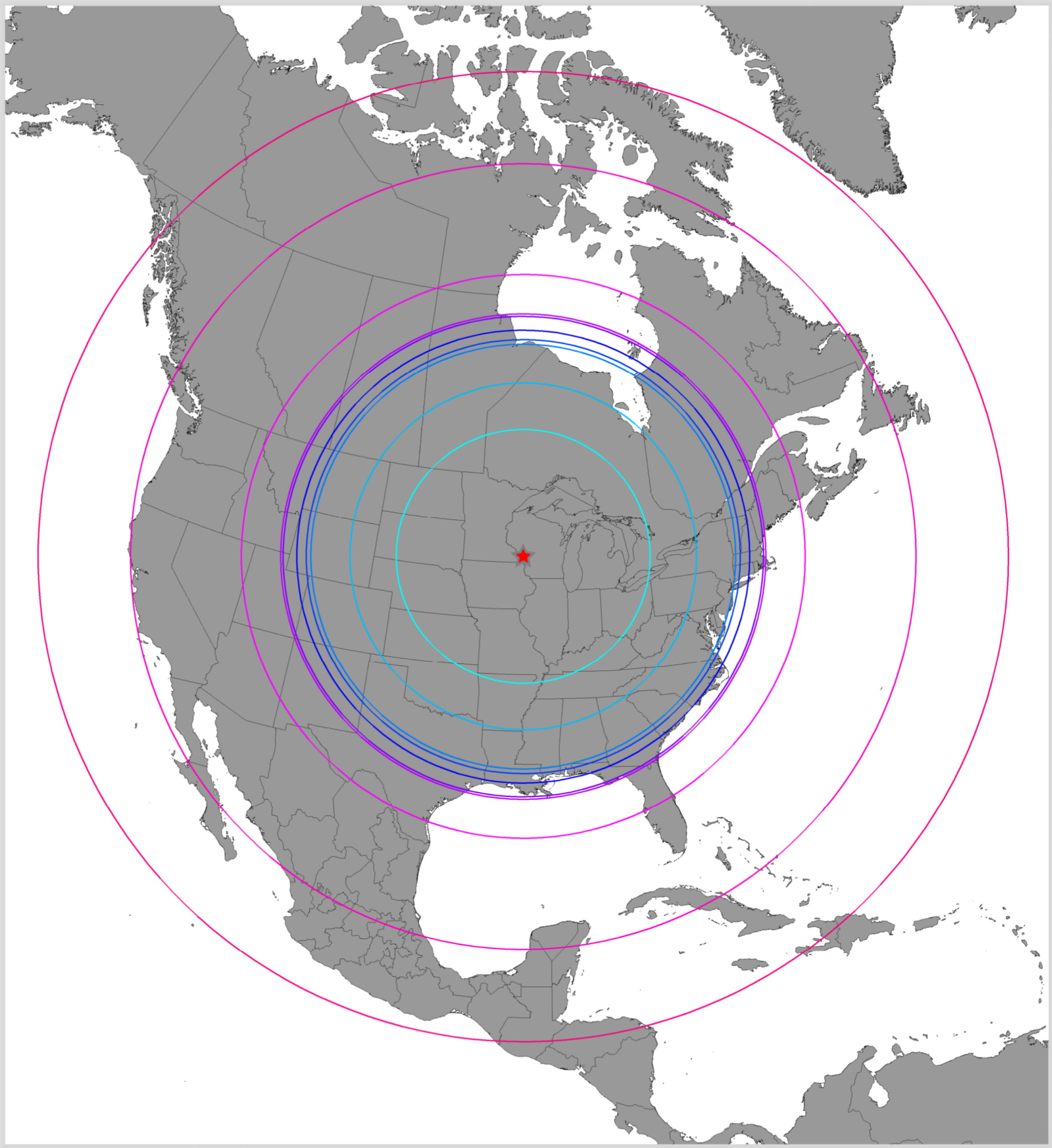
Future Runway Needs

The first step when determining the relevant departure weight for an aircraft is to determine the haul length. AC 150/5325-4B, Section 403.c(2) divides operations into short-haul and long-haul depending on the relationship of an aircraft's operating weight to its payload and range. If the haul length exceeds the distance at which fuel requirements place any limitation on payload – also known as the payload break point – the flight is considered a long-haul flight and for planning purposes the operating weight of the aircraft should be set to the MTOW. If haul length does not exceed the payload break point, the operation is considered a short haul operation and the "actual operating takeoff weight" of the aircraft should be used. The payload breakpoint for each existing and potential future aircraft at LSE is shown below in **Table 3-14** and graphically in **Figure 3-1**.

Table 3-14: Aircraft Payload Break Points

Aircraft	Payload Break Point Ranges
CRJ200	550 Nautical Miles
A319 WV00*	750 Nautical Miles
CRJ700	920 Nautical Miles
ERJ145LR	940 Nautical Miles
ERJ175	980 Nautical Miles
CRJ900	1,040 Nautical Miles
ERJ170	1,050 Nautical Miles
CRJ200LR	1,220 Nautical Miles
A320 WV00*	1,700 Nautical Miles
B737-800	2,100 Nautical Miles

Source: Airport Planning Manuals
Notes: Weight Variant Zero



Aircraft Payload Break Points			
Aircraft	Range (Miles)	Aircraft	Range (Miles)
CRJ200	550	CRJ900	1040
A319	750	ERJ170	1050
CRJ700	920	CRJ200LR	1220
ERJ145LR	940	A320	1700
ERJ175	980	B737-800	2100

0 350 700 1050
Graphic Scale in Miles

Figure 3-1: **Airport Payload Breakpoints**

La Crosse Regional AIRPORT

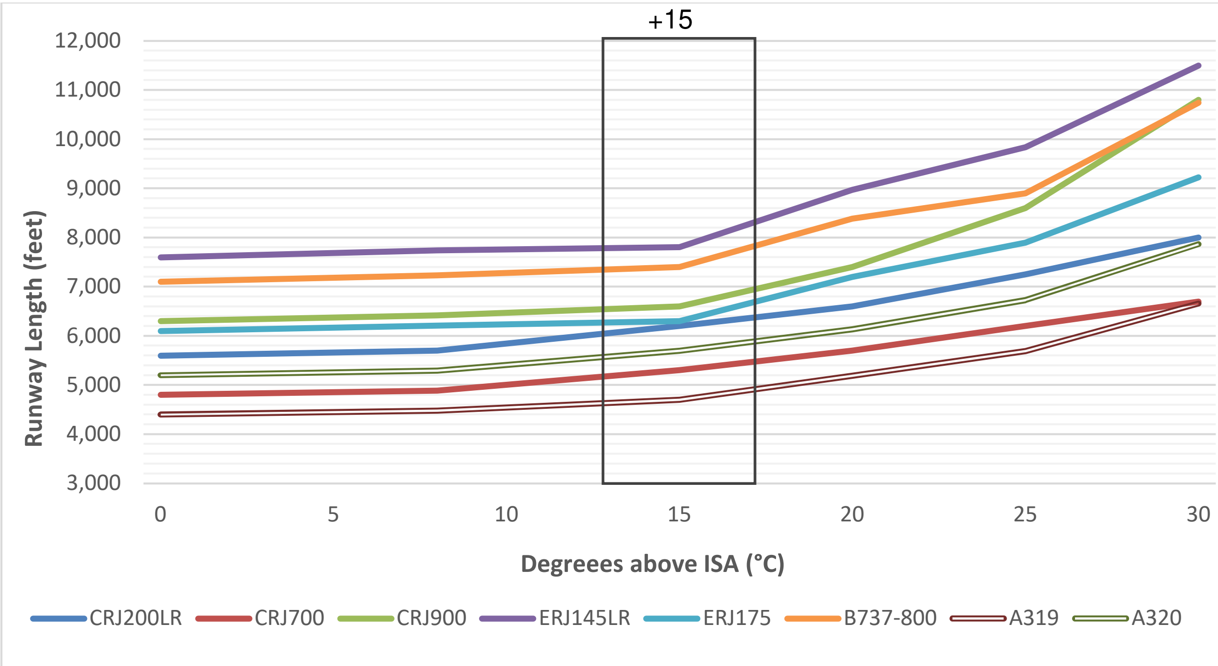
Source: *maps.princeton.edu/catalog/stanford-ns372xw1938*

These ranges are determined in the respective aircraft's planning manuals and use ISA standard conditions in still air. However, the presence of the jet stream and warming temperatures mean that these distances may overestimate potential aircraft payload break point range from LSE. The range of many of these aircraft when operating at or slightly below their payload break point could reach the east coast of the United States. This means that these aircraft can reach airports in this range while operating at MTOW. Allowing these aircraft to operate at MTOW allows for the potential of additional routes and can handle to increase of future enplanements. Departing at MTOW naturally has an impact to runway length needs. A comparison of the takeoff length required for these aircraft on the existing lengths (as shown textually in Table 3-12) can be seen on the next page in **Chart 3-1** at different ISA conditions and is compared to these same aircraft operating at MTOW in **Chart 3-2**.

In comparing the runway length required for each of these conditions, it can clearly be seen that aircraft operating at their MTOW, unsurprisingly, require a significantly greater runway length. Many aircraft needs approach the full length of Runway 18/36. The Boeing 737-800, one of the largest aircraft currently operating at LSE, requires nearly the full length of Runway 18/36 but so would several other aircraft. The ERJ145LR and CRJ200LR are currently operating at LSE and would require near the full runway length during the summer as well as the CRJ900, which is anticipated to be the future critical aircraft.

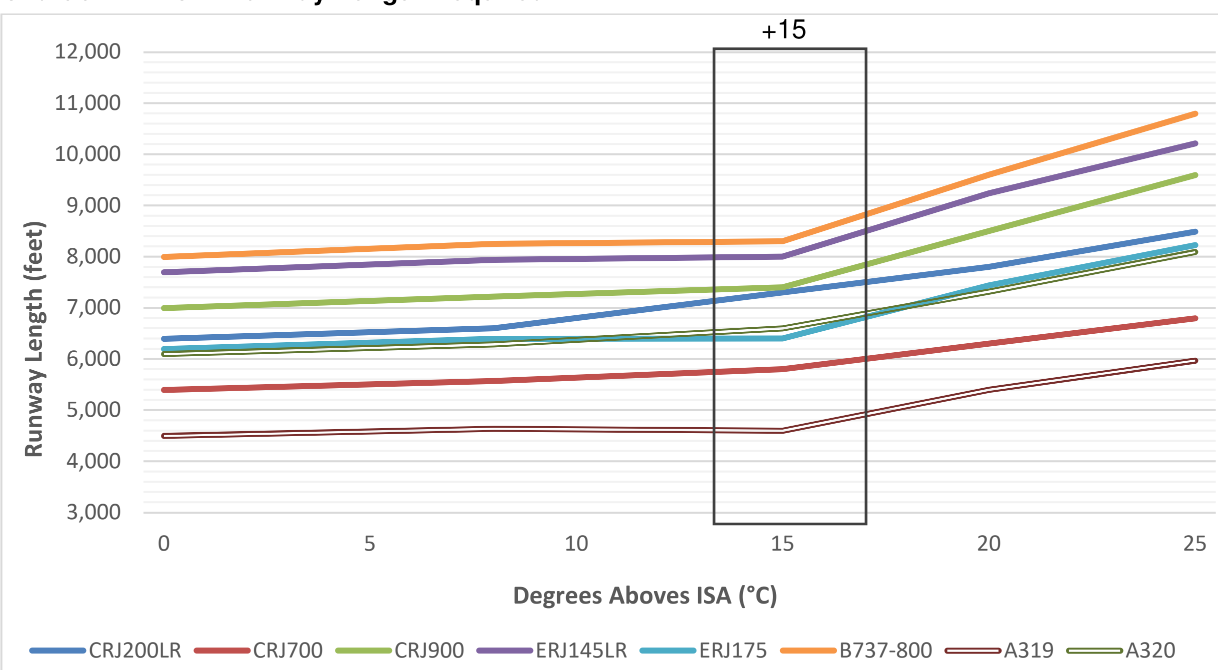
In addition to the needs of these aircraft to continue to operate at their MTOW and serve potential future destinations, another factor to consider is the impact of climate change on runway length needs. As explained at the beginning of this section, air density has a significant impact on aircraft performance. Less dense air, either because of elevation or temperature, lessen both the thrust generated by an aircraft's engine and the lift produced by the wings. This creates an exponential increase in runway length needs as air density decreases. This is illustrated by the increasing curve showing runway length requirements as the temperature rises beyond ISA conditions in Charts 3-2 and 3-3. It is important to note that runway length needs do not have a linear relationship to temperature increases, and the performance characteristics of these airplanes vary widely in terms of sensitivity to temperature increases, so interpolation between these charts is not a precise method for estimating runway length needs.

Chart 3-1: Route Specific Runway Length Required



Notes: ISA +15 is applicable for existing conditions at LSE. Not all aircraft performance charts include each ISA stage shown and so interpolation and comparisons were used where necessary. Runway lengths correspond to the routes shown in Table 3-12.

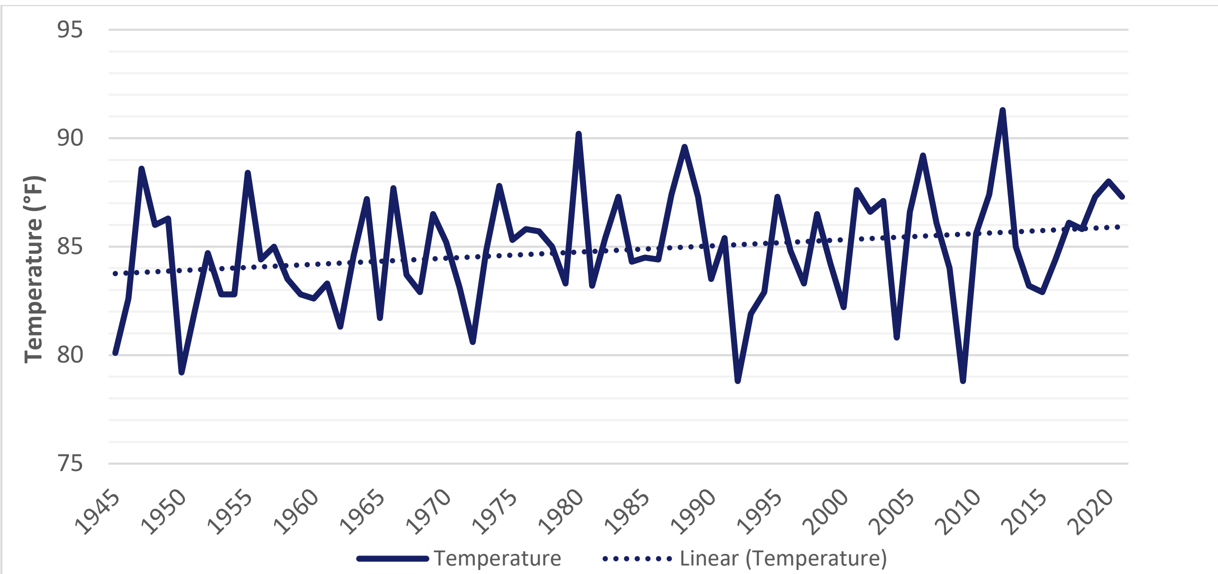
Chart 3-2: MTOW Runway Length Required



Notes: ISA +15 is applicable for existing conditions at LSE. Not all aircraft performance charts include each ISA stage shown and so interpolation and comparisons were used where necessary. Runway lengths correspond to the routes shown in Table3-12.

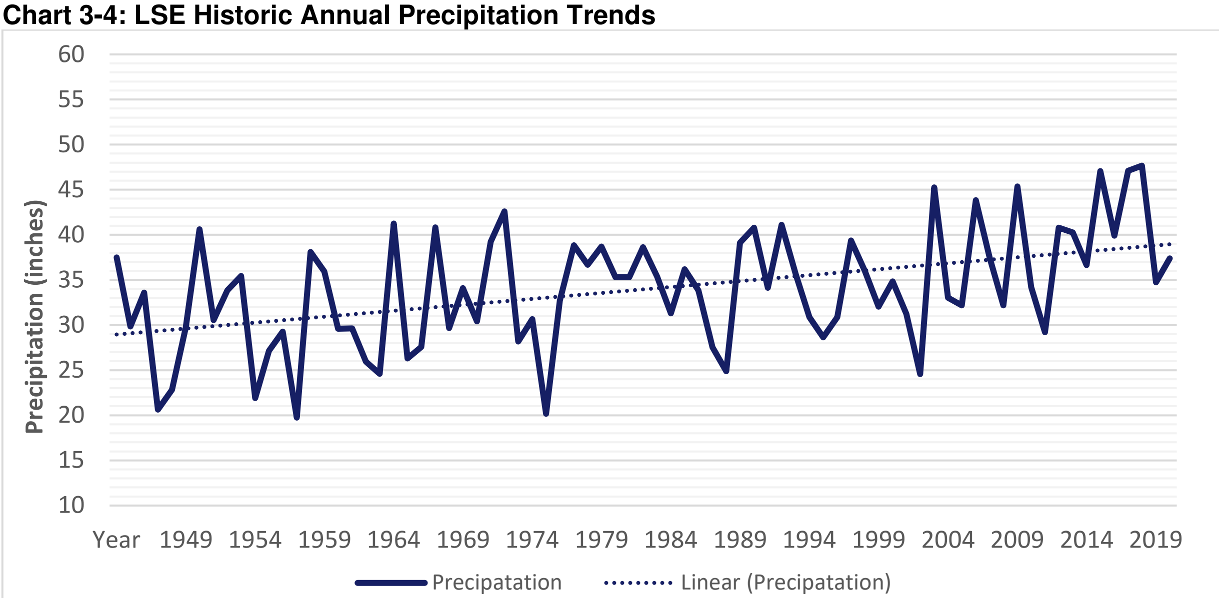
Weather trends at La Crosse show increasing temperature and precipitation levels over the past several decades. Historic records from the National Oceanic and Atmospheric Administration (NOAA) are shown in **Chart 3-3** and **Chart 3-4** and illustrate an increase in both temperature and annual precipitation. Precipitation increases landing distances due to a contaminated runway environment. Runway length is determined in AC 150/5325-4B, *Runway Length Requirements for Airport Design*, by using the mean maximum temperature for the hottest month, which has increased over the past several decades. The increase in temperature shown for LSE is easily detectable and is only expected to increase more rapidly in the future.

Chart 3-3: LSE Historic Temperature Trends



Source: NOAA, La Crosse Municipal Airport Weather Station, Station ID: USW00014920.
Notes: Temperature is shown as the mean maximum temperature of the hottest month.

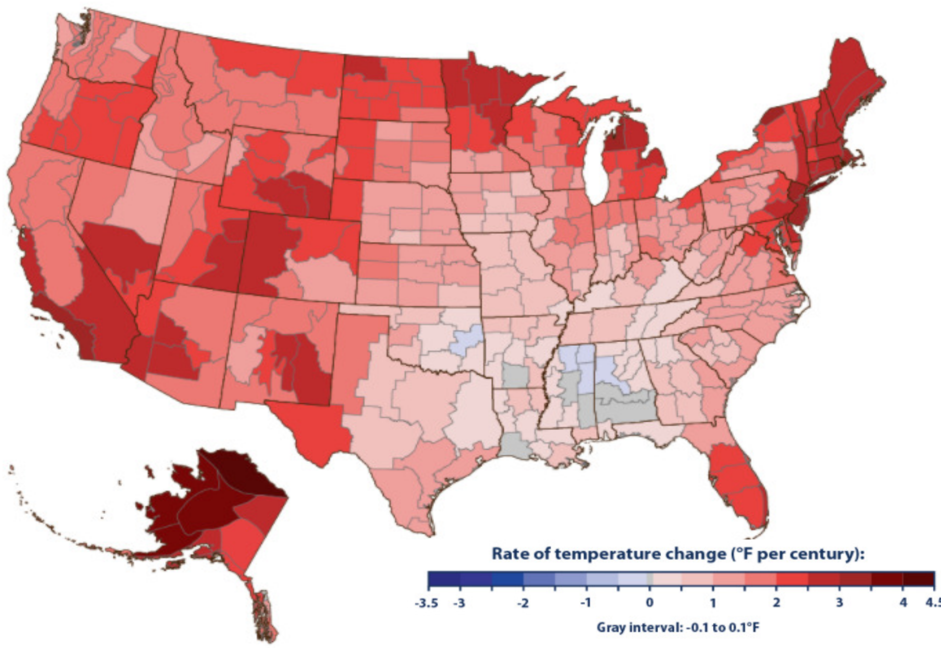
Chart 3-4: LSE Historic Annual Precipitation Trends



Source: NOAA, La Crosse Municipal Airport Weather Station, Station ID: USW00014920.

The U.S. Environmental Protection Agency (EPA) reports that since 1901 the average temperature in the lower 48 states has risen at an average of 0.16 degrees Fahrenheit per decade. However, temperatures have risen more quickly since 1970 and the past decade is the warmest on record. Temperature change across the United States is not homogenous and the most intense changes have occurred in areas of the north and west of the United States. As shown in **Figure 3-2**, the region surrounding the Airport has undergone higher than average temperature changes since 1901 at an approximate increase of 1.5 degrees. This is consistent with the survey of historic data shown previously in Chart 3-3.

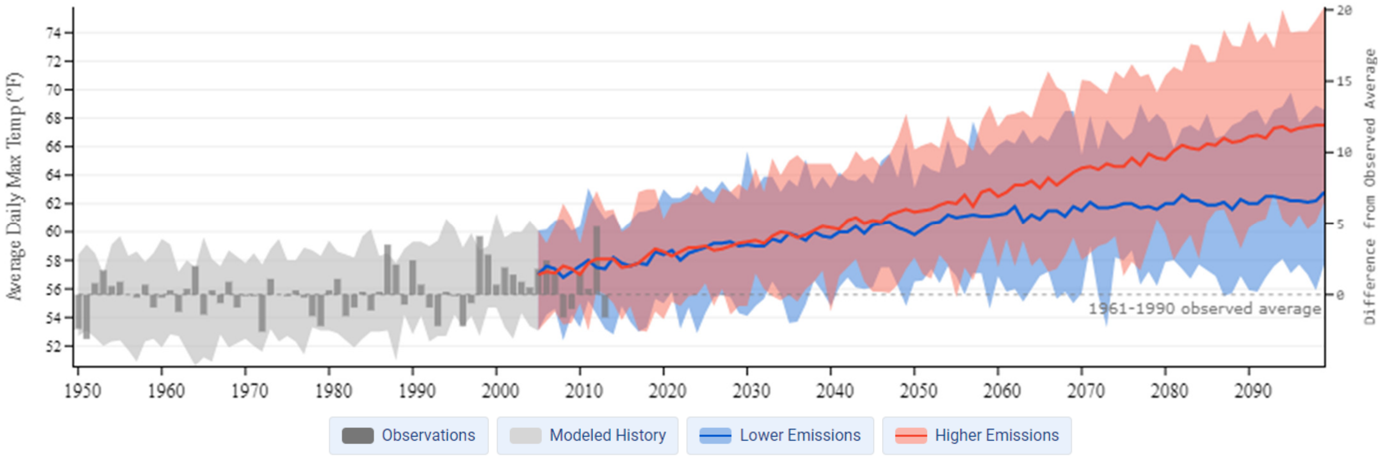
Figure 3-2: Rate of Temperature Change in the United States, 1901-2020



Source: US Environmental Protection Agency, https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature

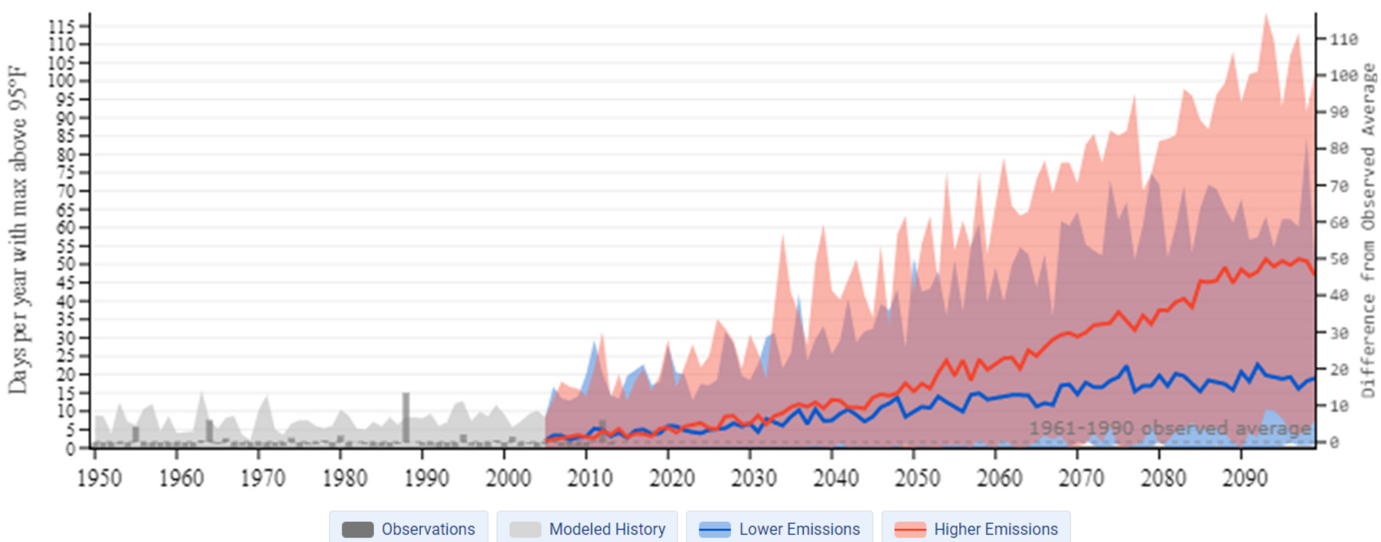
While recent temperature changes in the La Crosse area have been moderate, the rate of change and extremes of events are expected to increase exponentially. The U.S. Climate Resilience Toolkit is an online resource managed by NOAA that serves as a synthesis of information from the federal government and demonstrates the future impacts of climate change at LSE. As shown on the next page in **Chart 3-5**, the average daily maximum temperature for the Airport has increased over time and is expected to continue increasing at a more rapid rate through the 20-year planning period. Additional analysis shows how this ties more closely to runway length needs.

Chart 3-5: Projected Average Daily Maximum Temperature at LSE



Source: The Climate Explorer Tool, https://crt-climate-explorer.nemac.org/

Chart 3-6: Projected Days above 95 Degrees Fahrenheit at LSE



Source: The Climate Explorer Tool, https://crt-climate-explorer.nemac.org/

Based on the FAA runway length guidance, the most applicable available ISA condition for determining runway length at LSE is +15 ISA. This translates to 30 degrees Celsius or 86 degrees Fahrenheit which is very close to the 86.1 degrees Fahrenheit determined by a historic analysis (2012–2021) of LSE weather. However, increasing temperature trends indicate that +20 ISA conditions need to be considered in the future. A temperature of +20 ISA is the equivalent of a 95-degree Fahrenheit day and would significantly increase runway needs. The number of days above 95 degrees at LSE are shown in **Chart 3-6** to be slightly less than 20 during the 2010s but by the 2040s is expected to reach 33.6 days with lowered emissions and even 46.8 days if emissions continue to increase. This sharp increase in anticipated temperature means that within the planning period +20 ISA conditions are likely to be the new planning standard for LSE.

In summary, the needs of the Airport should not be evaluated by a single snapshot in time for a single aircraft type in a single contrived scenario. The purpose of a master planning effort is to not to only address existing needs but anticipate and plan for future needs before they occur. As the planning period for this effort is a 20-year window, the future reasonable needs of the Airport for that duration must also be considered. A prime example of this approach is that a sufficient evaluation of how to best equip the Airport to continue to serve the region includes not only the existing critical aircraft, but the future critical aircraft. In a similar fashion, even if existing runway lengths may meet the needs of present aircraft that operate on existing routes, a larger perspective is needed. An evolving fleet mix, potential for new routes both to popular hubs and to leisure destinations, and the demonstrated demands of climate change all support the need to maintain existing infrastructure at the Airport to protect for the future.

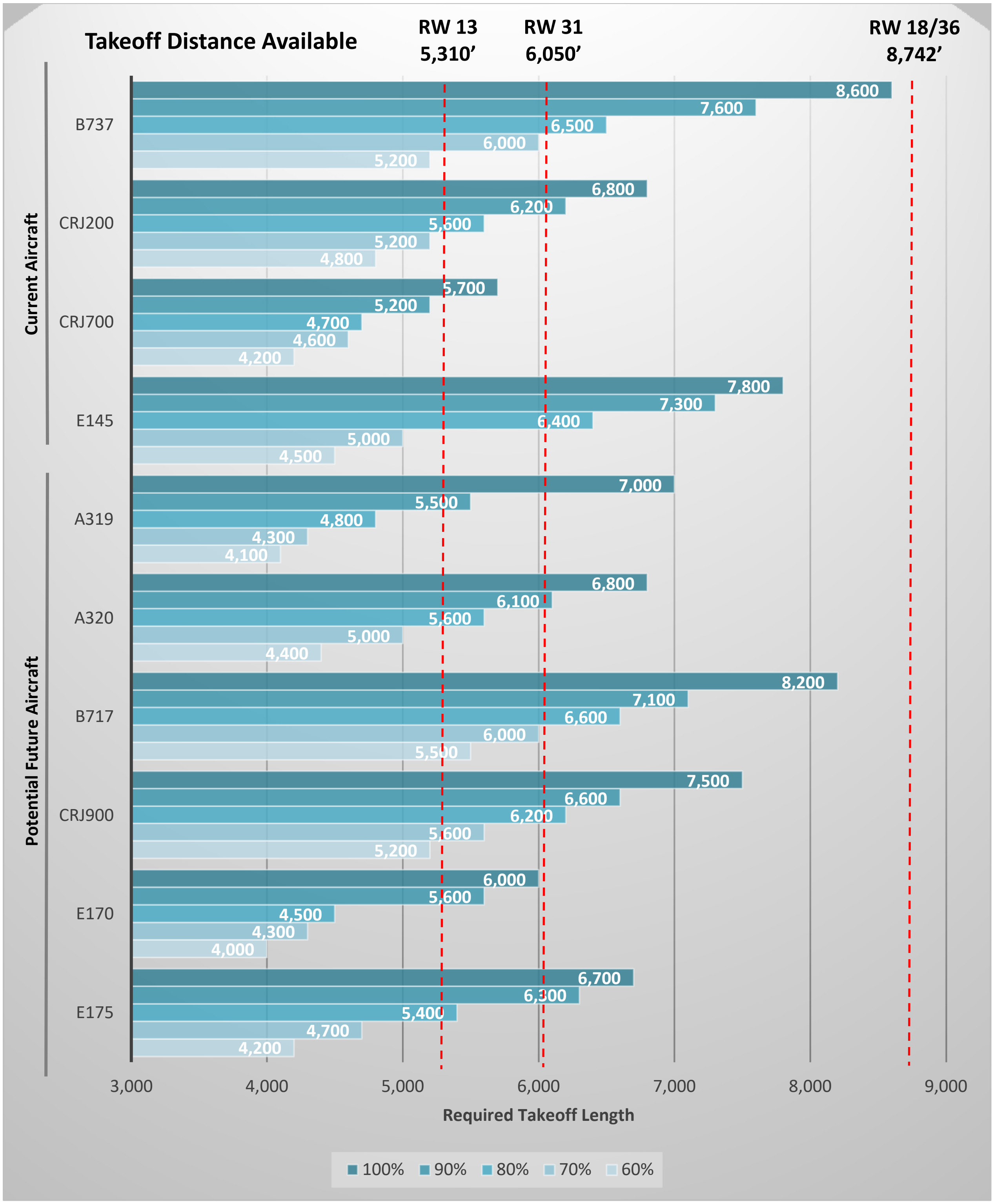
Notwithstanding the above reasons for maintaining the existing Runway 18/36 length at LSE, the FAA has indicated that the current length of Runway 18/36 is not justified in the 20-year planning period and has stated that, when the runway is next reconstructed, the runway will either have to be shortened or the unjustified portion will have to be funded by the Airport sponsor. If the runway needs to be shortened, an RPZ analysis, validation of the obstructions to the runway, and analysis of the associated taxiway geometry will have to be conducted. Adequate lead time needs to be set aside for additional planning prior to the runway reconstruction being eligible for federal funding.

Runway Length by Useful Load

Another method of accounting for future aircraft needs, even when the destination is not known, is to evaluate the required takeoff length by various useful loads. The useful load is different from the payload as it also accounts for the weight of fuel and so more broadly assesses the state of an aircraft. An aircraft's needs may change significantly depending on the weight at which it departs. The ERJ145LR is a prime example. The engine it carries, the Rolls-Royce AE 3007 A1, produces 7,580 pounds of thrust at takeoff power. This is less powerful than the CRJ200LR's engine, the GE CF34-3B1, which produces 9,220 pounds of thrust on takeoff. While this is not the only factor that determines runway length needs it is intuitive that it is a dominant influence for aircraft of similar size. A less powerful engine means that as the ERJ145LR approaches its MTOW it begins to require significantly more runway length than a more powerful aircraft. The assessment of takeoff needs at various useful loads, shown below, illustrates this phenomenon. The ERJ145LR is a staple of many regional air carrier operations and the potential takeoff weights of this and similar aircraft are a vital aspect of planning for the future.

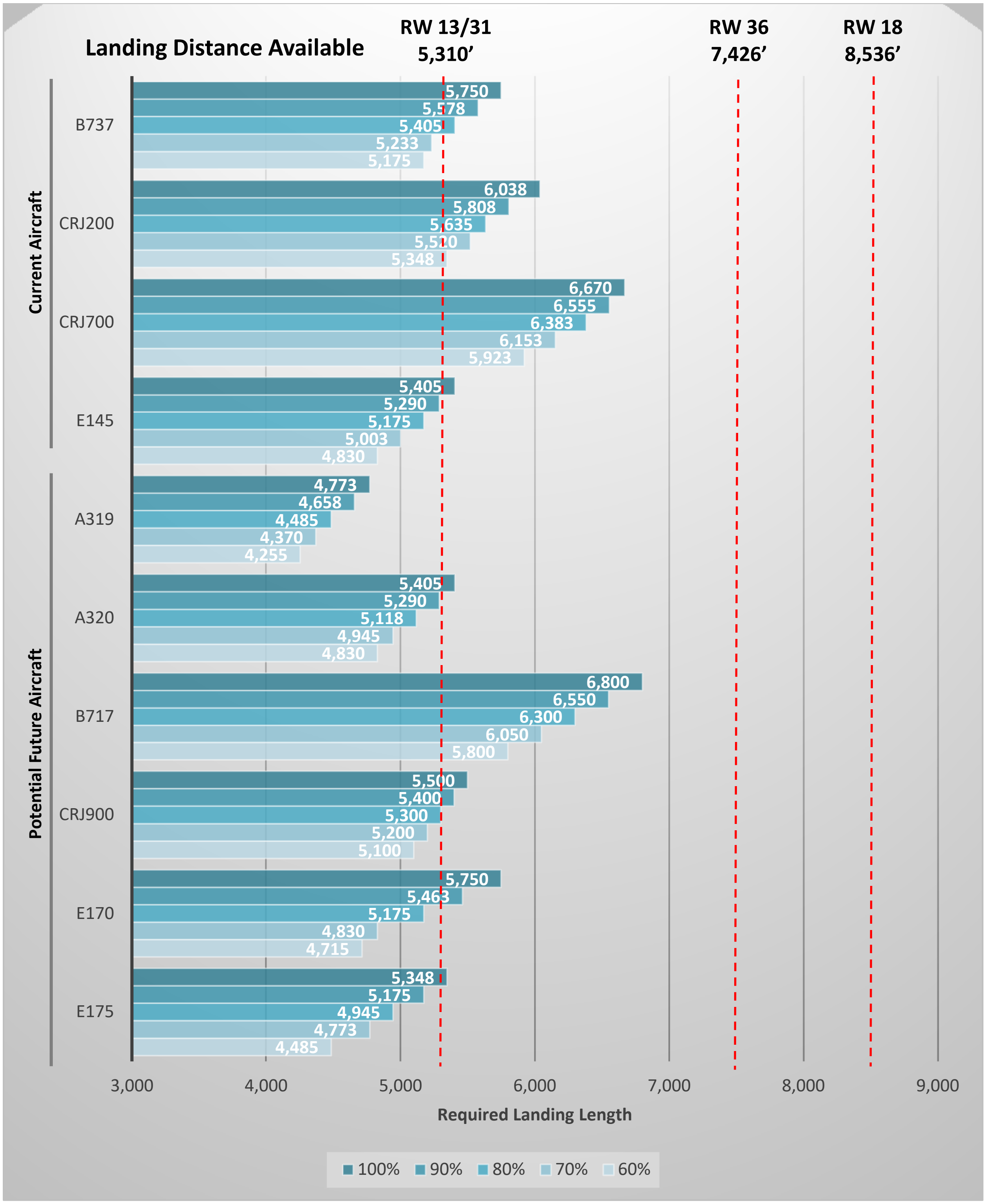
Runway takeoff length needs for the existing and potential future passenger aircraft fleet at various useful loads are illustrated in **Chart 3-7** below. While the takeoff distances are usually more demanding than the landing distances for the same aircraft, there are some exceptions, and **Chart 3-8** depicts the landing length needs for reference. Both the takeoff and the landing lengths are compared to the distances available on Runway 18/36 and Runway 13/31. As Runway 04/22 has a different fleet mix and method to determine the necessary runway length, it will be analyzed separately. **Appendix C** contains performance charts from airport planning manuals that were used to determine the required takeoff distances for each aircraft. **Appendix D** contains performance charts from airport planning manuals that were used to determine the required landing distances for each aircraft.

Chart 3-7: Required Takeoff Length by Useful Load



Source: Airport Planning Manuals, Mead & Hunt, Inc.

Chart 3-8: Required Landing Length by Useful Load



Lengths include a 15% adjustment for wet/slippery runway conditions, as permitted by AC 150/5325-4B, Chapter 4. Source: Airport Planning Manuals, Mead & Hunt, Inc.

Runway 18/36

Runway 18/36, which is 8,742 feet long, meets requirements for its design aircraft at MTOW in ISA +15 conditions. However, declared distances are published for the runway that limit the length available for certain operations to avoid on and obstacles near the Airport. The purpose of each of these distances is described in greater detail in this section.

Declared distances are defined as the distances declared available for a turbine-powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The takeoff run available (TORA) is the runway length available and suitable for the ground run of an aircraft taking off. The takeoff distance available (TODA) is the TORA plus the length of any remaining runway beyond the far end of the TORA. The TODA can be reduced to mitigate for obstacles in the departure area. The accelerate-stop distance available (ASDA) is the runway plus stopway length available and suitable for acceleration and deceleration of an aircraft aborting a takeoff. The landing distance available (LDA) is the runway length that is available and suitable for landing an aircraft.

The full length of Runway 18/36 is not available for ASDA and LDA in either direction, to provide 1,000 feet of runway safety area (RSA) and runway object free area (ROFA) beyond the stop end of the ASDA and LDA. In addition, the Runway 36 LDA is further reduced due to a displaced threshold, which is located further down the runway to provide a clear threshold siting surface and runway protection zone (RPZ). The RSA, RPZ, and other runway design standards are discussed further in Section 3.3.5.

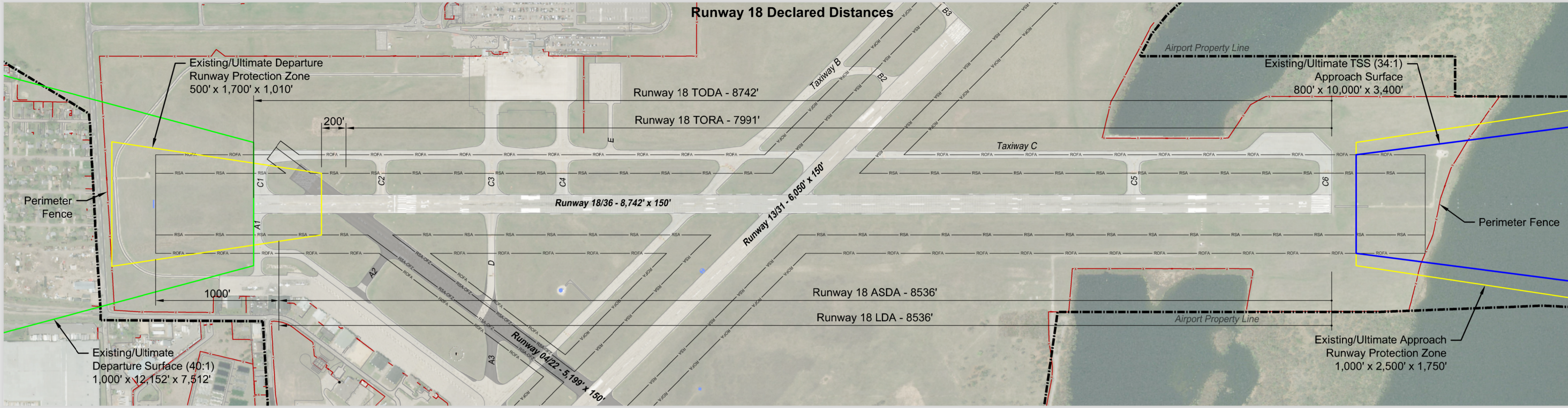
Based on existing obstructions and conflicting land uses, it is recommended that some of the declared distances be modified. The Runway 18 TORA should be shortened to allow for the departure RPZ to remain on Airport property. Some of the declared distances on Runway 36 also require adjustment. As the required lengths of the RSA and ROFA beyond the runway end both originate at the termination point for both the ASDA and LDA, 1,000 feet of RSA and ROFA must be provided beyond both of these declared distances. Both the ASDA and LDA must be shortened to avoid conflict with the perimeter fence off the Runway 36 departure end. The current and proposed declared distances for Runway 18/36 are summarized in **Table 3-15** below and shown graphically in **Figure 3-3**.

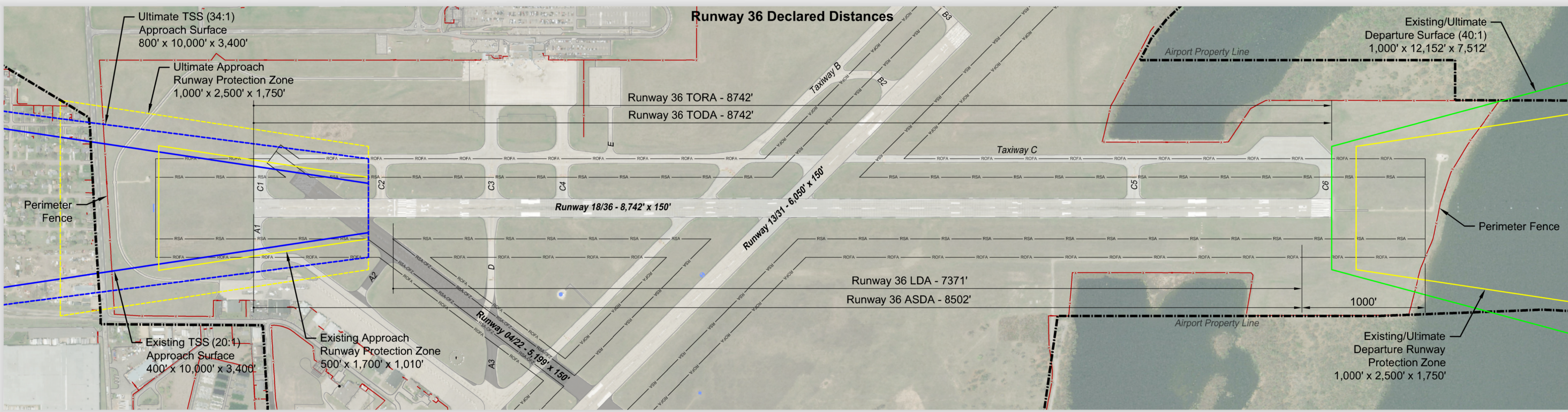
Table 3-15: Runway 18/36 Declared Distances (feet)

Runway	Takeoff Run Available (TORA)		Takeoff Distance Available (TODA)		Accelerate-Stop Distance Available (ASDA)		Landing Distance Available (LDA)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Runway 18	8,742	7,991	8,742	Same	8,536	Same	8,536	Same
Runway 36	8,742	Same	8,742	Same	8,557	8,502	7,426	7,371

Source: FAA Chart Supplement effective January 30, 2020

As discussed previously, the CRJ200 is the existing design aircraft for Runway 18/36 with the expectation to switch to the CRJ900 during the planning period. Runway 18/36 meets the takeoff and landing distance requirements for both the CRJ200 and the CRJ900. As discussed above, Runway 18/36 has adequate length for meeting current and future demands at LSE.





0 400 800 1200
Graphic Scale in Feet

Figure 3-3: **Runway 18/36 Declared Distances**

La Crosse Regional AIRPORT | Mead & Hunt

Source: *USGS Earthstar Geographics*

Runway 13/31

Runway 13/31 is LSE's secondary commercial runway and designated crosswind runway. As the runway is used for air carrier operations, it is important that the runway have similar features to Runway 18/36. Although Runway 13/31 is 6,050 feet long, operations on this runway are also influenced by declared distances. The current declared distances for Runway 13/31 are summarized in **Table 3-16** below.

Table 3-16: Runway 13/31 Declared Distances				
Runway	**Takeoff Run Available (TORA)**	**Takeoff Distance Available (TODA)**	**Accelerate-Stop Distance Available (ASDA)**	**Landing Distance Available (LDA)**
Runway 13	5,310 feet	5,310 feet	5,310 feet	5,310 feet
Runway 31	6,050 feet	6,050 feet	6,050 feet	5,310 feet
Source: FAA Chart Supplement effective January 30, 2020				

Operations on Runway 13 are significantly restricted as all declared distances on this runway are 5,310 feet, which means that the southeasternmost 740 feet of the runway is not available for takeoff or landing operations in this direction. Consequently, several aircraft are limited to less than desirable useful loads on this runway. When useful load is restricted, an aircraft must either carry less fuel, which limits potential range and destinations, or carry fewer passengers and/or less cargo, which affects profit margins.

Landing operations on Runway 31 have similar restrictions, as the LDA is 5,310 feet due to a displaced threshold located 740 feet from the end of the runway**.** The displaced threshold allows for 1,000 feet of RSA and runway object free area (ROFA) prior to the threshold, although only 600 feet is required. The most frequent air carrier aircraft using LSE today, the CRJ200 and the CRJ700, are limited to less than 60 percent useful load on landing in either direction on Runway 13/31. Several potential future aircraft would be affected by the current LDAs on Runway 13/31 as well.

While Runway 31 allows use of the full runway length for takeoff operations, air carriers generally prefer not to use it because it requires a long taxi distance and two runway crossings. In general, air carriers avoid long taxi distances due to excess fuel consumption and delay. Furthermore, additional runway crossings create unnecessarily hazardous situations. However, prevailing winds often dictate that air carriers depart Runway 31.

If air carriers switch to the CRJ900 in the future, Runway 13/31 limits maximum useful load on takeoff to less than 80 percent. Runway 31 would allow takeoff near 80 percent useful load, but Runway 13 would be restricted to just above 60 percent useful load. As previously discussed, this severely limits the fuel, passengers, and/or cargo the aircraft can carry, which is an undesirable situation for air carriers and LSE. As this Master Plan recommends the CRJ900 as the future design aircraft, LSE can expect a significant reduction in potential useful loads when air carriers take off on Runway 13/31.

This Master Plan recommends increasing the landing and takeoff distance available on Runway 13/31, to the extent practicable, in order to meet current and future needs at LSE. Alternatives for providing additional landing and takeoff distance will be discussed in Chapter 4.

Runway 04/22

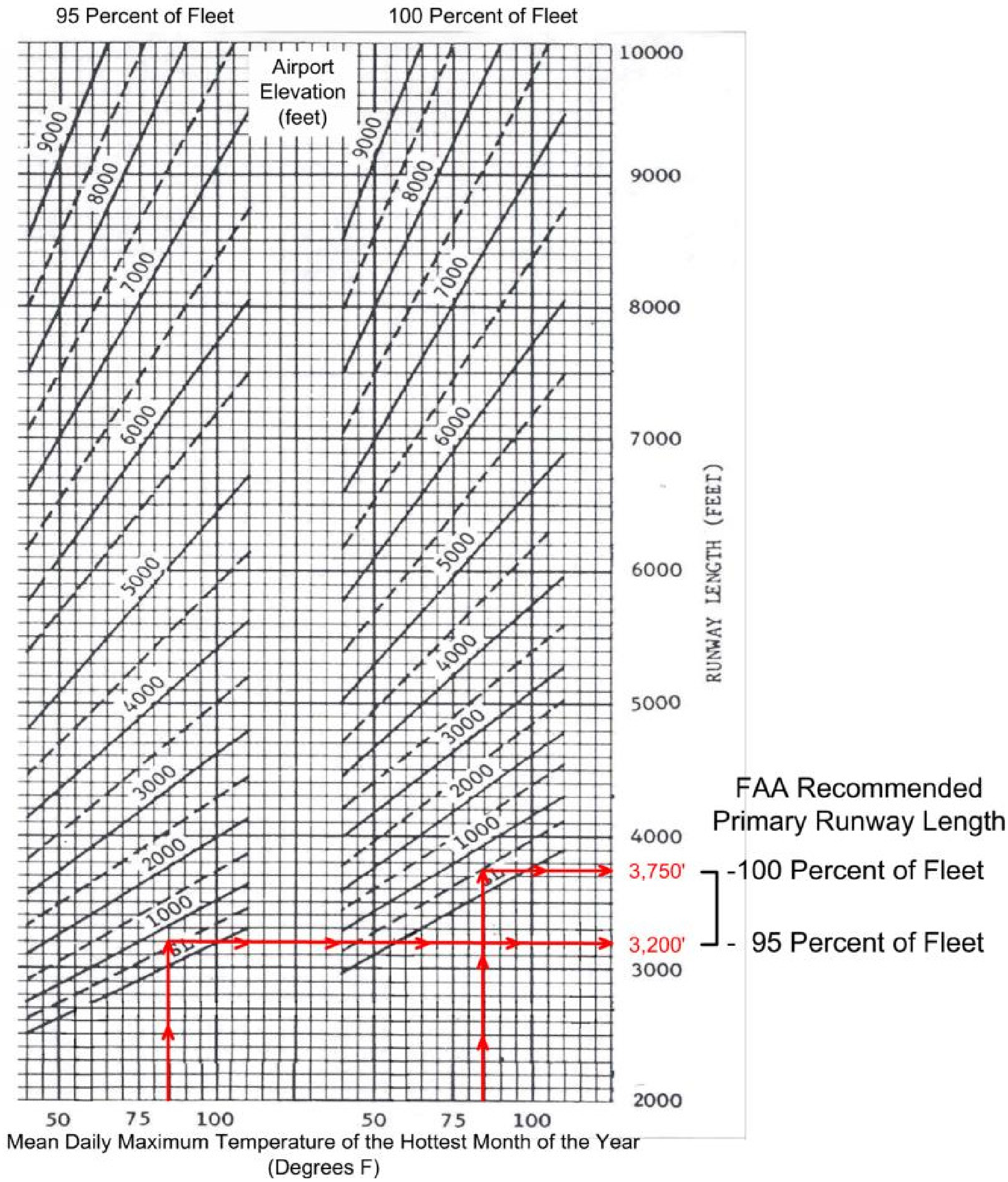
Runway 04/22, which is 5,199 feet long, is only used for general aviation (GA) operations. Additionally, the runway is closed over the winter months due to the poor pavement condition. As stated earlier, Runway 04/22 is primarily used by aircraft that can be categorized as *small aircraft*. AC 150/5325-4B provides alternate runway length design guidelines specifically for runways that are utilized by small aircraft. According to the AC, there are three different length categories recommended based on aircraft approach speeds:

- Small airplanes with approach speeds of less than 30 knots.
- Small airplanes with approach speeds of 30 knots or more but less than 50 knots.
- Small airplanes with approach speeds of 50 knots or more with maximum certificated takeoff weight of 12,500 pounds (6,670 kilograms) or less.
    - This category is further divided by the AC into family groupings based on whether the aircraft has fewer than 10 passenger seats or 10 or more passenger seats.

Most aircraft operating on Runway 04/22 have approach speeds greater than 50 knots and fewer than 10 passenger seats. The AC identifies two subcategories that should be used to further determine the proper runway length for this aircraft category: *95 percent of the fleet* or *100 percent of the fleet*.

Given LSE's location, proximity to other airports, and other available runway options, the subcategory of 95 percent of the fleet should be used to determine the appropriate length for Runway 04/22. **Chart 3-9** shows the AC runway length chart for the subcategories, with the appropriate lengths depicted as it relates to temperature and airport elevation at LSE. A runway length of 3,200 feet is recommended for the 95 percent of fleet subcategory of small aircraft with fewer than 10 passenger seats. Chapter 4, *Alternatives,* will identify options for providing a runway length of 3,200 feet on Runway 04/22.

Chart 3-9: Required Runway Length for Small Airplanes with Fewer than 10 Passenger Seats



Source: AC 150/5325-4B, Runway Length Recommendations for Airport Design.

3.3.5 Runway Design Standards

Several design criteria must be applied to the airport operating environment to provide a safe and efficient airfield. This section analyzes design standards that apply to each runway at LSE and makes recommendations that will be analyzed further in Chapter 4. According to AC 150/5300-13A, *Airport Design*, key runway design standards include the following:

- Runway Safety Area (RSA)
- Obstacle Free Zone (OFZ)
- Runway Object Free Area (ROFA)
- Runway Protection Zone (RPZ)

Each standard is intended to provide safe areas that minimize personal injury and property damage in the event of an emergency. Each of these areas are measured out equally from the runway centerline on either side and on either end. There are certain navigational aids (NAVAIDs) and other objects that are permissible within each area. According to the AC, only objects that have a certain function, composition, and/or height are allowed in these areas and zones; this is commonly referred to as *fixed-by-function*. Additionally, such objects must be mounted on a frangible coupling, which are designed to break away easily with minimal damage to objects that encounter them.

The RSA is a rectangular area designed to enhance the safety of an aircraft that may undershoot, overrun, or veer off the runway while providing greater accessibility for firefighting and rescue equipment during such circumstances. The OFZ is a smaller rectangular area that requires clearing of object penetrations, including aircraft fuselages and tails. The ROFA extends around and past the runway ends similar to, but wider than, the OFZ and RSA.

The RPZ is a trapezoidal area located beyond the runway ends in the approach and departure area. The function of an RPZ is to protect people and property on the ground. Airport sponsors are encouraged to own the property within the RPZ whenever possible and to keep the RPZ clear of incompatible objects and activities. The FAA identifies specific incompatible activities as outlined in the FAA Memorandum *Interim Guidance on Land Uses Within a Runway Protection Zone,* dated September 27, 2012.

The following sections review each runway and its compliance with AC 150/5300-13A standards.

Runway 18/36

Table 3-17 presents existing design standards for Runway 18/36, determines if existing standards are met, and shows recommended ultimate standards.

Table 3-17: Runway 18/36 Design Standards Compliance

Standard	Existing Standards C-II-2400 (ft)		Compliant with Existing Standards (Y/N)		Ultimate Standards C-III-2400 (ft)	
RSA						
Width	500		Y		No change	
Length Prior to Threshold	600		Y		No change	
Length Beyond Runway End	1,000		N		No change	
ROFA						
Width	800		Y		No change	
Length Prior to Threshold	600		Y		No change	
Length Beyond Runway End	1,000		N		No change	
Runway Separation Requirements						
Runway Centerline to Holding Position	250		Y		No change	
Runway Centerline to Parallel Taxiway	400		Y		No change	
Runway Centerline to Aircraft Parking Area	500		Y		No change	
Approach RPZ	**18**	**36**	**18**	**36**	**18**	**36**[1]
Length	2,500	1,700	Y	Y	2,500	1,700
Inner Width	1,000	500			1,000	500
Outer Width	1,750	1,010			1,750	1,010
Departure RPZ	**18**	**36**	**18**	**36**	**18**	**36**
Length	1,700	N/A	N	N/A	1,700	N/A
Inner Width	500				500	
Outer Width	1,010				1,010	

1 The ultimate Runway 36 approach RPZ may be larger if reduced visibility minimums can be provided.
Sources: FAA AC 150/5300-13A Airport Design.

With the current declared distances, Runway 18/36 is not compliant with existing RSA and ROFA standards because the perimeter fence is located within these areas off the Runway 36 departure end. As discussed in Section 3.3.4, this Master Plan recommends shortening the Runway 36 ASDA and LDA to resolve this. Runway 18/36 also is not compliant with existing departure RPZ standards because there are several incompatible land uses in the Runway 18 departure RPZ, including Fanta Reed Road and approximately 40 residential properties that are at least partially overlapped. As discussed in Section 3.3.4, this Master Plan recommends reducing the Runway 18 TORA to resolve this.

Runway 13/31

Table 3-18 presents the existing design standards for Runway 13/31, determines if existing standards are met and shows recommended ultimate standards.

Table 3-18: Runway 13/31 Design Standards Compliance

Standard	Existing Standards C-II-5000 (ft)		Compliant with Existing Standards (Y/N)		Ultimate Standards C-III-5000 (ft)	
RSA						
Width	500		Y		No change	
Length Prior to Threshold	600		Y		No change	
Length Beyond Runway End	1,000		Y		No change	
ROFA						
Width	800		Y		No change	
Length Prior to Threshold	600		Y		No change	
Length Beyond Runway End	1,000		Y		No change	
Runway Separation Requirements						
Runway Centerline to Holding Position	250		Y		No change	
Runway Centerline to Parallel Taxiway	300		Y		400	
Runway Centerline to Aircraft Parking Area	500		Y		No change	
Approach RPZ	**13**	**31**	**13**	**31**	**13[1]**	**31[1]**
Length	1,700	1,700			1,700	1,700
Inner Width	500	500	N	N	500	500
Outer Width	1,010	1,010			1,010	1,010
Departure RPZ	**13**	**31**	**13**	**31**	**13**	**31**
Length	1,700				1,700	
Inner Width	500	N/A	N	N/A	500	N/A
Outer Width	1,010				1,010	

1 The ultimate Runway 13/31 approach RPZs may be larger if reduced visibility minimums can be provided.
Source: FAA AC 150/5300-13A Airport Design.

Runway 13/31 is not compliant with existing RPZ standards because Lakeshore Drive is in the Runway 13 approach RPZ, and Fisherman's Road is in both the Runway 13 departure RPZ and the Runway 31 approach RPZ. However, removing these roads from the RPZs is impractical because it would severely impact either the utility of the runway or the communities surrounding the Airport. Chapter 4 will discuss implications for alternatives with respect to these runway design standards.

Runway 04/22

Table 3-19 presents the existing/ultimate design standards for Runway 04/22 and determines if these standards are met.

<table>
<tr><th colspan="5">Table 3-19: Runway 04/22 Design Standards Compliance</th></tr>
<tr><th>Standard</th><th colspan="2">Existing/Ultimate Standards B-I-5000 (small aircraft exclusively) (ft)</th><th colspan="2">Compliant with Existing/Ultimate Standards (Y/N)</th></tr>
<tr><td colspan="5">RSA</td></tr>
<tr><td>Width</td><td colspan="2">120</td><td colspan="2">Y</td></tr>
<tr><td>Length Prior to Threshold</td><td colspan="2">240</td><td colspan="2">Y</td></tr>
<tr><td>Length Beyond Runway End</td><td colspan="2">240</td><td colspan="2">Y</td></tr>
<tr><td colspan="5">ROFA</td></tr>
<tr><td>Width</td><td colspan="2">250</td><td colspan="2">Y</td></tr>
<tr><td>Length Prior to Threshold</td><td colspan="2">240</td><td colspan="2">Y</td></tr>
<tr><td>Length Beyond Runway End</td><td colspan="2">240</td><td colspan="2">Y</td></tr>
<tr><td colspan="5">Runway Separation Requirements</td></tr>
<tr><td>Runway Centerline to Holding Position</td><td colspan="2">125</td><td colspan="2">Y</td></tr>
<tr><td>Runway Centerline to Parallel Taxiway</td><td colspan="2">150</td><td colspan="2">Y</td></tr>
<tr><td>Runway Centerline to Aircraft Parking Area</td><td colspan="2">125</td><td colspan="2">Y</td></tr>
<tr><td colspan="5">RPZ</td></tr>
<tr><td>Runway</td><td>04</td><td>22</td><td>04</td><td>22</td></tr>
<tr><td>Length</td><td>1,000</td><td>1,000</td><td rowspan="3">Y</td><td rowspan="3">N</td></tr>
<tr><td>Inner Width</td><td>250</td><td>250</td></tr>
<tr><td>Outer Width</td><td>450</td><td>450</td></tr>
<tr><td colspan="5">Source: FAA AC 150/5300-13A Airport Design</td></tr>
</table>

Runway 04/22 exceeds most of the key standards for the recommended existing/ultimate RDC of B-I-5000 (small aircraft exclusively). The only exception is that Fisherman's Road is in the Runway 22 RPZ. If Runway 04/22 were to be decommissioned, design standards for the runway would not be relevant. If LSE decides to maintain Runway 04/22, either in its current configuration or at a shorter length, significant changes would need to be made to correspond with B-I design standards as the runway is currently designed to a higher standard. Chapter 4 will discuss implications for alternatives with respect to these runway design standards.

3.3.6 Runway Requirements Summary

Based on the analysis and conclusions above, Chapter 4 will identify runway alternatives for the following items at LSE:

- Down-sizing or decommissioning/removing Runway 04/22.
- Providing additional landing and takeoff distance on Runway 13/31.
- Implementing recommended existing/ultimate RDCs for each runway.

3.4 Taxiway Geometry

The following taxiways comprise the full parallel taxiway system at LSE:

- Taxiway C (full parallel to Runway 18/36)
- Taxiway A (full parallel to Runway 04/22)
- Taxiway B (full parallel to Runway 13/31)

There are several connector taxiways that link the terminal and GA aprons to the airfield and the parallel taxiways to the runways. However, Taxiways A, A1, A2, A3, B, B1, C3, and C4 provide direct access from aprons to the runway. According to AC 150/5300-13A, it is undesirable for taxiways to connect directly from an apron to a runway because a pilot may inadvertently taxi onto the runway when expecting a parallel taxiway.

Decommissioning and removal of Runway 04/22 could provide an opportunity for solving complex airport geometry and direct access issues. If Runway 04/22 was decommissioned, Taxiway A2 would no longer be necessary and would eliminate one of the direct access issues. Elimination of Runway 04/22 would also reduce the chance of runway incursions related to direct access from the south GA apron via Taxiways A3 and B. Similarly, Taxiway B would only cross one runway if Runway 04/22 was decommissioned. The implications of decommissioning Runway 04/22 on taxiway geometry will be analyzed further in Chapter 4.

The five-way intersection of Taxiway A, A3, and B has been identified as an area of concern by the Runway Safety Action Team (RSAT) at LSE. AC 150/5300-13A recommends that all taxiway intersections be designed based on the three-node concept, which means that a pilot should be presented with no more than three choices at an intersection. Ideally, the options are left, right, and straight ahead. The five-way intersection currently provides four choices for pilots taxiing in any direction.

Large charter aircraft, such as the B737, will often park temporarily on the south GA apron adjacent to Taxiway A to avoid obstructing the terminal apron and remain near the fixed base operator (FBO). Similarly, air carrier diversions will park in this same area. While air carrier diversions are less common than large charter events, the number of diverted aircraft can range from two up to seven at a time. Due to the size of the charter aircraft and group activity of air carrier aircraft, this ramp often becomes impassable and air traffic control must close Taxiway A. During these taxiway closures, aircraft based near the FBO and transient or based aircraft requiring fuel prior to takeoff must take a long detour involving three additional runway crossings to depart from Runway 31. This is particularly impactful as many of the jets at LSE are hangared along the south GA apron and use Runway 31 more often than air carrier aircraft due to its superior crosswind coverage and separation from air carrier traffic. In addition, any aircraft that would normally transit Taxiway A along the apron must also utilize less direct routes to avoid this section of Taxiway A when it is closed, such as when arriving on Runway 18 or 13 or departing on Runway 36. Therefore, expansion of the south GA apron or relocation of Taxiway A would not only allow better staging for the large charter aircraft and diverted air carrier aircraft but could reduce or eliminate impacts to all GA aircraft that normally transit this area.

Temporary parking for large charter aircraft sometimes overflows to the apron near Taxiway B. This blocks access for small GA aircraft based in the nearby T-hangars. It also only allows access to the Runway 31 threshold via back taxiing on the runway from Taxiway A. In addition, some of the old T-hangars directly adjacent to the apron were demolished in 2019. If a large corporate style hangar is constructed in this area, similar to the ones near Taxiway A, a charter aircraft parked on this apron would largely block access to any new hangars. Additional analysis of GA apron needs is presented in Section 3.8.4.

According to Airport data, closures of Taxiway A, Taxiway B, or Taxiways A and B occurred 82 times between January 2018 and August 2019 and totaled approximately 318 hours. Closures can be split into three categories:

- Taxiway A closure: occurred 59 times (72 percent).
- Taxiway B closure: occurred 10 times (12 percent).
- Taxiway A and B closure: occurred 13 times (16 percent).

Due to the multiple concerns and potential changes to this area, any taxiway configuration improvements would have to consider multiple aspects for both current and future conditions. Overall, the four primary taxiway configuration concerns at LSE are listed below and will be analyzed further in Chapter 4:

- Reduce direct apron-to-runway access.
- Maintain airfield access after potential Runway 04/22 decommissioning.
- Correct five-way intersection at Taxiways A, A3, and B.
- Improve circulation through Taxiway A and adjacent apron.

3.5 Instrument Approach Procedures

Currently, LSE has only one precision instrument approach procedure on Runway 18 that provides Category 1 minimums (200-foot decision height and ½ mile visibility). The approach is supported by an ILS and a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). The ILS consists primarily of glideslope and localizer antennas, which provide vertical and horizontal course guidance, respectively, to approaching aircraft. The MALSR provides visual confirmation of the runway centerline for pilots on approach to the runway and consists of a series of light bars preceded by a bank of sequenced flashing lights. The ILS and MALSR are often used during poor visibility such as at night and during inclement weather.

In addition to the precision approach, several different types of non-precision approaches are available at LSE including area navigation (RNAV) global positioning system (GPS) approaches and very high frequency omnidirectional range (VOR) approaches. An RNAV GPS approach allows for a straight-in approach without ground-based equipment such as a VOR, glideslope, or localizer. According to AC

150/5300-13A, a non-precision instrument approach is a straight-in instrument approach procedure that provides course guidance, with or without vertical path guidance, with visibility minimums not lower than ¾-mile (4000 RVR).

Precision approaches and non-precision approaches with vertical guidance are flown to a decision altitude (DA) at which a missed approach must be initiated if the required visual reference to continue the approach has not been established. A non-precision approach without vertical guidance is flown to a minimum descent altitude (MDA), which is the lowest authorized altitude on an approach that does not have vertical guidance. For the purposes of this facility requirements analysis, both the MDA and the DA are referenced as the approach decision height (DH) measured in feet above the runway threshold elevation.

The following sections evaluate existing approach procedures to each runway end and identify runway ends for which approach improvements should be considered.

3.5.1 Runway 18

Runway 18 currently provides the only precision instrument approach at LSE. While there are other instrument approaches to the remaining runway ends, they are categorized as non-precision instrument approaches and are not enhanced beyond the standard runway edge lights, visual approach slope indicators (VASI or PAPI), and runway end identifier lights (REILs). As a result, the decision heights and visibility minimums are higher on the other five runways.

Based on current available procedures, there is no need to further enhance the approach to the Runway 18. Therefore, there are no recommendations for changes to Runway 18 approach procedures.

3.5.2 Runway 36

Runway 36 currently has two non-precision approaches: an RNAV GPS approach and a VOR approach. With a DH of 300 feet above ground level (AGL), a visibility minimum of 1 statute mile, and a high intensity runway lighting (HIRL) system, Runway 36 is well positioned to handle current and future traffic at LSE. Additionally, Runway 36 is also designed to handle traffic with localizer performance with vertical guidance (LPV); this is the highest precision GPS approach currently available. LPV approaches are enhanced by Wide Area Augmentation System (WAAS) and provide precision comparable to a traditional ILS. WAAS is system of satellites and ground stations that provide signal corrections to GPS, making GPS approaches even more accurate.

The VOR approach to Runway 36 is considerably more restricted than the RNAV GPS approach as it has a DH of 600 feet AGL and a visibility minimum of 1 statute mile. If the approaching aircraft cannot use the RNAV GPS approach, the increased minimums can restrict use of LSE.

The Airport desires to enhance the Runway 36 instrument approach, if practical and feasible. Alternatives and possible solutions are discussed in Chapter 4.

3.5.3 Runway 13

Like Runway 36, Runway 13 also has two non-precision approaches: an RNAV GPS approach and a VOR approach. Despite the LPV enhancement to the RNAV GPS approach, it has a DH of 400 feet AGL and a visibility minimum of 1 statute mile, which are higher than minimums for Runway 18/36 approaches. If crosswind conditions dictate switching from Runway 18 to Runway 13, all instrument traffic is affected due to the significant increase in minimums as well as the decreased runway capacity resulting from increased aircraft spacing requirements. Use of this runway for instrument approaches is also likely limited by the LDA that is 740 feet shorter than the full runway. The Airport desires to enhance the Runway 13 instrument approach as Runway 13/31 has the best IFR crosswind coverage and Runway 18/36 has the only approach with visibility minimums less than one mile. Alternatives and possible solutions are discussed in in Chapter 4.

3.5.4 Runway 31

Runway 31 currently has a RNAV GPS approach, but the minimums are much higher than approaches to Runways 18, 36, and 13. As it does not have the LPV enhancement, the DH is 1,100 feet AGL and the visibility minimum is 3 miles for larger business jets and air carrier aircraft. Use of this runway for instrument approaches is also likely limited by the LDA that is 740 feet shorter than the full runway. The Airport desires to enhance the Runway 31 instrument approach as Runway 18 is the only approach with visibility minimums under one mile. Currently, Runway 31 has the highest approach minimums at LSE though aircraft are able to land on this runway and have a shorter taxi distance to the terminal area compared to many of the other runways. Alternatives and possible solutions are discussed in in Chapter 4.

3.5.5 Runway 04

Runway 04 currently has an RNAV GPS approach that is enhanced by localizer performance (LP). An LP approach is often used when an LPV approach is not possible. The main reason an LP approach is chosen over an LPV approach is because surrounding infrastructure or terrain interferes with safe approach altitudes. Runway 04 has a DH of 600 feet AGL, which is lower than the Runway 31 DH, but its visibility minimum of 1 statute mile is comparable to other runways at LSE. However, the GA user survey results discussed in Section 3.7 indicate that nearly all Runway 04/22 users conduct their operations during VFR conditions and do not use instrument approaches. The approaches to Runway 04 are sufficient for current and future operations. There are no recommendations for changes to Runway 04 approaches.

3.5.6 Runway 22

Runway 22 currently has a RNAV GPS approach, but it is the most restricted approach of its kind at LSE. It has the highest DH of 1,200 AGL and a visibility minimum of 1 ¼ miles at the low end of the aircraft category scale. However, there are several other runways with lower minimums and more accurate GPS approaches. The approach to Runway 22 is sufficient for current and future operations. There are no recommendations for change to the current approach on Runway 22.

3.5.7 Summary

Chapter 4 will consider alternatives for enhancing approaches to LSE, specifically for Runways 36, 13, and 31. Enhancements to the Runway 31 approaches are perhaps most critical given the excessively high minimums for procedures to this runway end. The alternatives analysis will include a comparison of the wind coverage for each of these runway ends, to determine which procedure enhancements would most improve overall accessibility of the airfield during inclement weather.

3.6 Air Traffic Control Tower (ATCT)

The ATCT is located at the apex of the south and east GA aprons, is approximately 800 feet from the Runway 04/22 centerline, and is approximately 900 feet from the Runway 13/31 centerline. The ATCT controls traffic on the airside and movement areas that include runways, taxiways, and some apron areas. Movement and non-movement areas are divided by a double line that is dashed on one side and solid on the other. The ATCT was constructed in the 1970s and is operated on behalf of the FAA by an independent contractor, Midwest ATC.

The 2013 planning study for LSE discussed the ATCT in detail and identified possible constraints for controller line-of-sight. Line-of-sight standards are outlined in FAA Order 6480.4A, *Airport Traffic Control Tower Siting Process.* The standards exist to ensure that ATCT staff have an unobstructed view of all movement areas and aircraft approaching and departing the airport. Alternatives for the southwest GA area should carefully consider controller line-of-sight to ensure it is maintained.

There is a vacant one-acre parcel located immediately east of the ATCT. According to the 2013 report, building heights on this parcel closest to the tower would be limited to 35 feet. At the eastern edge of the 1-acre parcel, building heights would be limited to 25 feet.

In addition to FAA line-of-sight standards, certain security requirements for ATCTs exist when determining a tower site. However, specific standards for tower siting are not made available to the public, and the FAA considers each tower site case-by-case. Consultant experience indicates that 300-foot setback is required from the nearest part of the ATCT to a publicly accessible location. The 1-acre parcel adjacent to the ATCT at LSE currently falls within the 300-foot setback. If a hangar or other structure was built on the 1-acre parcel with controlled access, such as inside of a perimeter fence, it might be permissible. Consultation with the FAA would be required to determine if specific development would be permissible on this parcel.

3.7 General Aviation User Survey

In the process of updating a master plan, the use of focus groups often facilitates information gathering from key user groups. A general aviation (GA) user survey solicited information from GA tenants at LSE that provides a user perspective for the analysis of LSE facilities in general and for Runway 04/22 specifically. Survey results are summarized below.

3.7.1 Based Aircraft Information & Annual Operations

In total, 32 LSE users participated in the survey. Questionnaires were made available to LSE tenants both online and in person. Twenty respondents base their aircraft at LSE, 11 are based at another airport, and one transient user was based at LSE in the past. A wide range of aircraft makes and models were represented ranging from a Cessna 172 to a King Air C90B. Several GA aircraft based at LSE are single engine; however, several multi-engine aircraft are represented such as a King Air C90B, Beechcraft Baron, and Twin Comanche. The aircraft types represented in the survey are summarized below in **Table 3-20**.

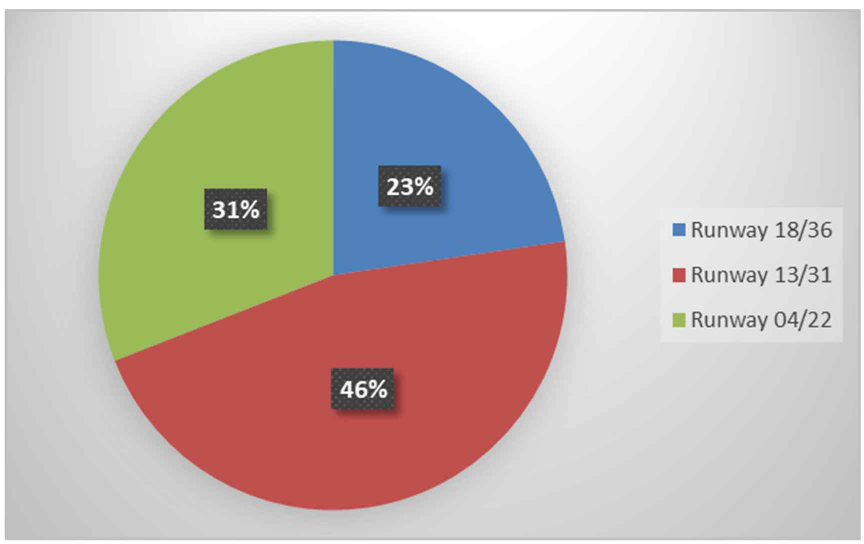
Table 3-20: GA Survey Aircraft Mix	
Make	**Model(s)**
American Champion	Super Decathlon
Beechcraft	BE58 Baron, King Air C90B
Cessna	170B, 172, 172M, 205, 310, 421
Piper	PA28-181 Archer, PA 28-140 Cherokee, PA30b Twin Comanche
Taylorcraft	BC-12-D
Vans	RV-4, RV-6A
Zenith	Zodiac
Source: La Crosse Regional Airport User Survey (2018)	

There are two terms used in the survey results to describe activity at LSE: operations and touch-and-go. An operation is counted when a user takes off or when a user lands – therefore, a takeoff and a landing count as two operations. A touch-and-go is a landing and takeoff that occur with a short amount of time spent on the runway during which the aircraft does not exit the runway. Overall, 11 respondents (35 percent) conduct at least 100 annual operations at LSE, while four respondents (13 percent) conduct more than 200 annual operations at LSE. Over half of respondents (57 percent) expect their annual operations to increase, while the remainder (43 percent) expect their annual operations to remain constant. Of the individuals who answered the survey, the average respondent conducts 85 operations per year at LSE.

3.7.2 Runway Use by Percentage

Respondents were asked to estimate runway use by percentage for each runway. When examining the results of annual operations per runway, Runway 13/31 has the highest percentage of annual use among respondents at 46 percent. The runway use results are summarized in **Chart 3-10.**

Chart 3-10: Respondent Runway use by Percentage



Source: La Crosse Regional Airport User Survey (2018)

3.7.3 Runway 04/22 Applicability to Airport Capacity

Runway 04/22 is the shortest runway at LSE and is used primarily by GA aircraft. A primary focus of this master plan update is to evaluate and analyze the current and future role of Runway 04/22. Factors analyzed in this master plan include its effect on airfield capacity and the financial feasibility of maintaining the runway.

Runway 04/22 is not used for commercial operations and is not expected to affect these operations. In Section 3.2, airfield capacity was estimated using data for two intersecting runways, as AC 150/5060-5 does not have a runway configuration diagram that matches the unique layout at LSE. Based on the ASV calculations, airfield capacity will be adequate throughout the planning period when Runway 18/36 and Runway 13/31 are considered, excluding Runway 04/22. Discussions with LSE airport administration and air traffic control located on the field also indicate that capacity is not expected to be adversely affected if Runway 04/22 was decommissioned.

Specific questions in the survey were devoted to the use of Runway 04/22 among the GA user group. Most respondents (88 percent) consider Runway 04/22 to be important to their operations at the Airport, while two (6 percent) state the opposite. Two respondents (6 percent) declined to answer this question.

Respondents indicated that Runway 04/22 is more convenient to the GA hangar locations on the southeast side of LSE, as it has a shorter taxi time and better access to this area. Respondents also indicated that Runway 04/22 provides more favorable winds, is usually assigned to small GA aircraft by the ATCT and separates GA and commercial traffic.

3.7.4 Minimum Runway Length for GA Users

The variety of survey respondents corresponds to a variety of aircraft based on the field. Respondents were asked for a minimum runway length requirement corresponding to their specific aircraft. **Table 3-21** summarizes these minimum runway lengths. The average respondent needs a minimum runway length of approximately 2,400 feet to operate their aircraft.

Table 3-21: Respondent Minimum Runway Length Requirements

Minimum Length (feet)	% of Respondents	Total Respondents
0 to 2,000	40.6	13
2,001 to 3,000	34.4	11
3,001 to 4,000	12.5	4
No Response	12.5	4

Source: Mead & Hunt, Inc., La Crosse Regional Airport User Survey (2018).

3.7.5 Common Destinations for GA Users

Users indicated a variety of common destinations, with most destinations within the state of Wisconsin. However, many reported destinations in neighboring states such as Minnesota and Iowa. Other destinations include Missouri, Nebraska, Arizona, and Ohio.

3.7.6 Aircraft Purpose & Percentage by Activity

Respondents were asked to assign the purpose of their LSE use by percentage. As seen in **Table 3-22**, most LSE use by respondents is split between pleasure/recreation, personal business, and flight training.

Table 3-22: Respondent Airport Use

Category	Percentage (%)
Pleasure/Recreation	28
Personal Business	28
Flight Training	22
Other	13
Military	6
Corporate	3
Cargo	0
Agricultural	0
Grand Total	**100**

Source: La Crosse Regional Airport User Survey (2018).

3.7.7 Instrument Approaches at LSE

Approximately one-third (34 percent) of respondents conduct instrument approaches into LSE. Most of those users conduct more than 20 instrument approaches on an annual basis. Several respondents do not conduct instrument approaches at all and some declined to answer. As the only precision instrument approach is to Runway 18, all precision instrument approaches occur on Runway 18, and Runway 04/22 and Runway 13/31 are used for VFR operations and non-precision approaches.

3.7.8 Adequacy of Current Facilities

Surveyed users were asked to evaluate the following facilities at LSE and their adequacy:

- Hangars
- Apron parking space
- Runways
- Taxiways
- Navigational aids
- Lighting & signage
- Instrument procedures
- Traffic patterns
- Pilot services
- Fuel dispensing
- Aircraft maintenance
- Automobile access/parking

When averaged, approximately half (48 percent) of respondents marked *Yes* when asked about the overall adequacy of current facilities. In general, the users surveyed believe that the current facilities are adequate.

Reasons for inadequate facilities were that self-serve fuel was not available, additional auto parking is desired, fuel is expensive, maintenance expertise is lacking, and more ILS approaches are desired. Survey respondents also identified desired areas of future improvement including self-serve fuel, free aircraft tie-downs and auto parking, and an ILS approach to Runway 36.

Lastly, any other comments regarding facilities and effects on current operations were solicited. Respondents desire that Runway 04/22 be kept operational and in safe condition, GA hangars be improved, self-serve fuel be provided, and long-term parking be provided at lower cost.

3.7.9 Conclusion

An overarching theme in the survey results is that respondents would prefer to keep Runway 04/22 active because of convenience. It is located close to GA hangars and separates departing and arriving GA and commercial traffic. In general, Runway 04/22 serves a purpose for GA users, but is not absolutely necessary to operations at LSE.

3.8 General Aviation Facilities

3.8.1 Existing Facilities

General aviation (GA) hangars and facilities occupy the area south of the intersection of Runways 13/31 and 04/22. The GA apron is divided into south GA apron and east GA apron, with the ATCT near the apex. The south GA apron frontage primarily accommodates box hangars and LSE facilities, such as the ARFF building and ATCT, while T-hangars are located on the east GA apron frontage and the interior area separated from the apron. This section discusses existing and future GA demand and its implications for this area, while also drawing on and reexamining the conclusions of the 2014 Terminal and General Aviation Development Concepts study.

The current hangar layout allows larger aircraft to be serviced on the south GA apron, while smaller aircraft circulate on the east GA apron. New T-hangars were recently constructed in the south interior area, with access to the east GA apron provided by two taxilane connections. To the east, a connection approximately 70 feet wide connects to the apron while another to the north is approximately 35 feet wide. This configuration allows for aircraft circulation throughout the T-hangar area but can cause congestion during heavy use periods as both access points are located to the east of the T-hangars. Reconfiguring this area should be considered to prevent congestion and accommodate growth. Limitations to expansion in this area include Runway 13/31 and its associated surfaces, such as the RSA, ROFA, and departure surface, other facilities to the west, and Fisherman's Road to the south.

If Runway 04/22 is reconfigured or decommissioned, it would allow the western apron to expand to better serve large aircraft. Currently, commercial charters and large corporate aircraft sometimes obstruct the south GA apron and make circulation difficult. These commercial charters include large Boeing aircraft such as the B737, B757, or B767 and will often move military personnel for training purposes. The current taxiway separation from the runway on each side of the GA apron is approximately 500 feet from the runway centerline, although only 400 feet is required. Reducing this separation by expanding the aprons would allow more room for aircraft circulation and/or new development. Removal and/or relocation of aging T-hangars from the east GA apron frontage would further improve GA development opportunities.

To resolve existing issues in this area, including runway to taxiway separations, direct runway to apron connections, and inadequate apron space, significant changes to the layout may be needed. Chapter 4 will consider reconfiguring this area to address these issues while also planning for future activity.

3.8.2 Other Potential GA Development Areas

Although GA activity is generally concentrated on the south side of LSE, there are other areas that have potential for future GA development. This section identifies other areas that could be used for additional GA development; however, it is unlikely that demand will increase during the planning period to the point that expansion into a new area is required. Concepts for these areas will be presented in Chapter 4.

West of Runway 13 Threshold

Although the ALP reserves space for a dedicated cargo facility to the west of the Runway 13 threshold, the 2013 GA Study concluded that sufficient demand to support this development is not expected in the foreseeable future. The 2018 Highest and Best Land Use (HBLU) Study completed by Explorer Solutions (see **Appendix E**) noted that the adjacent area is occupied by industrial and commercial use and proposed accommodating a complementary aeronautical use near the Runway 13 threshold. Future development could include shipping and receiving and could establish a corporate presence at LSE with easy access to the airfield.

Northeast Development Area

The area around the Runway 22 threshold is unoccupied except for recreational and natural areas east of Fisherman's Road. Depending on the preferred alternative for Runway 04/22, this area could be developed to include hangars near the Runway 31 and 22 thresholds. Access to this area is currently limited and Fisherman's Road is narrow and located within the Runway 31 RPZ. On the airside, aircraft would have to cross Runway 13/31 to reach any hangars or other services available on the other side. If this area is developed for improved vehicle access, aircraft services should be considered to reduce Runway 13/31 crossings and encourage efficient circulation.

3.8.3 Hangar Demand

The number of hangars needed at an airport is closely related to the number of based aircraft. Some airports also offer hangars for itinerant aircraft storage, typically as a service offered by an FBO. The preferred based aircraft forecast selected in Chapter 2 is shown below in **Table 3-23**. This is less than the 20-year forecast of 113 based aircraft identified by the 2014 GA Development Study. Since the 2014 study was completed, demand has decreased slightly, and LSE has begun to reconfigure the hangar layout to better accommodate user needs.

Table 3-23: Based Aircraft Fleet Mix					
Year	**Single**	**Jet**	**Multiengine**	**Helicopter**	**Total**
2017	60	8	4	2	**74**
2022	66	9	5	2	**82**
2027	70	9	7	3	**89**
2032	74	10	7	3	**94**
2037	76	11	8	4	**99**
Source: Chapter 2 Forecasts.					

As stated in Chapter 1, several of the T-hangars along the east GA apron frontage are aging and scheduled to be removed. This will reduce the T-hangar unit count by 24 while two additional T-hangars constructed to the south will add 18 units, slightly reducing the total number of T-hangar units. However, T-hangars are currently at approximately 70 percent capacity and removing aging buildings and better tailoring hangar facilities to the anticipated user base is desirable.

Hangar demand can be projected based on the number of aircraft expected at LSE over the 20-year planning period. Typically, T-hangars are used for single-engine aircraft, while box hangars are used for multi-engine or turbine aircraft. The approximate space required for each type of aircraft, including a buffer area around each aircraft, is shown in **Table 3-24**. Projections through the planning period for total hangar space demand were calculated based on the projected based aircraft number above and the space requirements from Table 3-24. These results are shown in **Table 3-25**.

Table 3-24: Approximate Hangar Sizes for Aircraft Types		
Aircraft Type	**Examples**	**Approximate Square Feet**
Single Engine	Cessna 172, Cirrus SR-22	1,400
Multiengine & Helicopters	Piper Seneca, Beechcraft King Air	2,500
Small & Midsized Jets	Cessna Citation, Learjet	4,000
Large Business Jets	Gulfstream G550, Global Express	10,000
Source: Mead & Hunt, Inc.		

Table 3-25: Hangar Demand Forecast

Aircraft Type	2017	2022	2027	2032	2037
Single Engine					
Projected Based Aircraft	60	66	70	74	76
Total Hangar Demand (sq. ft.)	84,000	92,400	98,000	103,600	106,400
Multi Engine					
Projected Based Aircraft	4	5	7	7	8
Total Hangar Demand (sq. ft.)	10,000	12,500	17,500	17,500	20,000
Helicopters					
Projected Based Aircraft	2	2	3	3	4
Total Hangar Demand (sq. ft.)	5,000	5,000	7,500	7,500	10,000
Jet					
Projected Based Aircraft	8	9	9	10	11
Total Hangar Demand (sq. ft.)	32,000	36,000	36,000	40,000	44,000
T-Hangar Demand					
Total T-hangar Available	58,600	58,600	58,600	58,600	58,600
Total T-hangar Demand	54,600	60,060	63,700	67,340	69,160
T-hangar Surplus	**4,000**	**-1,460**	**-5,100**	**-8,740**	**-10,560**
Box Hangar Demand					
Total box hangar Available	84,200	84,200	84,200	84,200	84,200
Total box hangar Demand	76,400	85,840	95,300	101,260	111,240
Box hangar Surplus	**7,800**	**-1,640**	**-11,100**	**-17,060**	**-27,040**
Total Hangar Demand					
Hangar Space Available	142,800	142,800	142,800	142,800	142,800
Hangar Space Demand	131,000	145,900	159,000	168,600	180,400
Hangar Surplus	**11,800**	**-3,100**	**-16,200**	**-25,800**	**-37,600**

T-hangar capacity is adjusted to account for the net change in space available resulting from on-going T-hangar projects. Turboprop aircraft can either be counted as single or multiengine depending on the model and most turboprop aircraft owners tend to prefer box hangars for maintenance purposes. Therefore, a portion of single engine aircraft growth is counted towards box hangar demand.
Source: Mead & Hunt, Inc.

The ongoing modifications to the existing T-hangar inventory, including relocating buildings to the south while removing excess units, will help reduce unneeded T-hangar space and better accommodate future box hangar demand. Although there is an apparent current surplus of box hangars, box hangars are already effectively at capacity and business in the area is growing. As turbine aircraft become more common in the based aircraft fleet, additional box hangars will be required. There are two existing open areas along the south GA apron frontage where new box hangars could be constructed, and the removal of three aging T-hangars on the east GA apron will allow new box hangars to be constructed along the existing east GA apron. In addition, the south side of the south GA apron is unoccupied, and additional box hangars could be accommodated without interfering with the Runway 18 departure surface or Runway 36 RPZ.

3.8.4 Aircraft Parking Demand

Activity in the existing south GA complex is served by two aprons running southwest and southeast from their joined apex. The larger south GA apron generally runs southwest and is approximately 1,500 feet long by 180 feet wide, though it narrows to 160 feet to the south. It supports larger box hangars, the FBO and ATCT on the west side of the south GA complex. The east GA apron is approximately 1,200 feet long by 140 feet wide. Positioned adjacent to the east GA apron are smaller private hangars, T-hangars, and green space near the apex between the two aprons.

As narrow-body and regional jet commercial aircraft that often park and board on the GA aprons are more demanding than the business jets and smaller GA aircraft that typically operate there, consideration should be given to improving the apron pavement strength. The GA aprons in this area are designed for lightweight aircraft, with some areas designed for aircraft weighing 30,000 pounds or less. The aprons are not currently designed to support the same loads as Taxiways A, B, and C, Runway 18/36, and Runway 13/31, but they are often used by larger aircraft that use these runways and taxiways. Strengthening the GA aprons should be considered during reconstruction design to allow air carriers and larger charters to transit these areas as needed.

South GA Apron

The south GA apron is situated between Taxiway A and the larger hangars and FBO adjacent to the apron. While Taxiway A allows aircraft to easily access the area, it often must be closed when larger aircraft park on the south GA apron. For instance, large commercial charter aircraft, such as the Boeing 737, often park and board in this area. If large aircraft such as the B737 park on the apron for staging and while awaiting boarding, their large wingspan prevents other aircraft from using Taxiway A while maintaining proper wingtip clearance between aircraft and, therefore, Taxiway A must be closed to other taxiing aircraft. Section 3.4 contains additional details on how these shutdowns impact aircraft circulation around the airfield.

While large charter aircraft are the most demanding aircraft that use this area, business jets commonly use the aprons for staging and servicing. These aircraft are able to park on the apron without interfering with general circulation and include business jets like the Gulfstream G200, Falcon 2000, and Learjet 35. As there are several private hangars and an FBO that require access to the apron and airfield this area generally is not used for long-term parking by aircraft, as it would obstruct hangars. The east GA apron usually accommodates aircraft that require long-term parking.

East GA Apron

The east GA apron provides the only access to T-hangars at the center of the south GA complex. Aircraft use the east GA apron to taxi to the T-hangars adjacent to the apron and then may utilize taxilanes between these T-hangars to continue to their destination. Therefore, this apron is used not only for long-term itinerant aircraft parking but plays an important role in allowing circulation and access to many of the smaller GA hangars. As the south GA apron primarily supports large private hangars and the FBO, aircraft are usually on the south apron for staging or enplaning/deplaning. Maintaining long-term aircraft parking on the east GA apron allows the south GA apron to remain less cluttered and for larger corporate and charter aircraft to circulate through the area. For these reasons, long-term aircraft parking should be primarily limited to the east GA apron while simultaneously permitting access to the smaller GA hangars in the center of this complex.

ADG I aircraft require 79 feet of clear space for taxilanes and, in the current configuration, are able to pass to the south of aircraft parking and north of the fence when taxiing southeast on this apron. Larger aircraft are not able to fit through this area and must use Taxiway B to pass aircraft parking. Aircraft using Taxiway B must contact the ATCT before entering the movement area. The dimensions from the edge of Taxiway B to the movement area marking allow for aircraft as large as ADG III to use Taxiway B, while maintaining the required distance from parked aircraft. However, most of the T-hangars adjacent to this apron and in the center of the GA complex are only spaced to permit ADG I aircraft to transit between these T-hangars. ADG III aircraft have no need to enter this area and can use Taxiway B to bypass the area but many business aircraft are categorized as ADG II and it would be beneficial to modify the central GA complex to allow a more diverse fleet mix as development continues in this area.

Although based aircraft owners generally prefer hangars, itinerant aircraft operators often prefer temporary parking, which is located on the east GA apron. These tie-downs are less expensive than hangared parking and allow aircraft to receive some services on the apron, such as refueling. Designated tie-down parking consists of four tie-downs for larger turbine aircraft and twenty-two smaller tie-downs for piston aircraft. Additional unmarked parking space is available for large charter aircraft at the apex of these two aprons. Currently the east GA apron is primarily used for long-term itinerant parking for business jets and smaller aircraft. The south GA apron is used for staging and enplaning/deplaning aircraft and the apex between the two aprons is used for large charter aircraft, as that section contains the strongest pavement. As development in this area continues overflow parking capable of supporting large charter aircraft will become increasingly important as these aircraft would otherwise block the entrance to hangars. Parking large charter aircraft in other areas would also create unnecessary wear on the pavement. Therefore, it is recommended that the northern portion of this apron be maintained in its existing configuration to accommodate charter aircraft while smaller aircraft are able to use the designated tie-downs.

3.9 Terminal Area

Airport terminals accommodate both passengers and aircraft utilizing the Airport. The terminal at LSE accommodates scheduled passenger service through two regularly scheduled air carriers: American Airlines (service to Chicago) and Delta Airlines (service to Minneapolis and Detroit). Commercial charters for Fort McCoy personnel occur on the field, and private charters are available through the FBO.

3.9.1 Terminal Building

In 2015, most the terminal building was fully renovated and updated. The project included relocating secured seating, expanding capacity in the secure area, connecting the secure and non-secure restaurant, and updating the building interior. Significant improvements were made to the placement of jet bridges that allow larger aircraft to utilize the terminal. Access to the third gate was improved by relocating the nearby security area. Figures 1-8 and 1-9 in Chapter 1 depict the current layout of the terminal building.

Peak Passenger Activity

Expected terminal facility demand is based on the peak period activity forecasts presented in Chapter 2. These forecasts are used to identify the design hour (peak passenger activity) to be used in calculating terminal space requirements. Facilities should be sized appropriately for periods of high passenger volume. During the design hour, a terminal facility generally experiences usage of 5 percent to 10 percent less than absolute peak level of activity.

Peak activity forecasts account for the total number of enplaning and deplaning passengers in the terminal building during the design hour and determine requirements for portions of the terminal facility that specifically serve enplaning and/or deplaning passengers. At airports with no connecting flights, such as LSE, it is assumed that enplanements and deplanements are generally equal during the peak hour.

From 2008 to 2013, LSE saw a significant decrease in enplanements due to the economic recession, but enplanements have steadily grown since 2013. This recovery has occurred in conjunction with increases in average available seats per flight and passenger load factor. Currently, approximately 30 percent of airline departures at LSE occur during the peak hour.

Fleet Mix Considerations

Boarding gates provide access to aircraft from the terminal. Aircraft size determines the distance required between boarding gates. Likewise, the seating capacity of the aircraft will determine the amount of hold room space needed for each gate.

Historically, the industry has been trending towards larger aircraft with greater seating capacity while reducing frequency of flights. From 2009 to 2012, turboprop aircraft with 34 seats, such as the SAAB340, were replaced by 50-seat aircraft, such as the CRJ200 and ERJ145 regional jets. As discussed previously, trends are now favoring regional aircraft with 70 to 90 seats and 50-seat aircraft, such as the CRJ200, are being retired. LSE is subject to this trend as American Airlines is steadily replacing the CRJ200 with the CRJ700. While the CRJ200 is still being used at LSE, a switch to a larger aircraft is expected within the planning period.

Analysis

LSE should provide terminal facilities that accommodate future commercial and charter flights in a flexible, efficient manner that does not limit future development. An analysis of the terminal facility's functionality compared to anticipated demand shows that overall space in the terminal building is roughly equivalent to forecasted demand throughout the 20-year planning period. **Table 3-26** shows estimates of terminal space requirements throughout the 20-year planning period based on industry standards.

Although some functional areas show a minor deficit in space, LSE recently renovated and reconfigured the terminal building, and it is performing adequately at the current time. Potential future deficiencies associated with public spaces in the terminal are also identified in Table 3-26 for concourse passenger circulation, secure and non-secure restrooms, and concessions. This analysis also indicates that a fourth airline gate may be required within 20 years. Although the analysis shows adequate space for inbound/outbound baggage, Airport staff indicate that the layout of the outbound baggage room makes it difficult to utilize the full bag belt due to inadequate turning radii for baggage tugs.

Chapter 4 will identify planning-level concepts for resolving circulation issues for baggage tugs in the outbound baggage area, as well as adding more secure hold room space and an additional airline gate. If further expansion is needed before the end of the 20-year planning period, it is recommended a separate study be conducted, as the scope and complexity of the project will be dependent on factors specific to Airport needs at that time. Given that overall space may exceed demand, the Airport should consider options for either expanding or relocating the terminal building.

Table 3-26: LSE Terminal Space Program Study						
Forecast Year		**2017**	**2022**	**2027**	**2032**	**2037**
Annual Enplaned Passengers		92,951	99,288	106,058	113,288	121,012
Peak Hour Enplaned Passengers		87	93	100	106	114
Functional Area	**Existing Gross Square Footage (GSF)**	**Recommended GSF**				
Security Checkpoint						
Number of Lanes	1	1	1	1	1	1
Passenger Screening	1,810	1,200	1,200	1,200	1,200	1,200
Checkpoint Queueing	762	700	700	700	700	700
Checkpoint Exit	360	600	600	600	600	600
Checkpoint Total	***2,932***	***2,500***	***2,500***	***2,500***	***2,500***	***2,500***
Secure Concourse						
Number of Gates	3	3	3	3	3	4
Circulation	2,140	4,389	5,184	5,357	5,875	6,048
Gates and Seating	4,790	3,606	4,016	4,288	4,521	4,817
Restrooms	652	2,100	2,200	2,240	2,260	2,300
Subtotal Public	**7,582**	**10,095**	**11,400**	**11,885**	**12,657**	**13,165**
(NP) Concession	*1,140*	*1,394*	*1,489*	*1,591*	*1,699*	*1,815*
(NP) Building Support	*30*	*127*	*150*	*155*	*170*	*175*
Subtotal Nonpublic	*1,170*	*1,521*	*1,639*	*1,746*	*1,869*	*1,990*
Concourse Total	***8,752***	***11,616***	***13,039***	***13,631***	***14,526***	***15,155***
Non-Secure Terminal						
Number of Baggage Carousels	1	1	1	1	1	1
Circulation and Queuing	10,540	8,216	9,459	9,819	10,703	11,075
Waiting and Bag Claim	4,275	3,539	3,780	4,038	4,313	4,607
Public Restrooms	867	1,885	1,916	1,948	1,982	2,019
Concessions and Vending	22	153	163	174	186	199
Support Space	537	626	657	691	727	766
Subtotal Public	***16,241***	***14,419***	***15,975***	***16,670***	***17,911***	***18,666***
(NP) Baggage Screening	730	1,200	1,200	1,200	1,200	1,200
(NP) Inbound/Outbound Baggage	4,460	2,600	2,800	3,000	3,100	3,300
(NP) Airline Areas	2,038	1,108	1,184	1,264	1,351	1,443
(NP) Car Rental Areas	947	975	1,024	1,075	1,129	1,185
(NP) Leased Space	869	1,799	1,862	1,930	2,002	2,079
(NP) Airport Offices and Support Areas	3,221	3,328	3,434	3,469	3,544	3,580
Subtotal Nonpublic	***12,265***	***11,010***	***11,504***	***11,938***	***12,326***	***12,787***
Building Utilities and Chases	3,620	4,805	5,573	5,767	6,280	6,477
Terminal Total	**32,126**	**30,234**	**33,052**	**34,375**	**36,517**	**37,930**
Terminal Facility Total	***43,810***	***44,350***	***48,591***	***50,506***	***53,543***	***55,585***

All existing and recommended spaces estimated by Mead & Hunt, Inc. based on industry standard guidance and consultant experience. Actual required areas dependent on space adjacency and arrangement. Not all spaces are eligible for FAA funding. Further study is recommended as part of project design.

Sources: FAA Advisory Circulars, Airports Cooperative Research Program, Mead & Hunt, Inc.

3.9.2 Apron Areas

The Terminal area has two aprons. The first is the terminal apron located immediately adjacent to the terminal building and currently measures approximately 870 feet long by 400 feet wide while the GA Terminal Apron is located 100 feet to the north of the terminal apron and is approximately 260 feet long by 325 feet wide. Both of these aprons are discussed in this section.

Terminal Apron

A sizable portion of the center of this apron is typically occupied by the jet bridges and the air carrier aircraft that utilize them. Aircraft in ADG I, II, or III may use any gate at LSE, although aircraft in ADG IV are only able to use Gate 1, located on the south side of the apron. However, aircraft using this gate are not always able to power out after enplaning, as aircraft using other gates block their exit and the angle at which they had to approach the gate make it unlikely they would be able to continue to execute the necessary turn. An apron expansion to the south completed in 2019 has provided enough room for aircraft to maneuver to this gate in a manner that allows them to power out. However, the apron has not yet been marked for parking or taxi paths as the air carriers are conducting their own study to determine how to best anticipate fleet needs. Once properly marked, this extended apron will prevent aircraft from taxiing as close to the edge of the pavement and allow more aircraft to depart from the gate under their own power.

The apron pavement was first constructed in 1988 although the concrete panels on the southern and eastern edge were constructed in 2004 while the north portion of the apron, which was originally asphalt, was reconstructed with concrete in 2006. Due to the age of the pavement various cracks are present which present several risks. As pavement deteriorates, loose pieces of concrete are subjected to jet blast which incurs the risk of being propelled and damaging equipment or harming personnel. This risk is exacerbated by the uneven nature of some of these cracks, as snow removal equipment may unintentionally catch the edges of these cracks and either causing the snowplow to come to an abrupt stop and/or create additional loose concrete.

The terminal apron expansion completed in 2019 added 122 feet to the south end of the terminal apron and in summer 2020 a project was completed that expanded the apron approximately 80 feet to the east. While this provides more pavement than strictly necessary to meet the taxiway design standards this is a preferable construction approach to having partial or asymmetric panels. AC 150/5320-6F, *Airport Pavement Design and Evaluation,* Section 3.14.12.2, states that “Because cracks tend to form in odd-shaped slabs and in slabs with structures and other embedment, it is good practice to maintain sections that are nearly square or rectangular in shape.” This is supported by Section 406.b of AC 150/5300-13A, *Airport Design*, which states that taxiway design should consider constructability and maintenance, and it will often be preferable to construct more pavement than the minimum required to maintain the prescribed distance from the pavement edge to aircraft landing gear.

The new pavement is designed for heavy aircraft over 100,000 pounds, as aircraft of this weight are already using the apron and the existing 50-seat CRJ200 are becoming less common. Envoy Air has already began transitioning its CRJ200 aircraft, which have a maximum taxi weight (MTW) of 47,700 pounds, to the CRJ700 which has a MTW of 73,000 pounds. SkyWest is expected to follow this trend in the future. In a similar fashion, charter flights are phasing out the MD88 (MTW of 150,500) in favor of the B737 (MTW of

174,900). Aircraft of this weight will often park on the apron and flexible pavement can rut over time, particularly during high summer temperatures. As air carriers continue their transition to larger aircraft several are expected to routinely approach or exceed the weight of 100,000 pounds and the upcoming apron project will allow for better circulation and support for the future air carrier fleet.

Terminal GA Apron

The GA apron is located 100 feet north of the terminal apron. Aircraft can park here and exit the airside area without the need to enter the terminal building. This apron has pedestrian access via a gate in the fence although there is not any other infrastructure adjacent to the apron. While aircraft will occasionally park here overnight this pavement is not commonly utilized and ways to best utilize this area will be considered in the following chapter.

3.9.3 Parking Lots and Ground Access

Public Parking Requirements

LSE has a total of 981 automobile parking spaces in the terminal area separated into five lots. One lot just west of the terminal contains hourly/short term parking, while two lots further west contain daily/long-term parking. One lot directly south of the terminal contains employee parking, and one lot to the north contains the rental car parking. **Table 3-27** shows the current capacity for each parking category.

Table 3-27: Public Parking Spaces

Parking Lot	Parking Spaces
Employee Parking	57
Hourly Parking	64
Rental Car	190
Daily Parking	670
Total	**981**

Source: LSE Airport Administration.
Note: These parking space counts were developed prior to construction of the car wash facility in 2019.

LSE currently has 3.4 parking spaces for every enplaned passenger on the average day of the peak month (**Table 3-28**). This is consistent with parking space ratios at similar airports in the region. This ratio was applied to the preferred enplanement forecast to determine the potential for additional parking space needs.

Table 3-28: Public Parking Space Requirements

Year	Peak Month Enplanements	Peak Month Average Day Enplanements	Parking Requirement Ratio	Total Required Parking Spaces
2017	9,016	291	3.4	981
2022	9,631	311	3.4	1,056
2027	10,288	332	3.4	1,128
2032	10,989	354	3.4	1,205
2037	11,738	379	3.4	1,287

Sources: Mead & Hunt, Inc.

Results indicate LSE may need approximately 300 additional parking spaces by 2037. LSE should consider alternatives for adding parking spaces during the 20-year planning period. The layout and design of parking areas may also need to be reconfigured in the future due to transportation innovation and related opportunities.

Ground Access and Circulation

As discussed previously in Chapter 1, two access roads serve LSE. Airport Road serves as the main access point for air carrier passengers and provides circulation through the terminal area, parking lots, rental facility, and exits. Fanta Reed Road and Fisherman's Road, located on the south side of the Airport, provide access to the GA facilities and parking lots in that area.

The intersection of Fanta Reed Road and Dawson Avenue poses some aesthetic challenges. The intersection is currently a three-way stop with a small sign for LSE and smaller signs pointing towards specific airport facilities. A larger sign with more visible directions to facilities is recommended along with more landscaping to provide a more pleasing aesthetic and improved wayfinding.

Additionally, wayfinding signage south of I-90 is minimal specifically on Dawson Avenue. It is recommended that additional signs of substantial size be placed along Dawson Avenue south of I-90 to better serve local traffic not utilizing the interstate.

3.10 Snow Removal Equipment (SRE) and Maintenance Facilities

Snow removal equipment (SRE) and maintenance equipment are currently stored in a facility located in the south GA complex. The building, constructed in 1991, is currently 22,800 square feet and has immediate access to the unsecure landside through an access gate near the building. SRE vehicles transit through the T-hangar area to access runways and taxiways.

The current SRE facility has several functional areas where additional space would be beneficial. A preliminary space assessment was conducted to evaluate potential triggers for expanding or relocating the current SRE/maintenance storage facility. The most constrained areas in the existing SRE facility are the vehicle storage and circulation areas. Due to the size of the SRE vehicles and their attachments, the Airport often parks equipment in the central drive-through aisle as it is too large to fit in equipment stalls as currently designed. Additionally, the central drive-through aisle is not wide enough to handle the largest pieces of equipment and the space needed to maneuver in and out of the facility. Other areas such as sand and chemical storage, parts and equipment storage, the maintenance shop and wash bay, and office and personnel support space are constrained for the existing operations at LSE.

Appendix H provides a detailed space analysis covering the areas previously discussed. This master plan recommends that vehicle storage and vehicle circulation be modified in the next five to 10 years to accommodate modern equipment space needs and more efficient vehicle circulation.

3.11 Aircraft Rescue and Firefighting (ARFF) Facilities

ARFF equipment needs are determined by the ARFF Index. The index at an airport is determined by the length of the largest air carrier aircraft with an average of at least five daily departures in a single index group. The ARFF Index is shown in **Table 3-29**. Other ARFF requirements are included in Code of Federal Regulations (CFR) 139.317, *Aircraft rescue and firefighting: Equipment and agents.* CFR 139.317 specifies equipment for each index, water, foam and dry chemical capacities.

Table 3-29: ARFF Index Group Determination

Index	Aircraft Length
A	Less than 90 feet
B	At least 90 feet but less than 126 feet
C	At least 126 feet but less than 159 feet
D	At least 159 feet but less than 200 feet
E	At least 200 feet

Source: AC 150/5220-10E

The largest aircraft that serves LSE is the B737-800, an Index C aircraft. The B737-800 conducts charter operations primarily during the summer. However, these aircraft currently average less than five daily departures. In such cases, an airport can revert to the next lowest index group. LSE is an Index B airport, which aligns with its FAA Part 139 certification status as of December 2017.

For an Index B airport, there are two options for equipment:

- One vehicle that carries at least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent and 1,500 gallons of water and a commensurate quantity of Aqueous Film Forming Foam (AFFF) application.
- Two vehicles with:
    - One vehicle carrying extinguishing agents previously mentioned
    - One vehicle carrying an amount of water and a commensurate quantity of AFFF so that the total quantity of water for foam production carried by both vehicles is at least 1,500 gallons.

LSE currently has two ARFF trucks: an Oshkosh T1500 (1997) and an Oshkosh Striker 1500 (2008). Both trucks meet the specified ARFF Index for LSE.

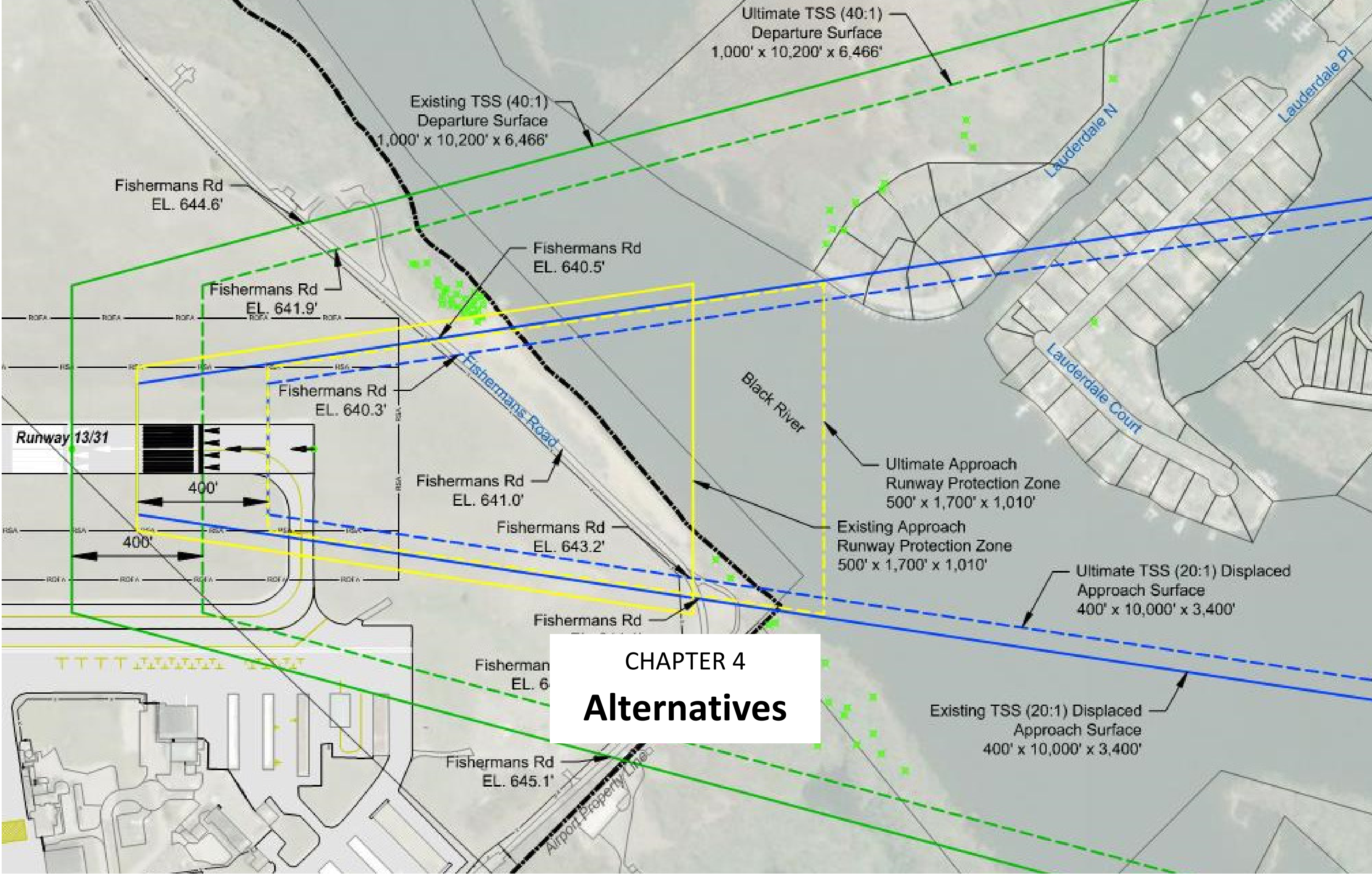
AC 150/5210-15A, *Aircraft Rescue and Firefighting Station Building Design,* states the primary objective for siting an ARFF station is a site(s) that meets or exceeds FAR Part 139.319 vehicle response requirements for Part 139 certification purposes. FAR Part 139.319 states that one ARFF vehicle from the station must reach the midpoint of the farthest runway serving air carrier aircraft within three minutes and deploy the extinguishing agent; all other required ARFF vehicles must reach the same point within four minutes and deploy their extinguishing agent. LSE currently has an ARFF station located just south of the ATCT that houses both ARFF trucks. LSE meets the standards for response time with its current ARFF station location.

Current ARFF facilities are approaching 30 years in age, and, while existing facilities are adequate, the Airport plans to rehabilitate them in the near-term. The planned rehabilitation project includes correcting water leakage issues in the exterior walls, replacement of the apparatus bay doors and emergency notification systems, and improvements to bring plumbing and HVAC systems up to current building code requirements. Based on the analysis of current equipment, the current ARFF station site, and aircraft forecasted for the planning period, there are no recommendations for improvement to the current ARFF facilities and equipment for the duration of the planning period, beyond near-term rehabilitation.

3.12 Summary

Chapter 4 will consider the facility requirements presented in this chapter and summarized below when developing and analyzing development alternatives.

- Runway 04/22 should be downsized or decommissioned and removed, as it is oversized and not strictly necessary based on FAA airfield capacity and wind coverage guidelines.
- Available takeoff and landing distances on Runway 13/31 should be increased to meet design aircraft requirements.
- Connector taxiways should be re-designed to reduce direct apron-to-runway access.
- Options for correcting the five-way intersection at Taxiway A, A3, and B should be considered.
- Instrument approaches to Runways 36, 13, and 31 should be enhanced, if practical or feasible, to improve airfield accessibility during inclement weather.
- The south GA apron should be expanded, or Taxiway A should be relocated, to better accommodate large turbine and charter aircraft.
- Concepts should be developed for accommodating future hangar demand, aviation business uses, and non-aeronautical uses.
- Options should be studied for correcting outbound baggage tug circulation issues and adding more secure hold room space and an additional airline gate in the existing terminal building. An area should also be reserved for long-term relocation of the terminal building.
- Additional auto parking spaces should be considered in the terminal area.
- The existing SRE facility should be expanded to accommodate future equipment storage, maintenance, and vehicle circulation needs.
- Opportunities for improving signage, landscaping, and aesthetics at the intersection of Fanta Reed Road and Dawson Avenue should be considered.
- Directional signage south of I-90 on Dawson Avenue is recommended to improve wayfinding and awareness for local traffic not utilizing I-90.



CHAPTER 4

Alternatives

4.1. Introduction

This chapter presents and analyzes alternatives developed to meet needs identified in the facility requirements chapter. The alternatives take into consideration long-term development at LSE while addressing near-term needs, with various scenarios for each need identified. Alternatives are presented and analyzed in the following sections:

- Runway 04/22 Alternatives
- Runway 13/31 Alternatives
- Taxiway & Apron Alternatives
- Instrument Approach Alternatives
- South General Aviation (GA) Area Alternatives
- Aeronautical Development Area Alternatives
- Non-Aeronautical Development Area Alternatives
- Snow Removal Equipment (SRE) Facility Alternatives
- Aircraft Rescue and Firefighting (ARFF) Facility Alternatives
- Passenger Terminal Alternatives
- Solar Feasibility Study
- Summary

4.2. Runway 04/22 Alternatives

As discussed in previous chapters, Runway 04/22 is aging and is not needed for wind coverage or airfield capacity purposes. This section presents and compares alternatives for the ultimate disposition of Runway 04/22 and recommends a preferred alternative.

Runway 04/22 is currently 5,199 feet long and 150 feet wide. As discussed in Chapter 3, *Facility Requirements*, aircraft that use Runway 04/22 are primarily general aviation (GA) aircraft with a maximum gross weight of 12,500 pounds or less. Weighing 12,500 pounds or less classifies these aircraft as *small aircraft* as defined by Federal Aviation Administration (FAA) Advisory Circulars (AC) 150/5300-13A, *Airport Design*, and 150/5325-4B, *Runway Length Requirements for Airport Design*. The GA fleet mix using Runway 04/22 has a runway design code (RDC) of A-I/B-I (Chapter 3, Section 3.3.2). The key A-I/B-I design standards for Runway 04/22 are summarized in **Table 4-1**.

Table 4-1: Ultimate Runway Design Standards for Runway 04/22 – B-I Small Aircraft

Type	Dimensions (feet)	
Runway Width	60	
Runway Safety Area (RSA)	Length beyond departure end	240
	Length prior to threshold	240
	Width	120
Runway Object Free Area (ROFA)	Length beyond departure end	240
	Length prior to threshold	240
	Width	250
Runway Protection Zone (RPZ)	Length	1,000
	Inner Width	250
	Outer Width	450

Source: Figure 3-5, AC 150/5300-13A, Airport Design

The critical aircraft for Runway 04/22 length are small propeller-driven aircraft with fewer than 10 passenger seats and were analyzed under guidelines in AC 150/5325-4B. Based on the critical aircraft, the AC recommends a length of 3,200 feet for Runway 04/22. This length was determined using field elevation and temperature (mean day maximum hot month), as shown in Figure 2-1 from AC 150/5325-4B (see Chapter 3, Chart 3-9).

Many GA users would prefer to keep Runway 04/22 active due to its convenient location near the GA hangar area and the separation it provides between GA and air carrier traffic. As discussed in Chapter 3, Runway 04/22 serves a purpose for GA users, but is not absolutely necessary to operations at LSE. As a result, these four alternatives for Runway 04/22 address scenarios for maintaining or decommissioning the runway:

- Reconstruct Runway 04/22
- Shorten on the Runway 04 End
- Shorten on Both Ends of Runway 04/22
- Decommission and Remove Runway 04/22

4.2.1. Alternative 1: Reconstruct Runway 04/22

As discussed in Chapter 1, *Inventory*¸ during a pavement condition survey done at LSE in 2015, portions of Runway 04/22 received PCI scores ranging from the 20 to 60 (poor to fair condition). Due to the deteriorating pavement and foreign object debris (FOD) present across the entire length of the runway, it will soon require complete reconstruction. **Figure 4-1** illustrates the standards associated with reconstructing Runway 04/22 at its existing width and length, replacing the existing high intensity runway edge lights (HIRL) with light emitting diode (LED) medium intensity runway edge lights (MIRL), and repairing the existing PAPIs. The estimated cost for design and construction is $3.3 million. Because the runway is not necessary for wind coverage or capacity purposes according to FAA criteria, without a change in FAA criteria, these costs will be borne entirely by the Airport. This alternative also would not resolve geometry and runway incursion issues associated with the five-way intersection of Taxiways A, A3, and B.

4.2.2. Alternative 2: Shorten on the Runway 04 End

Alternative 2 would shorten Runway 04/22 to 3,200 feet by removing 1,999 feet of pavement on the Runway 04 end and narrow the runway to 60 feet by removing the outer 45 feet of pavement width on each side of the runway. This alternative would also remove the existing lighting from the runway to make it a daytime visual runway. Alternative 2 (**Figure 4-2**) meets runway length requirements and A-I/B-I design standards established in Chapter 3. The estimated cost for design and construction of this alternative is $2.7 million. This estimate includes removing Taxiways A2, A3, and D (see Section 4.4 for more information regarding removal of these taxiways) and replacing them with a 90-degree connector taxiway from Taxiway A to the relocated Runway 04 end. Because the runway is not necessary according to FAA criteria, without a change in FAA criteria, these costs will be borne entirely by the Airport.

4.2.3. Alternative 3: Shorten on Both Ends of Runway 04/22

Alternative 3 (**Figure 4-3**), a variation on Alternative 2, would relocate both runway thresholds, with approximately 1,375 feet removed on the Runway 04 end, approximately 625 feet removed on the Runway 22 end, and the runway width reduced to 60 feet. Consideration was given to co-locating the Runway 04 threshold with existing Taxiway A2; however, this concept was dismissed because Taxiway C would be in the Runway 04 RPZ. Reducing length on each runway end as proposed by this alternative would prevent the runway protection zones (RPZ) from crossing Taxiway C to the southwest and Fishermans Road to the northeast. This alternative would also remove the existing lighting from the runway to make it a daytime visual runway. The estimated cost for design and construction of this alternative is $3.2 million. This estimate includes removing Taxiways A2, A3, A4, and D (see Section 4.4 for more information), removing the northeastern portion of Taxiway A, and constructing new connector taxiways from Taxiway A to the relocated runway ends. Because the runway is not necessary per FAA criteria, without a change in FAA criteria, these costs will be borne entirely by the Airport.

4.2.4. Alternative 4: Decommission and Remove Runway 04/22

Alternative 4 (**Figure 4-4**) would close and decommission Runway 04/22. This alternative would remove all runway pavement, Taxiways A2 and A4, and the northeastern portion of Taxiway A.

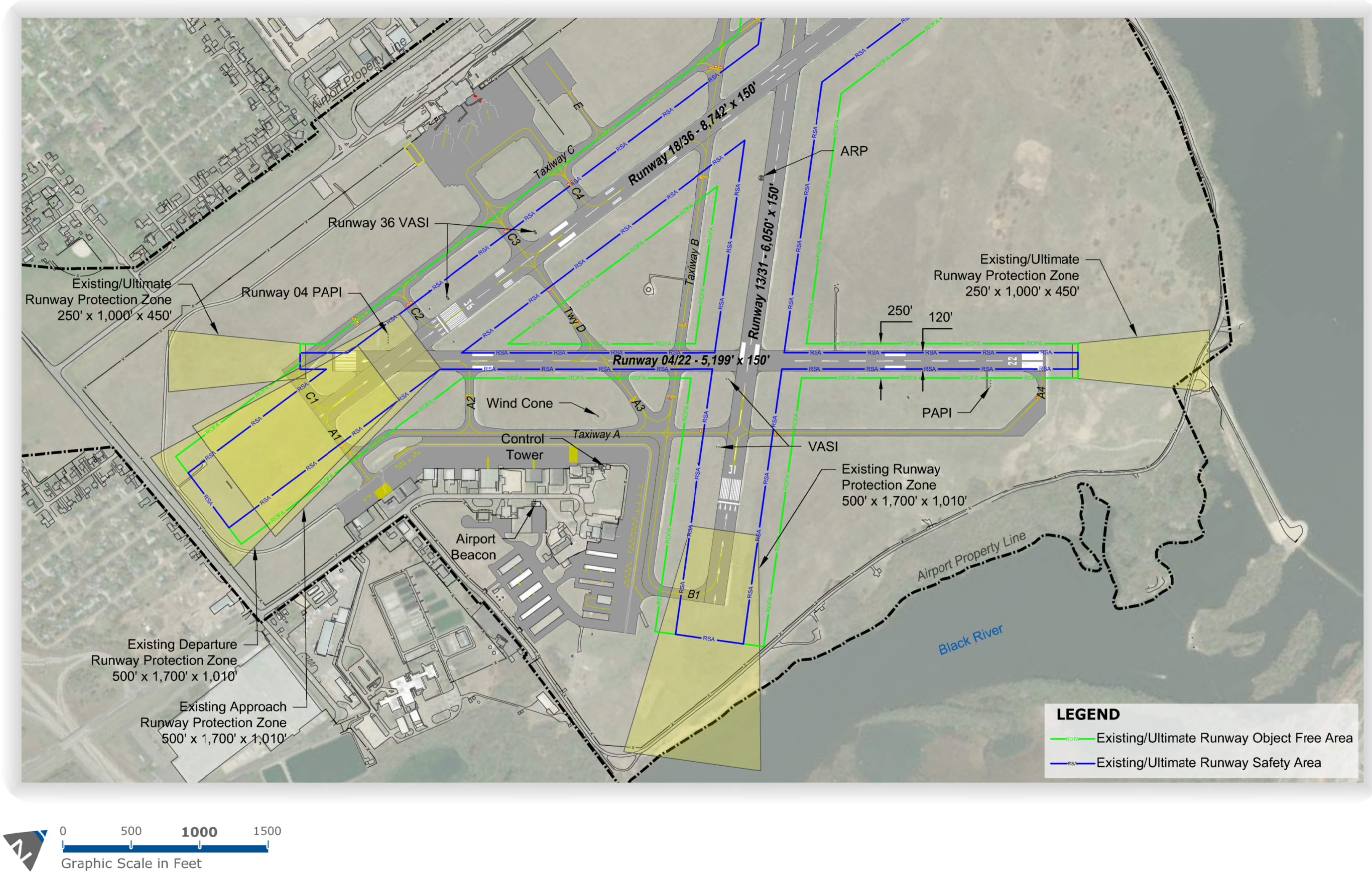


Figure 4-1: **Runway 04/22: Alternative 1: Reconstruct Runway 04/22**

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Source: *USGS Earthstar Geographics*

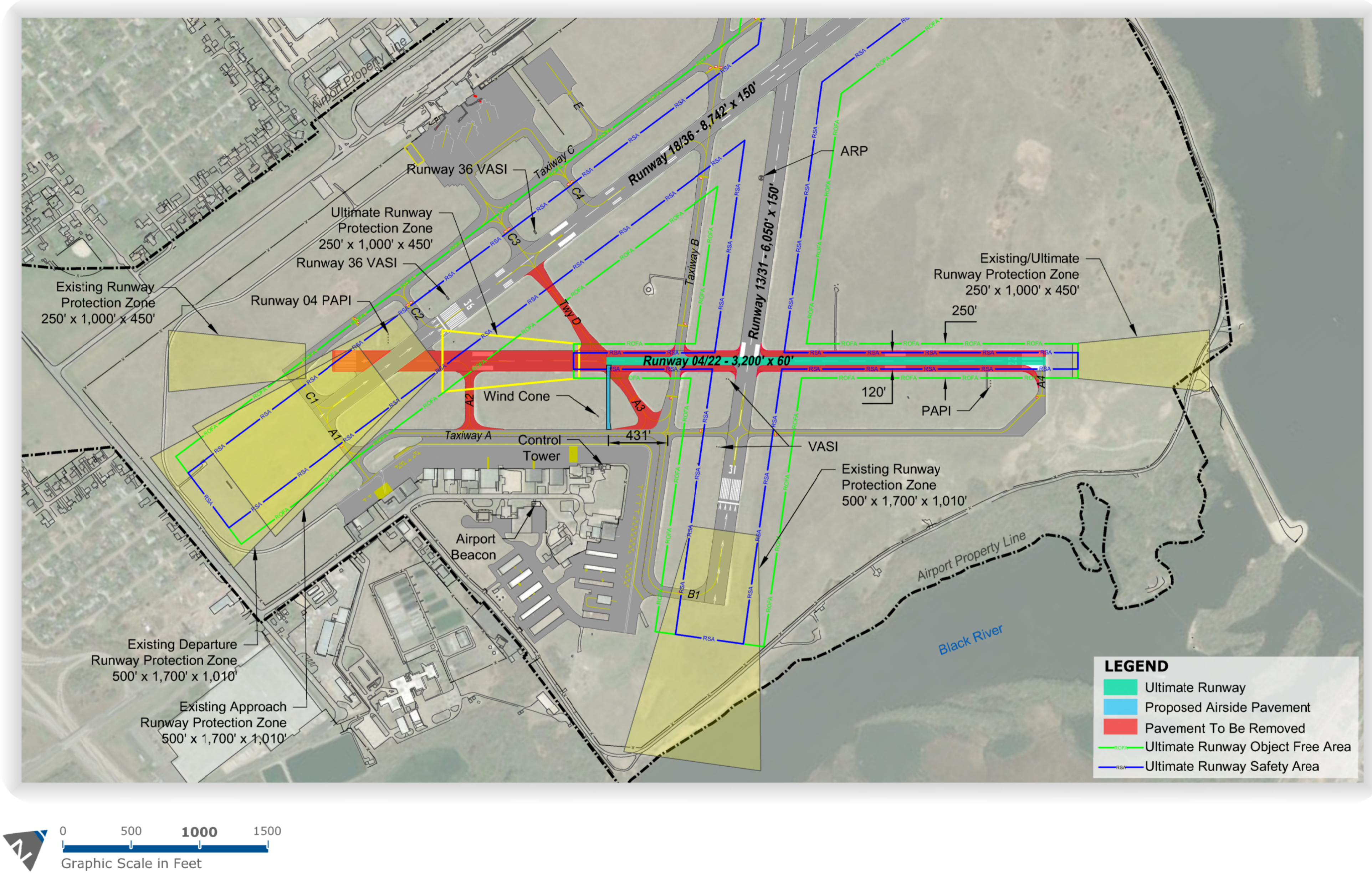

Figure 4-2: **Runway 04/22: Alternative 2: Shorten On Runway 04 End**

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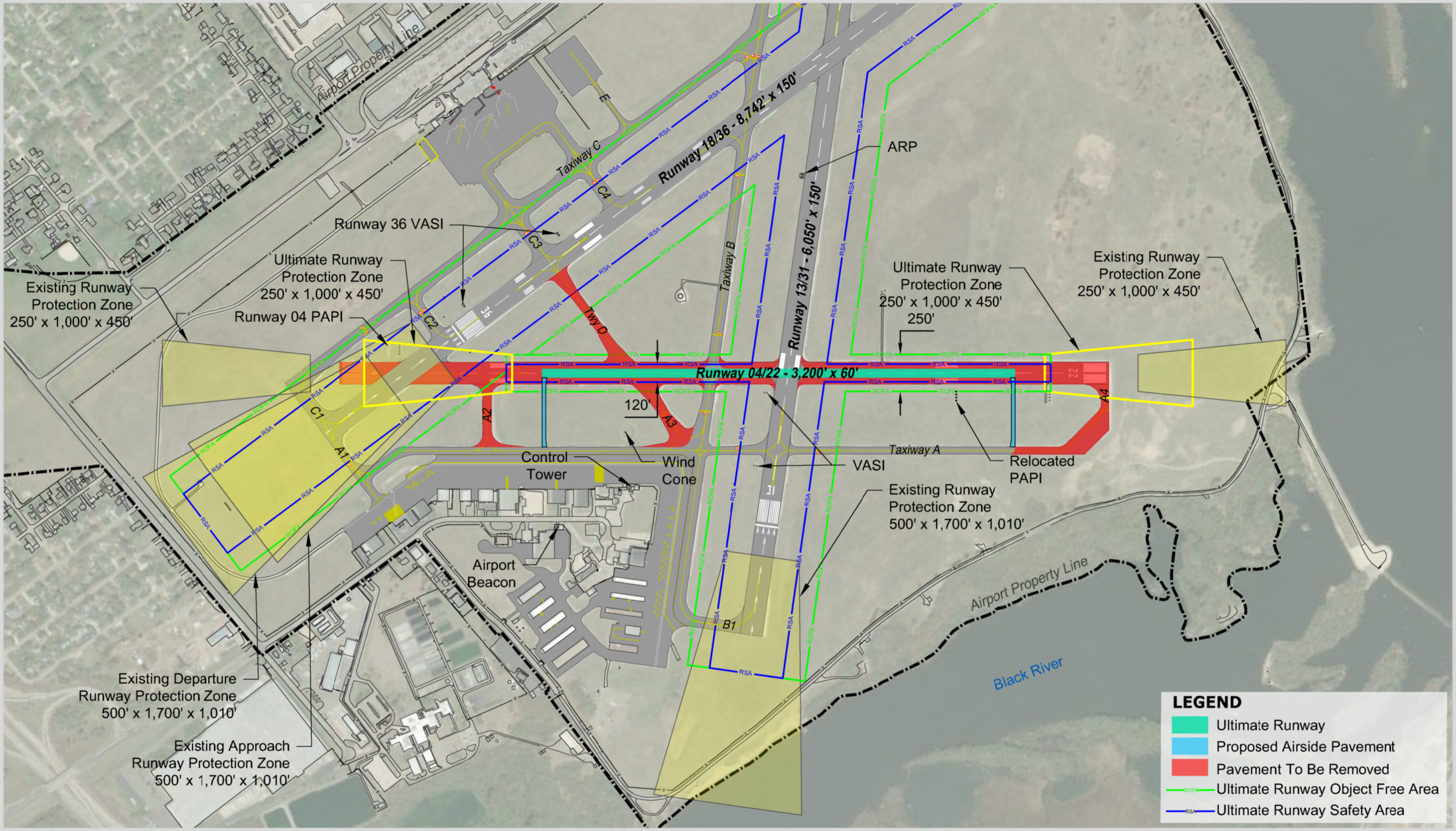
Source: *USGS Earthstar Geographics*



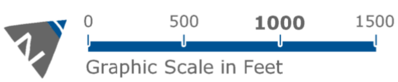


Figure 4-3: **Runway 04/22: Alternative 3: Shorten On Both Runway Ends**

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Source: *USGS Earthstar Geographics*

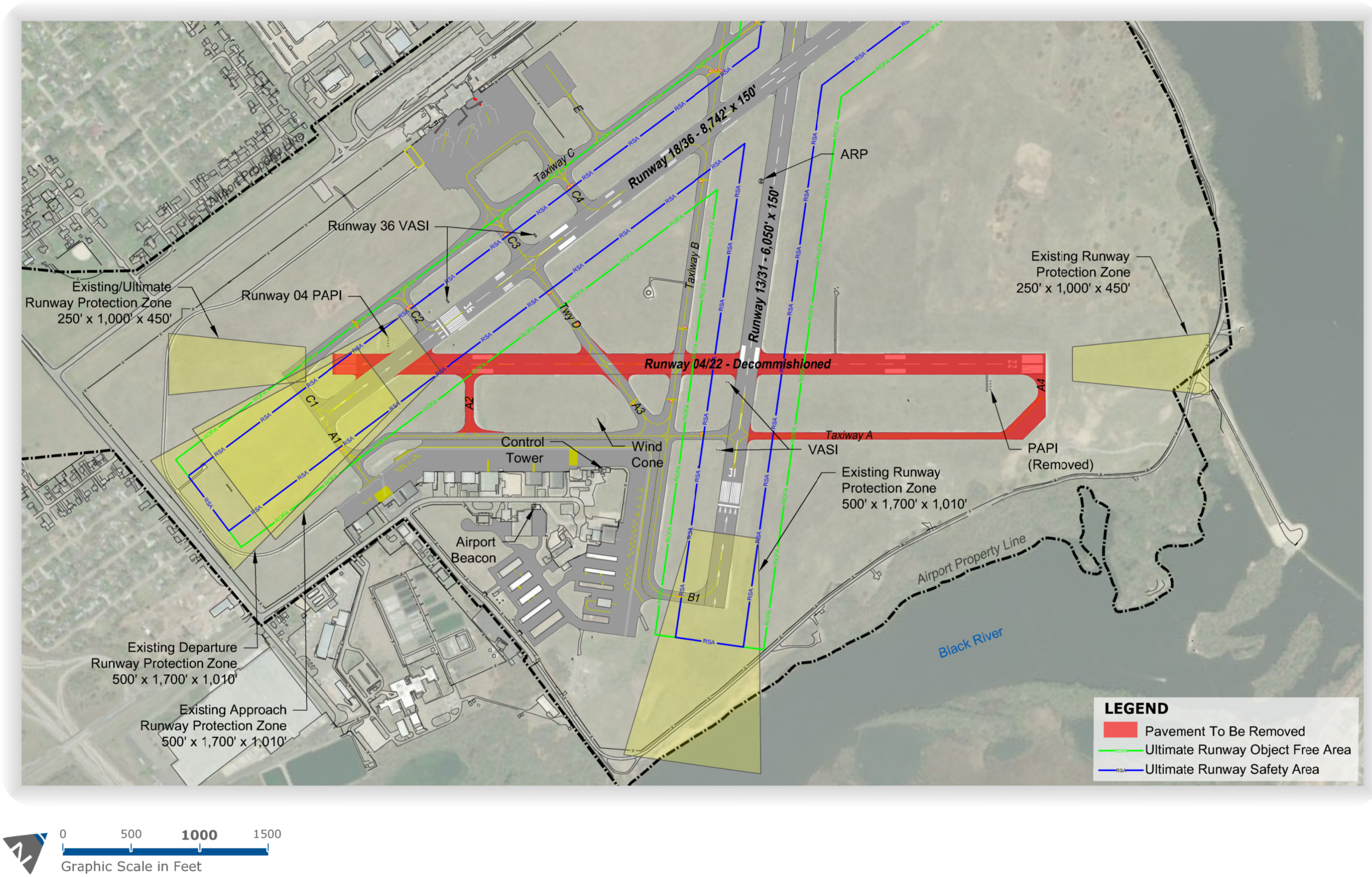

Figure 4-4: **Runway 04/22: Alternative 4: Decommission And Remove Runway 04/22**

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Source: *USGS Earthstar Geographics*

The estimated cost for design and construction of this alternative is $2.5 million. This estimate includes removing Taxiways A2 and A4 and removing the northeastern portion of Taxiway A. Although the costs to remove the runway and taxiways are of a similar magnitude to reconstructing or shortening/narrowing the runway as proposed by the previous alternatives, runway removal should be eligible for financial assistance from the FAA because it would simplify the airfield layout and prevent wrong runway landings and departures, thereby enhancing airfield safety. At current Airport Improvement Program (AIP) participation rates, the FAA would provide 90 percent funding and the State of Wisconsin would likely contribute an additional 5 percent. The Airport would then only be responsible for 5 percent of the project cost, or approximately $125,000.

This alternative would not eliminate the five-way intersection of Taxiways A, B, and A3; options for resolving issues associated with this intersection are considered in Section 4.4.

4.2.5. Recommended Alternative

Although reconstruction or shortening/narrowing of Runway 04/22 as proposed by Alternatives 1, 2, and 3 would satisfy the desires of the based GA community at LSE, the financial investment required from the Airport for each alternative would come at the expense of other projects with a greater importance to the larger La Crosse region. For this reason, the Master Plan recommends that Runway 04/22 be decommissioned before its deteriorating pavement renders it unsafe to use. The decommissioned runway pavement could remain in place until such time that the FAA and Wisconsin Department of Transportation Bureau of Aeronautics (WisDOT BOA) commit funds for its removal. Decommissioning and removal of Runway 04/22 will be shown in the year 2030 of the Master Plan Capital Improvement Program (CIP).

The closure of a runway naturally has an impact on the tenants and users of the Airport. A General Aviation (GA) User Group was convened for the master planning process close coordination with representatives from the local GA community. The first GA User Group meeting was held on May 23rd, 2018, to familiarize everyone with the master planning process and highlight project focus areas. The runway's AIP classification and the challenge of securing funding for it was discussed in further detail, with the potential for closing and decommissioning the runway, at a second GA User Group meeting on December 18th, 2018. Finally, after reviewing the alternatives discussed in this section and soliciting GA user input, it was presented to the GA User Group on November 20th, 2019, that the runway would be closed in the future.

4.3. Runway 13/31 Alternatives

As discussed in Chapter 3, Runway 13/31 provides superior wind coverage to Runway 18/36 and functions as a secondary air carrier runway at LSE. Due to published declared distances, takeoff and landing lengths are considerably restricted on Runway 13/31 when compared to the needs of the existing and future air carrier fleet mix. Furthermore, data collected by the air traffic control tower (ATCT) over a five-month period in 2018 shows that Runway 13/31 is used for air carrier takeoffs and landings when wind conditions make it preferable. Inadequate runway length directly contributes to reduced useful loads on air carrier aircraft that translates to less fuel, passengers, and/or cargo. In general, factors that reduce useful loads for air carriers may negatively affect air carrier profit margins.

Due to the complex nature of declared distances and the affected runways, this section is divided into four subsections, including:

- **Runway 13/31 Alternatives Criteria** – This subsection summarizes the criteria used to analyze the alternatives.
- **Runway 13/31 Alternatives** – This subsection presents the alternatives developed for the Master Plan.
- **Preferred Alternative** – This subsection presents a matrix comparing the alternatives and recommends a preferred alternative.

4.3.1. Runway 13/31 Alternatives Criteria

To effectively develop and compare Runway 13/31 alternatives, several factors are considered including design standards, declared distances, airport utility, environmental effects, and feasibility. These factors are explained in this section.

Design Standards

As discussed in Chapter 3, the recommended ultimate RDC for Runway 13/31 is C-III. Using guidance from AC 150/5300-13A, Table 3-5, **Table 4-2** identifies key C-III-5000 design standards. All alternatives considered by this section meet runway width, Runway Safety Area (RSA), Runway Object Free Area (ROFA), and Runway Obstacle Free Zone (ROFZ) standards. However, the degree to which each alternative meets runway protection zone (RPZ) and threshold siting surface (TSS) standards varies. The alternatives will be compared with respect to these design standards, as the Airport's ability to increase available runway length on Runway 13/31 is significantly affected by the RPZ and the TSS locations.

Runway Protection Zone (RPZ) – The RPZ is a trapezoidal-shaped area that is centered on the extended runway centerline. In general, the RPZ starts 200 feet beyond the runway end but in certain circumstances can start elsewhere. In these cases, two RPZs are often employed: a departure RPZ and an approach RPZ. When two RPZs exist, the approach RPZ begins 200 feet from the landing threshold while the departure RPZ begins 200 feet beyond the far end of the Takeoff Run Available (TORA).

According to the FAA Memorandum "Interim Guidance on Land Uses Within a Runway Protection Zone," dated September 27, 2012, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses in RPZs. Consultation with FAA is required whenever incompatible land uses would enter the limits of the RPZ as the result of an airfield project, a change in the critical design aircraft that increases the RPZ dimensions, a new or revised instrument approach procedure that increases the RPZ dimensions, or a local development proposal in the RPZ (either new or reconfigured). Land uses requiring coordination with FAA include buildings and structures, recreational land uses, transportation facilities including public roads, and above-ground utility infrastructure, among others. Existing incompatible land uses in the Runway 13/31 RPZs include Lakeshore Drive on the Runway 13 end and Fishermans Road on the Runway 31 end.

Table 4-2: Ultimate Runway 13/31 Design Standards (C-III-5000)		
Standard	**Dimensions (feet)**	
Runway Width	150	
Runway Safety Area (RSA)	Length Beyond Departure End	1,000
	Length Prior to Threshold	600
	Width	500
Runway Object Free Area (ROFA)	Length Beyond Departure End	1,000
	Length Prior to Threshold	600
	Width	800
Runway Obstacle Free Zone (ROFZ)	Length Beyond Runway End	200
	Width	400
Runway Protection Zone (RPZ)	Length	1,700
	Inner Width	500
	Outer Width	1,010
Approach Threshold Siting Surface (TSS)	Length	10,000
	Inner Width	400
	Outer Width	3,400
	Slope	20:1
Departure Threshold Siting Surface (TSS)	Length	10,200
	Inner Width	1,000
	Outer Width	6,466
	Slope	40:1
Source: AC 150/5300-13A, Table 3-5; FAA Engineering Brief 99		

Threshold Siting Surfaces (TSS) – The TSS includes sloping approach and departure surfaces that should be clear of objects to protect aircraft arriving and departing the runway. Chapter 1, Section 1.5, discusses TSS dimensions for each runway at LSE. If there is no displaced threshold, the approach TSS begins 200 feet before the physical runway end. When a displaced threshold is used, the approach TSS begins 200 feet before the start of the Landing Distance Available (LDA). Unless the runway has a designated clearway, the departure surface begins at the end of the Takeoff Distance Available (TODA) and extends along the extended runway centerline at a slope of 40:1.

When the RSA, ROFA, approach RPZ, and TSS requirements are met, the threshold is placed at the beginning of the runway. When these requirements are not met, the threshold may be located further down the runway to avoid or mitigate obstacles that would otherwise prevent meeting the requirements. This is known as a displaced threshold. Runway 31 has a displaced threshold located 740 feet from the runway end to provide 1,000 feet of RSA and ROFA prior to the threshold, although only 600 feet is required. The Runway 31 approach TSS is currently clear of obstructions, but there are obstacles on the bluffs further out in the runway approach that severely restrict the visibility and cloud ceiling conditions in which an aircraft can land on this runway.

There are currently numerous trees that penetrate the departure TSS for both ends of the runway. These obstructions require that aircraft climb at a steeper angle than the standard 200 feet per nautical mile in instrument meteorological conditions (IMC, less than 3-statute-mile visibility and/or less than 1,000 feet cloud ceiling above ground level [AGL]). Aircraft departing Runway 13 in IMC must climb 420 feet per nautical mile, and aircraft departing Runway 31 in IMC must climb 340 feet per nautical mile.

Declared Distances

Impacts to declared distances should be considered for each alternative. As discussed in Chapter 3 (Section 3.3.4), declared distances are those available on a specific runway for a turbine-powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The Takeoff Run Available (TORA) is the runway length available and suitable for the ground run of an aircraft taking off. The TODA is the TORA plus the length of any remaining runway beyond the far end of the TORA. The TODA can be reduced to mitigate for obstacles in the departure area. The Accelerate-Stop Distance Available (ASDA) is the runway plus stopway length available and suitable for acceleration and deceleration of an aircraft aborting a takeoff. The LDA is the runway length available and suitable for landing an aircraft.

Airport Utility

Airport utility is the ability of an airport to safely and efficiently accommodate aircraft activity. Airport utility is largely dictated by the length of its runways, as length can be a limiting factor that restricts the ability of an aircraft to use an airport. For instance, the current design aircraft for Runway 13/31, the CRJ200, cannot land using the Runway 13/31 LDA of 5,310 feet with greater than 60 percent useful load (see Chapter 3, Chart 3-8). When the landing distance is restricted in this way, air carriers using the CRJ200 are adversely affected as they must land with less than a desirable load or divert to an alternate airport.

Information gathered by control tower staff from August through December of 2018 supports air carrier use of Runway 13/31. Aircraft categorized by air traffic control (ATC) as large commuter aircraft (i.e., aircraft weighing more than 41,000 pounds and up to 255,000 pounds) make limited use of Runway 13/31. For Runway 13/31, these aircraft include large business jets and air carrier regional jet aircraft such as the CRJ200, CRJ700 and ERJ145. These jets used Runway 13/31 a total of 1.5 percent of the time, when both arrival and departure operations are considered, despite the better wind coverage offered on this runway compared to Runway 18/36.

In addition to runway length, additional crosswind coverage aids in safe and efficient accommodation of aircraft activity. Crosswind coverage was covered in depth in Chapter 3, Section 3.3.3. Runway 13/31 provides greater than 95 percent wind coverage at 10.5 knots in all weather, IFR, and VFR conditions. In the event there is a crosswind, it is preferred that an aircraft operate into the wind. For LSE, the prevailing wind is such that takeoff and landing on Runway 13 is typically preferred during crosswind conditions.

Environmental Effects

Whenever possible, alternatives should attempt to avoid, then minimize, and then mitigate environmental impacts. LSE is located on French Island, which is bounded by the Mississippi River, the Black River, and Lake Onalaska. The airfield is on dry land, and no wetlands would be negatively impacted by runway alternatives considered by this Master Plan. Selection of a preferred alternative should consider environmental factors, such as required tree removal and impacts to surrounding land uses including residences, recreational areas, and wildlife refuges.

Feasibility

Each alternative is evaluated based on factors that may affect its feasibility. These factors include implementation cost, construction and funding timelines, and impacts to surrounding infrastructure. Runway 13/31 is bounded by Lakeshore Drive to the northwest and Fishermans Road to the southeast. Feasibility of alternatives will consider effects to these bounding features.

4.3.2. Runway 13/31 Alternatives

This subsection presents two alternatives for Runway 13/31 at LSE. These alternatives consider the criteria discussed in Chapter 3 and Section 4.3.1 above. The alternatives include the following:

- Alternative 1: Maximize Declared Distances for Runway 13/31
- Alternative 2: Extend Runway 13 by 663 feet

Alternative 1: Maximize Declared Distances for Runway 13/31

This alternative examines the current declared distances for Runway 13/31 and identifies which declared distances could be theoretically modified without extending the runway. This alternative was developed to identify all potential means for increasing available takeoff and landing distances, and to demonstrate that extending the runway is the only prudent alternative for doing so. For reference, the criteria that affect the start and end points of each declared distance are summarized in **Table 4-3**.

Table 4-3: Declared Distances Controlling Surfaces

Declared Distance	Criteria Affecting Start Point	Criteria Affecting End Point
Take Off Run Available (TORA)	Start of Takeoff	Departure RPZ, TODA
Take Off Distance Available (TODA)	Start of Takeoff	Departure Surface
Accelerate Stop Distance Available (ASDA)	Start of Takeoff	RSA, ROFA
Landing Distance Available (LDA)	RSA, ROFA, Approach RPZ, TSS	RSA, ROFA

Note: Start of takeoff typically occurs at the beginning of the designated runway pavement.
Source: FAA AC 150/5300-13A, Airport Design

This alternative considers the declared distances for each runway end separately to determine whether they could be lengthened without a physical extension to the runway. Potential increases to declared distances using the existing runway length are shown in **Table 4-4** and **Figure 4-5**.

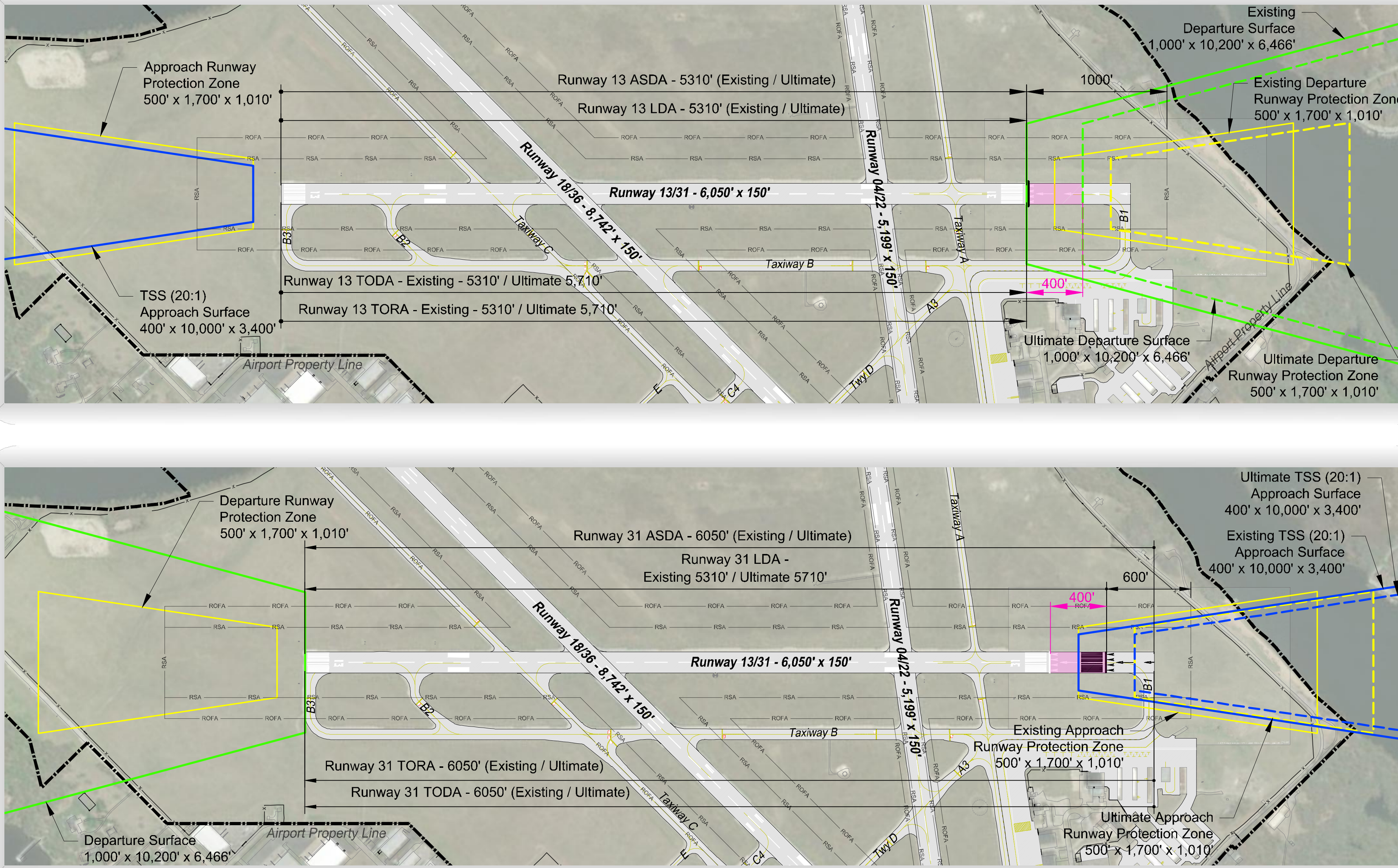
Table 4-4: Runway 13/31 Declared Distances				
Runway	**TORA**	**TODA**	**ASDA**	**LDA**
Current Published Declared Distances				
13	5,310'	5,310'	5,310'	5,310'
31	6,050'	6,050'	6,050'	5,310'
Longest Possible Declared Distances				
13	**5,710'**	**5,710'**	5,310'	5,310'
31	6,050'	6,050'	6,050'	**5,710'**
Note: Highlighted declared distances are those that are different from the current published declared distances.				
TORA = Takeoff Runway Available		ASDA = Accelerate Stop Distance Available		
TODA = Takeoff Distance Available		LDA = Landing Distance Available		
Source: FAA Form 5010-1 Airport Master Record (accessed January 9, 2019)				

As shown in Figure 4-5, the Runway 13 TORA/TODA and Runway 31 LDA are the only distances that could theoretically be lengthened; however, lengthening these distances would have significant trade-offs in terms of approach and departure obstructions and incompatible land uses. The following describes the analysis conducted to reach these conclusions.

Alternative 1 – Runway 13 Declared Distances

Design Standards – The current Runway 13 TORA, TODA, ASDA, and LDA are all 5,310 feet, leaving 740 feet of unusable pavement on the southeast end of the runway for Runway 13 operations. The two declared distances that could be theoretically changed for Runway 13 are the TORA and the TODA. Extending the TORA would require shifting the departure RPZ and extending the TODA would require shifting the departure surface.

As shown in Table 4-3**,** the TORA start point is the start of takeoff while the end point is dependent on the departure RPZ and TODA. As the start of takeoff begins at the physical end of the runway and cannot be moved without extending the runway, moving the end point is the only option for increasing the TORA. Shifting the Runway 13 departure RPZ to the southeast would allow for extending the TORA if the TODA were also extended the same distance but would exacerbate existing incompatible land use issues beyond the Runway 31 end. This potential shift is depicted in **Figure 4-6**. The overall length of Fishermans Road within the departure RPZ would be reduced slightly from 1,150 feet to 1,100 feet.



0 500 1000 1500
Graphic Scale in Feet

Figure 4-5: **Runway 13/31 Alternative 1: Maximize Declared Distances**

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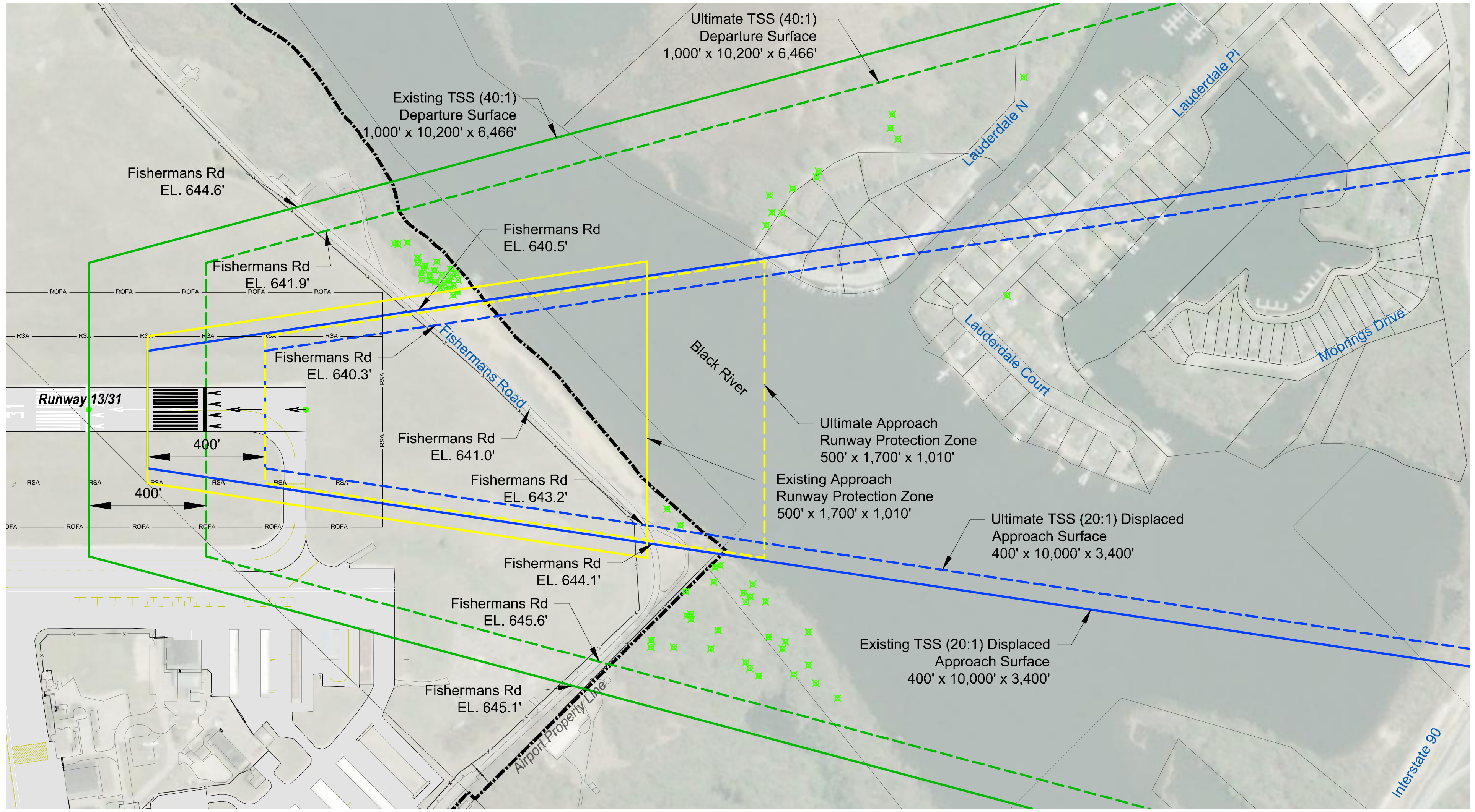
Source: *USGS Earthstar Geographics*



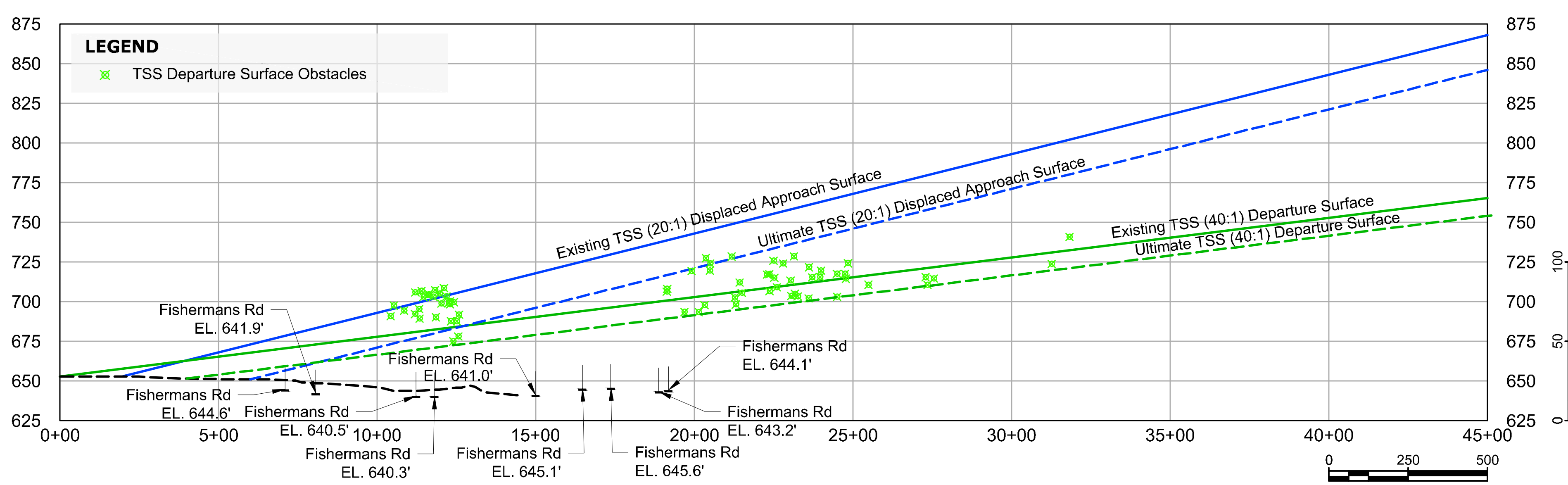


Figure 4-6: **Runway 13/31 Alternative 1: Runway 31 Detail**

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The TODA begins at the start of takeoff, and the TODA end point is determined by the departure surface. If the departure surface is shifted further southeast, the TODA end point could be shifted as well. The TODA could be extended approximately 400 feet to a total of 5,710 feet while also providing more than 15 feet of departure surface clearance over Fishermans Road. However, shifting the departure surface would increase the extent and degree of object penetrations to the departure surface. Based on obstruction data collected in 2018, there are approximately 50 trees currently penetrating the Runway 13 departure surface, 20 of which are off-Airport. If the departure surface were shifted 400 feet to the southeast, an additional 20 trees would penetrate the surface, 16 of which are off-Airport. Removing these trees could allow a change in the TODA without requiring increases to instrument departure minimums and climb gradients. The locations of the trees are shown in **Figure 4-6**.

The ASDA start point is the start of takeoff and cannot be changed without extending the runway. The end point is dependent on meeting RSA and ROFA standards beyond the ASDA. According to AC 150/5300-13A, if RSA and ROFA standards are not met, additional RSA and ROFA length can be obtained by reducing the ASDA. The Runway 31 ASDA is currently reduced to provide the required 1,000 feet of RSA and ROFA beyond the ASDA end point. If the ASDA end point were relocated to the southeast, the RSA and/or ROFA would extend over Fishermans Road. For this reason, the current Runway 13 ASDA end point cannot be changed without violating RSA and/or ROFA design standards.

Lastly, LDA is affected by a combination of design standards previously mentioned. The LDA start point is affected by the RSA, ROFA, approach RPZ, and approach TSS. As the LDA begins at the Runway 13 end, the LDA start point cannot be moved without extending the runway. The LDA end point is dependent on meeting RSA and ROFA standards beyond the LDA. As with the ASDA, the LDA end point cannot be changed without violating RSA and/or ROFA design standards.

Airport Utility – Maximizing the TORA and TODA would allow aircraft to depart Runway 13 in a wider range of scenarios. The CRJ700 could depart Runway 13 at 100 percent useful load, but all other existing and potential future air carrier aircraft identified by Chapter 3 would continue to be weight-limited when departing Runway 13.

Environmental Effects – The affected environmental resources are primarily trees in the Runway 13 departure surface. As noted above, approximately 70 trees would penetrate the departure surface if the TODA were extended to the southeast. Approximately half of these trees are located off-Airport on private residential lots and federal government property.

Feasibility – For trees located off airport property, LSE would need to coordinate with the affected property owners. Off-airport tree removal can be expensive if compensation is provided to the property owner. The FAA would also have to approve the shift of the departure RPZ, as moving the end point of the TORA would change the road length in the RPZ.

Alternative 1 – Runway 31 Declared Distances

Design Standards – For operations on Runway 31, the only declared distance limited to less than the full runway length is the LDA. The Runway 31 LDA is currently limited to 5,310 feet with 740 feet of unusable pavement prior to the displaced threshold. According to AC 150/5300-13A, the FAA will consider displacing a threshold to:

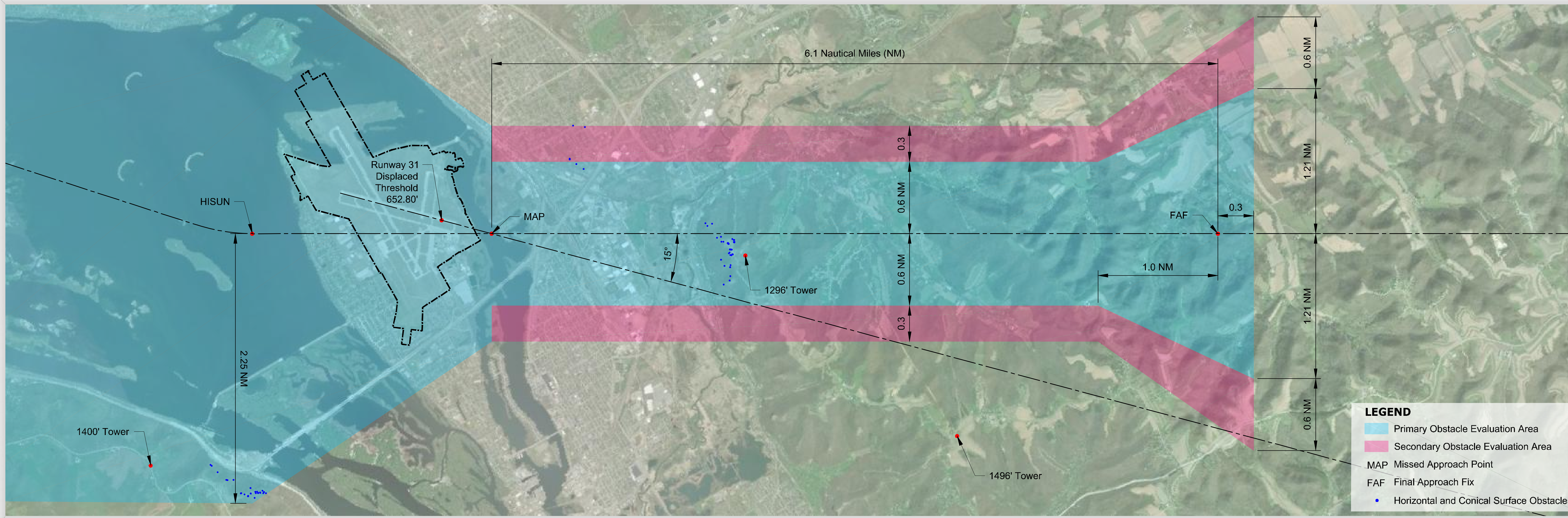
- Provide proper clearance for landing aircraft over existing obstacles while on approach to landing;
- Obtain additional RSA and/or ROFA prior to the threshold;
- Locate the RPZ such that incompatible land uses are mitigated; or
- Mitigate environmental impacts, including noise impacts.

The LDA start point is affected by the RSA, ROFA, Approach RPZ, and TSS. The current Runway 31 displaced threshold location provides 1,000 feet of RSA and ROFA prior to the threshold, although only 600 feet is required prior to the threshold. As the RSA and ROFA design standards are exceeded, the displaced threshold could be relocated by 400 feet to the southeast. However, there are several items that should be considered carefully with respect to potential relocation of the Runway 31 threshold, including the Runway 31 approach TSS, the approach RPZ, impacts to existing Runway 31 Lateral Navigation (LNAV) approach minimums, and the potential for a future vertically-guided instrument approach procedure to Runway 31.

Runway 31 Future Approach TSS – The location and elevation of Fishermans Road and trees southeast of the Runway 31 threshold should be considered when evaluating placement and clearing of the approach TSS. If the Runway 31 approach TSS were shifted 400 feet to the southeast, it would be clear of any trees in the approach and provide 15 feet of clearance over Fishermans Road as shown in Figure 4-6. Therefore, a 400-foot shift of the approach TSS is not expected to prevent extending the Runway 31 LDA by 400 feet.

Runway 31 Future Approach RPZ – Incompatible land uses such as public roads and places of public assembly should be considered when evaluating placement of the approach RPZ. Fishermans Road is approximately 1,500 feet from the current Runway 31 displaced threshold and would be only 1,100 feet from the relocated displaced threshold. However, the overall length of Fishermans Road within the departure RPZ would be reduced slightly from 1,150 feet to 1,100 feet.

Runway 31 Existing LNAV Minimums – Relocating the Runway 31 threshold may have negative impacts to the existing non-precision Global Positioning System (GPS) LNAV instrument approach procedure. The Runway 31 LNAV approach currently has a Category C visibility minimum of 3 statute miles and a decision height of 1,100 feet above the threshold. As shown in **Figure 4-7**, the LNAV approach is currently offset from the runway centerline at an angle of 15 degrees. There are several obstacles in the offset final approach area, including a tower located approximately 3 miles away and naturally occurring terrain. There are two applicable obstacle clearance surfaces (OCS) in this area that, if penetrated, limit the visibility minimums for a runway. These surfaces are shown in **Figure 4-8** and include a 34:1 OCS that, if penetrated, limits visibility to not lower than 3/4 mile, and a 20:1 OCS that, if penetrated, limits visibility to not lower than 1 mile. While the 20:1 OCS is currently clear, relocating the Runway 31 threshold would increase the likelihood of future penetrations to this OCS as well as the 34:1 OCS. Therefore, a 400-foot shift of the displaced threshold may limit future improvements in LNAV approach minimums.



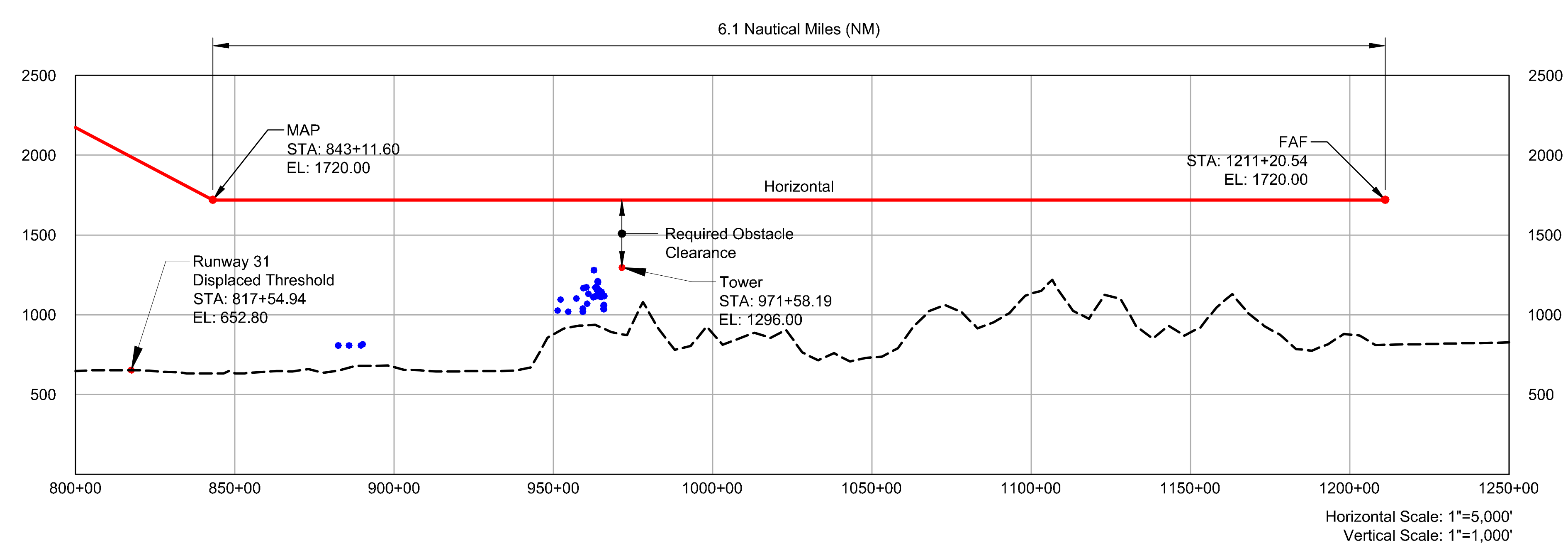


Figure 4-7: **Runway 31 LNAV Final Approach Plan and Profile**

Source: *USGS Earthstar Geographics*

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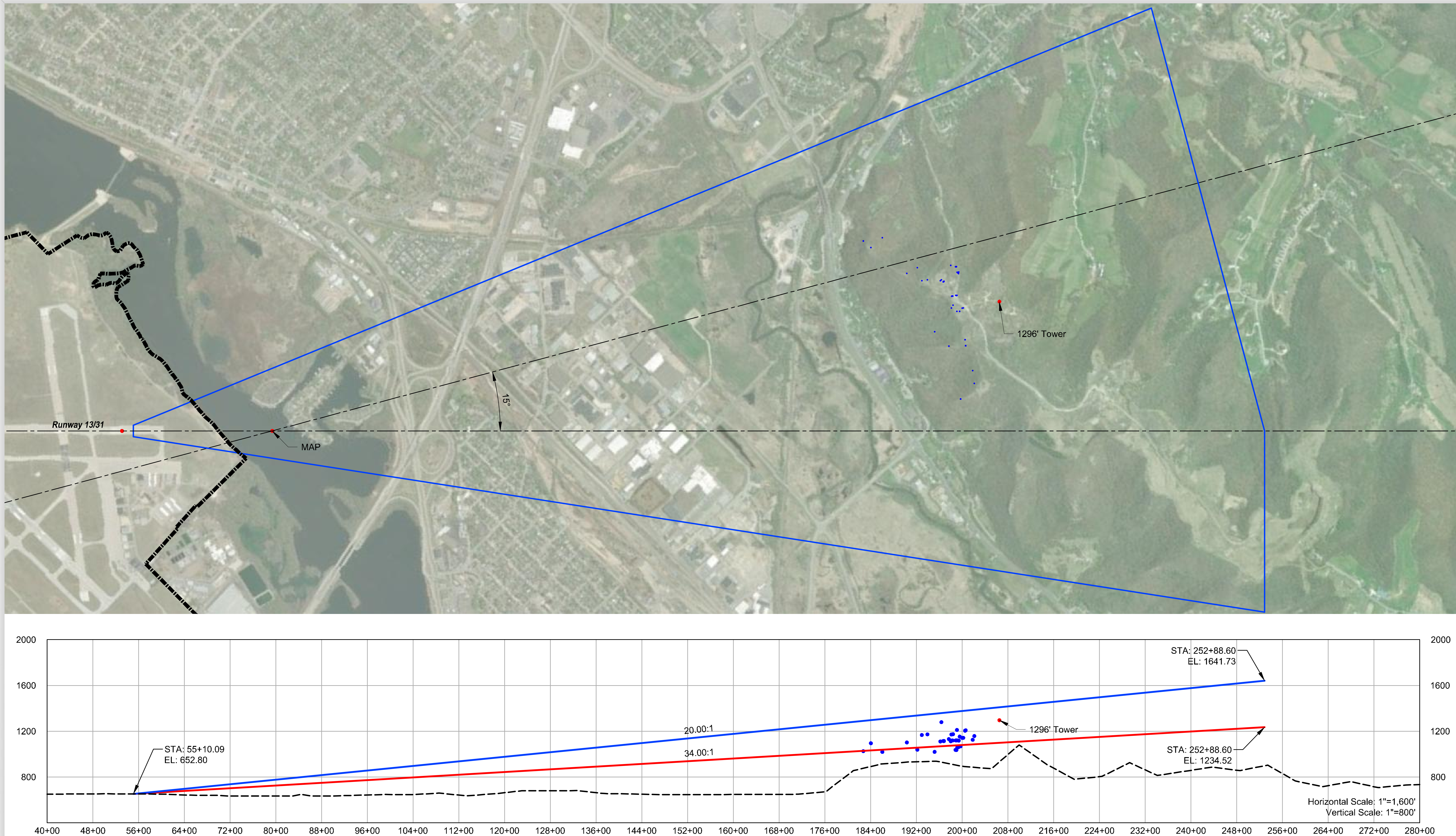

0 800 1,600 2,400
Graphic Scale in Feet

Figure 4-8: **Runway 31 Visual Approach Surface**

Source: *USGS Earthstar Geographics*

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Airport Utility – Control tower staff at LSE has indicated that Runway 13/31 is often used by local and itinerant aircraft operations during crosswind conditions because it has superior wind coverage to Runway 18/36. Therefore, airport utility is restricted when the LDA is less than the full runway length. However, as discussed previously, prevailing winds and lower approach visibility minimums usually dictate landing on Runway 13. While maximizing the Runway 31 LDA would positively impact airport utility, it would not meet the needs of critical design aircraft users that prefer landing on Runway 13.

Environmental Effects – Relocating the Runway 31 displaced threshold would not require off-Airport obstruction removal to clear the approach TSS. While it would move the Runway 31 displaced threshold closer to Fishermans Road and off-Airport land uses, this should not create any new incompatible land use issues.

Feasibility – Relocating a displaced threshold requires a very complex and time-consuming planning, design, and coordination effort on the part of both the Airport and the FAA. Pavement markings and lighting systems would need to be reconfigured, and instrument approach procedures would need to be redesigned. The benefits to critical design aircraft users are not expected to offset the cost and effort required to relocate the displaced threshold, as these users prefer to land on Runway 13. The FAA would also have to approve the shift of the approach RPZ, as moving the start point of the LDA would change the road length in the RPZ.

Alternative 2: Extend Runway 13/31 by 663 feet

The 2015 Airport Layout Plan (ALP) for LSE shows a planned 663-foot extension to the Runway 13 end for a total length of 6,713 feet. **Figure 4-9** shows the new declared distances under this alternative, and **Figure 4-10** shows a detail view of the proposed extension to and design surfaces for the Runway 13 end.

Design Standards – Extending Runway 13 affects several design standards, including the RSA, ROFA, approach/departure RPZ, and approach/departure TSS. Extending Runway 13 as proposed by this alternative maximizes potential runway length while still meeting RSA and ROFA standards on Airport property. Shifting the approach/departure RPZs and approach/departure TSS would affect Lakeshore Drive and trees beyond the relocated runway end. **Figure 4-10** shows the existing and ultimate RSA, ROFA, approach/departure RPZs, and approach/departure TSS beyond the Runway 13 end under this alternative.

The proposed Runway 13 extension could potentially be used for all declared distances. However, there are important implications to consider specifically for the Runway 13 LDA and Runway 31 TORA/TODA.

As noted previously, the start point for the LDA is affected by the RSA, ROFA, approach RPZ and TSS. The proposed extension keeps the RSA and ROFA inside the Airport fence and on Airport property; therefore, these standards would be met.

Figure 4-9: **Runway 13/31 Alternative 2: Extend By 663 Feet**

Source: *USGS Earthstar Geographics*

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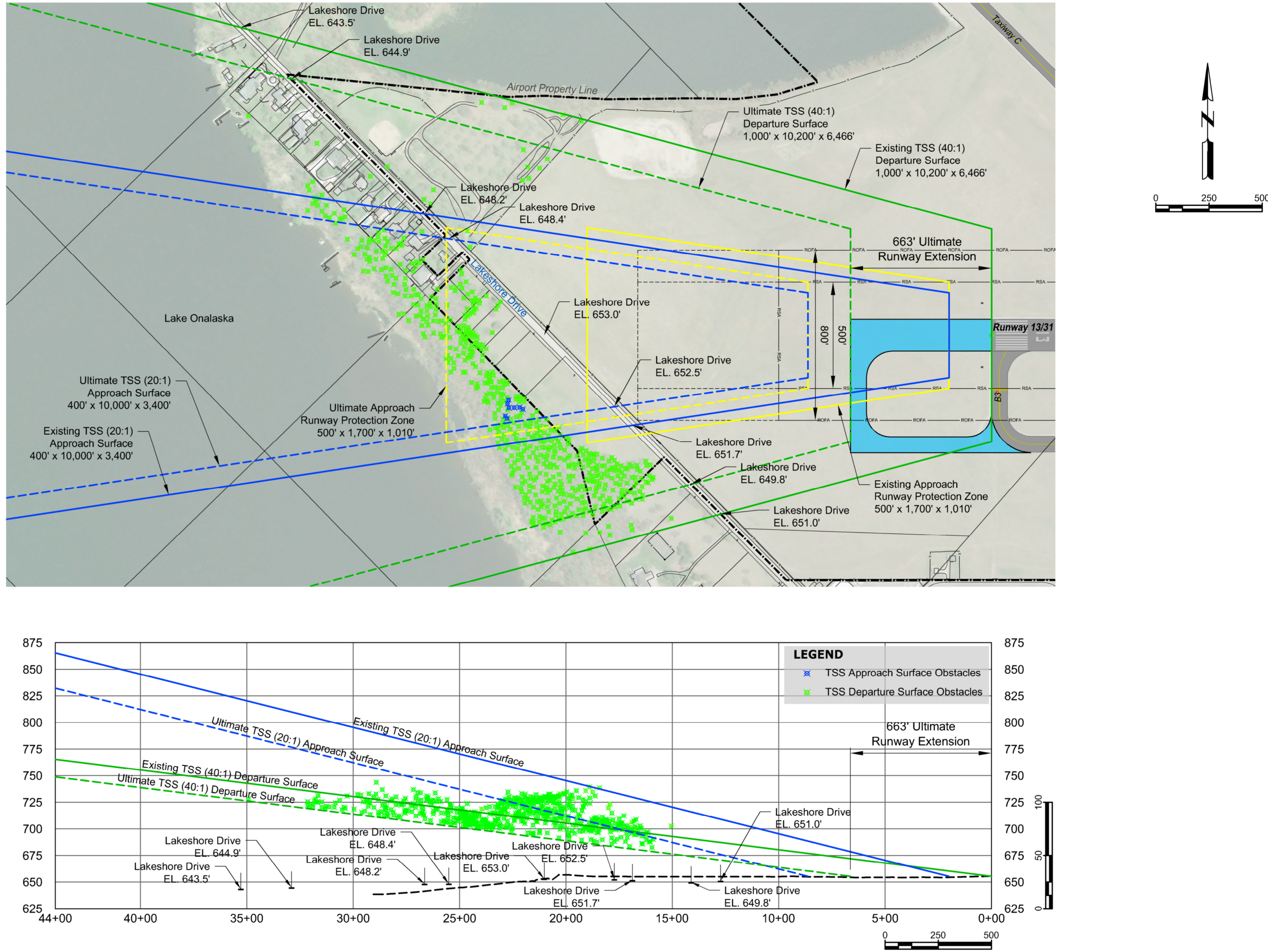

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Figure 4-10: **Runway 13/31 Alternative 2: Runway 13 Detail**

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Incompatible land uses such as public roads and places of public assembly should be considered when evaluating placement of the RPZs. If the entire runway extension was used for Runway 13 LDA and Runway 31 TORA, the approach and departure RPZs would shift to the northwest and increase the RPZ area outside the Airport fence. This would increase the length of Lakeshore Drive within the RPZ from approximately 350 feet to approximately 1,200 feet. Lakeshore Drive is approximately 2,100 feet from the current Runway 13 end and would be only 1,400 feet from the relocated Runway 13 end. However, this is further than the 1,100-foot distance of Fishermans Road from the Runway 13 TORA end point and Runway 31 LDA start point proposed under Alternative 1. Although no detailed traffic counts have been conducted, the general type and frequency of use for both roads are comparable. The RPZ changes for Alternative 2 are expected to present fewer safety concerns than the RPZ changes for Alternative 1, due to the increased distance of the road from the TORA end point and LDA start point, as well as proposals to raise and widen Fishermans Road considered by this Master Plan (see Section 4.8 for more information regarding this proposal). Relocating Lakeshore Drive out of the RPZ is not an option as the shoreline of Lake Onalaska is just 750 feet west of the road.

The approach and departure TSS would also need to be cleared for the entire 663-foot extension to be used for Runway 13 LDA and Runway 31 TODA. Both distances could utilize the full runway extension while also providing more than 15 feet of approach and departure TSS clearance over Lakeshore Drive. However, this would increase the number of penetrations to both surfaces. The Runway 13 approach TSS is currently clear of object penetrations, but if the approach TSS were shifted 663 feet to the northwest, four off-Airport trees would penetrate the relocated approach TSS proposed by this alternative. There are approximately 210 trees currently penetrating the Runway 31 departure surface, 184 of which are off-Airport. If the departure TSS were shifted 663 feet to the northwest, an additional 428 trees would penetrate the surface, 280 of which are off-Airport. Removing these trees could allow a change in the TODA without requiring increases to instrument departure minimums and climb gradients. The locations of the trees are shown in **Figure 4-10**.

Airport Utility – Extending Runway 13/31 would increase landing and takeoff distances in both directions. This would greatly increase airport utility and benefit air carrier and corporate users due to limitations associated with the existing runway length and declared distances.

The existing design aircraft for Runway 13/31, the Bombardier CRJ200, is expected to be phased out soon. The CRJ900 is the ultimate design aircraft, with the CRJ700 expected to operate at LSE in the interim. The takeoff and landing lengths required for these aircraft are discussed in Section 3.3.4. The CRJ200 must currently operate at less than 60 percent useful load to land on Runway 13/31. If the runway were extended 663 feet (6,713 feet total), the CRJ200 would be able to operate at over 80 percent useful load, which would be a significant improvement. Furthermore, the CRJ700 is currently limited to less than 60 percent useful load and the CRJ900 is limited to approximately 80 percent useful load when landing in either direction on Runway 13/31. The runway extension would allow these aircraft to operate at greater useful loads that better reflect air carrier needs. Similarly, the takeoff distance required is affected as the Runway 13 TORA and TODA are both less than the existing runway length. With no extension to Runway 13, CRJ200, CRJ700, and CRJ900 departures would continue to be limited to less than 80, 100, and 60 percent useful load, respectively. If Runway 13 was extended 663 feet, each aircraft would be able to operate at greater useful loads that better reflect air carrier needs. The declared distances proposed by this alternative are compared to the critical design aircraft requirements in **Table 4-5**.

Table 4-5: Alternative 2 Declared Distance Improvements and Critical Design Aircraft Requirements

Declared Distances	TORA/TODA Runway 13	TORA/TODA Runway 31	LDA Runway 13	LDA Runway 31
Current Declared Distances	5,310'	6,050'	5,310'	
Proposed Declared Distances	5,973'	6,713'	5,973'	
Critical Design Aircraft Requirements	**Takeoff Distance 60% Useful Load**	**Takeoff Distance 100% Useful Load**	**Landing Distance 60% Useful Load**	**Landing Distance 100% Useful Load**
Bombardier CRJ200	4,800'	6,800'	5,350'	6,050'
Bombardier CRJ700	4,200'	5,700'	5,950'	6,700'
Bombardier CRJ900	5,200'	7,500'	5,100'	5,500'

Sources: Airport Planning Manuals, Mead & Hunt Inc.

Environmental Effects – The proposed extension to Runway 13 would be entirely on Airport property. No wetlands would be affected. The extension and associated taxiway extension would require that proper National Environmental Policy Act (NEPA) environmental documentation to be completed, which is expected to include an Environmental Assessment. While it would move the Runway 13 end closer to Lakeshore Drive and off-Airport land uses, this should not create any new incompatible land use issues, such as homes in the RPZ. The affected environmental resources are primarily trees in the Runway 31 departure surface. As noted above, over 600 trees would penetrate the departure surface if the entire runway extension was used for TODA. Approximately two-thirds of these trees are located off-Airport on private residential lots and federal government property.

Feasibility – Feasibility challenges for this extension include FAA approval of the approach/departure RPZ shift and possible required easements, the cost of construction, and the effect on off-Airport trees. Extending the runway would also require relocating airfield lights, including the Runway End Identifier Lights (REILs) and Visual Approach Slope Indicator (VASI), as well as installing new runway and taxiway lighting with the extension. A parallel taxiway extension would also be needed for aircraft to access the relocated Runway 13 threshold. The estimated total for this project, including these supporting efforts, is $6.0 million.

4.3.3. Runway 13/31 Alternatives Comparison

Table 4-6 summarizes and compares the runway length improvements associated with the two Runway 13/31 alternatives discussed above. Alternative 2 is clearly superior in terms of the additional runway length as it would provide for takeoff and landing operations in both directions on Runway 13/31. Although Alternative 2 would be more expensive than Alternative 1, it would introduce fewer feasibility challenges than Alternative 1, as it does not involve any changes to the Runway 31 displaced threshold location. Alternative 2 also avoids potential future issues related to obstructions in the approach and departure areas beyond the Runway 31 end. For these reasons, Alternative 2 is recommended as the preferred alternative for this Master Plan and will be included in the intermediate-term CIP.

Table 4-6: Runway 13/31 Alternatives Declared Distances Comparison

	Alternative 1		Alternative 2	
	RW 13	RW 31	RW 13	RW 31
Total Published Runway Length	6,050 feet		6,713 feet	
Declared Distances				
Takeoff Run Available (TORA)	5,710 feet	6,050 feet	5,973 feet	6,713 feet
Takeoff Distance Available (TODA)	5,710 feet	6,050 feet	5,973 feet	6,713 feet
Accelerate-Stop Distance Available (ASDA)	5,310 feet	6,050 feet	5,973 feet	6,713 feet
Landing Distance Available (LDA)	5,310 feet	5,710 feet	5,973 feet	5,973 feet
Feasibility				
Description of Challenges	RPZ Shift FAA Coordination		RPZ Shift Cost of Construction NAVAID Relocations	

4.4. Taxiway & Apron Alternatives

The following six taxiway alternatives were studied for the Master Plan and are presented below:

- Remove Taxiways A3 and D
- Relocate Taxiway A
- Convert Runway 04/22 into a Taxiway
- Extend Taxiway from A1 to D
- Relocate Taxiways C3 and C4
- Construct Mid-field Runway 13/31 Exit Taxiway

4.4.1. Alternative 1: Remove Taxiways A3 and D

This alternative would remove Taxiways A3 and D to simplify the intersection of Taxiways A and B into a four-way intersection. As discussed in Chapter 3, Section 3.4, taxiways that directly connect an apron to a runway are undesirable as a pilot might inadvertently taxi onto the runway when expecting a parallel taxiway. The LSE Runway Safety Action Team (RSAT) identified a five-way intersection between Taxiway A, A3, and B at the apex of the GA aprons as a contributing factor for runway incursions. AC 150/5300-13A recommends all taxiway intersections use a three-node design concept so that a pilot is presented with no more than three choices at an intersection. Ideally, the options should be left, right, and straight ahead. The five-way Taxiway A/A3/B intersection is of heightened concern because it combines a four-node intersection with two direct apron-to-runway connector taxiways.

However, the functions and usefulness of Taxiways A3 and D should be considered prior to deciding to remove them. These taxiways are located such that their primary functions are to provide:

- An exit taxiway option for aircraft landing Runway 18
- A direct route across the airfield for aircraft taxiing between the air carrier apron and Runway 31,
- A direct route across the airfield for ARFF vehicles transiting between the ARFF station and air carrier apron.

An exit taxiway utilization study was conducted for this Master Plan using guidance in AC 150/5300-13A, Section 409, to determine whether Taxiways A3 and D are required for aircraft left turns when landing on Runway 18. **Table 4-7** compares the Runway 18 exit taxiway locations to the cumulative utilization percentages shown in Section 409, Table 4-13. Based on the information in this table, Taxiways A3/D are not needed for most large aircraft exiting Runway 18/36 during dry conditions because 92 percent of these aircraft can utilize Taxiway C4, but they are often needed for larger aircraft during wet conditions when aircraft require additional landing distance due to reduced runway friction.

Table 4-7: Runway 18 Exit Taxiway Analysis

Taxiway	Distance from RW 18 Threshold	Turn Direction	Taxiway Angle	Aircraft Type Utilization			
				Small Single Engine	Small Twin Engine	Large	Heavy
Dry Runway Cumulative Utilization							
C5	1,600'	Right turn only	Right angle	39%	0%	0%	0%
B	5,150'	Both ways	Acute angle	100%	100%	76%	55%
C4	6,200'	Right turn only	Right angle	100%	100%	92%	71%
C3/D/A3	6,800'	Both ways	Right angle	100%	100%	98%	90%
C2	7,700'	Right turn only	Right angle	100%	100%	100%	100%
C1/A1	8,650'	Both ways	Right angle	100%	100%	100%	100%
Wet Runway Cumulative Utilization Percentages							
C5	1,600'	Right turn only	Right angle	23%	0%	0%	0%
B	5,150'	Both ways	Acute angle	100%	100%	12%	0%
C4	6,200'	Right turn only	Right angle	100%	100%	48%	10%
C3/D/A3	6,800'	Both ways	Right angle	100%	100%	71%	35%
C2	7,700'	Right turn only	Right angle	100%	100%	97%	84%
C1/A1	8,650'	Both ways	Right angle	100%	100%	100%	99%

Source: FAA Advisory Circular 150/5300-13A
Note: Small aircraft = 12,500 lbs or less, Large aircraft = 12,500 lbs to 300,000 lbs, Heavy aircraft = greater than 300,000 lbs

The impact of removing Taxiways A3/D on cross-field aircraft taxiing and ARFF emergency response is summarized in **Figure 4-11**. If Taxiways A3/D were removed, the taxi distance from the air carrier apron to the Runway 31 end would increase nearly 50 percent, from 4,570 feet to 6,660 feet. Removing the taxiways would not affect the Airport's mandate for ARFF response vehicles to reach each runway midpoint within three minutes of a fire emergency alarm, as the taxiways are not used as part of the shortest route from the ARFF station to the runway midpoints. However, removing the taxiways would increase the distance ARFF vehicles would have to travel to reach the air carrier apron nearly 50 percent from 3,700 feet to 5,510 feet.

4.4.2. Alternative 2: Relocate Taxiway A

This alternative would relocate Taxiway A to provide adequate separation from parked aircraft on the south GA apron. As discussed in Chapter 3, Sections 3.4 and 3.8.4, the existing south GA apron is often congested due to parked aircraft during peak events. Charter aircraft and large corporate jets use this area for staging, and when they are parked on the apron, it is difficult for other aircraft to circulate through the area. A portion of Taxiway A adjacent to the apron often must be closed because adequate separation cannot be provided between Taxiway A and the wingtips of large narrow-body jet aircraft parked or maneuvering on the apron. Relocating Taxiway A would allow aircraft to navigate the area without closing the taxiway or reducing aircraft parking capacity in these scenarios. To determine the lateral distance that Taxiway A should be relocated from its current position, the demands of a parked B737-800 on the apron were considered. The proposed layout is shown in **Figure 4-12A** and discussed below.

The proposed layout assumes a 34-foot separation between the wingtip of a parked B737-800 aircraft to the nearby hangars. This is a conservative estimate based on the wingtip clearance required for parallel taxilanes for aircraft of this size. On the Taxiway A side of the B737-800, a standard ADG II TOFA of 115 feet is reserved to provide passage for small turbine aircraft without entering the movement area controlled by the tower. This would allow corporate jets to taxi past the apron without needing to contact the tower, as they would not need to cross the movement line to maneuver around a parked aircraft. This would reduce ATC workload and improve aircraft circulation efficiency. Taxiway A would be relocated so that another B737-800 aircraft could simultaneously move past the expanded apron under direction from ATC. The relocated Taxiway A concept is designed to minimize unnecessary pavement between the apron and Taxiway A to reduce stormwater and maintenance impacts while separating the taxiway from the apron. This alternative also includes relocating Taxiway A3 and the portion of Taxiway A between the south GA apron and Runway 13/31 to reduce the complexity of the five-way intersection of Taxiways A, A3, and B.

In summary, this configuration would allow a parked B737-800, a corporate jet in the ADG II category, and another B737-800 on Taxiway A to simultaneously pass each other with ATC only managing the B737-800 in transit. The estimated cost of relocating Taxiway A under this alternative is $4.5 million. This estimate does not include relocation of Taxiway A3 and the portion of Taxiway A between the south GA apron and Runway 13/31. This would occur during a future project phase to be completed following decommissioning and removal of Runway 04/22 and would cost an estimated additional $3.0 million.

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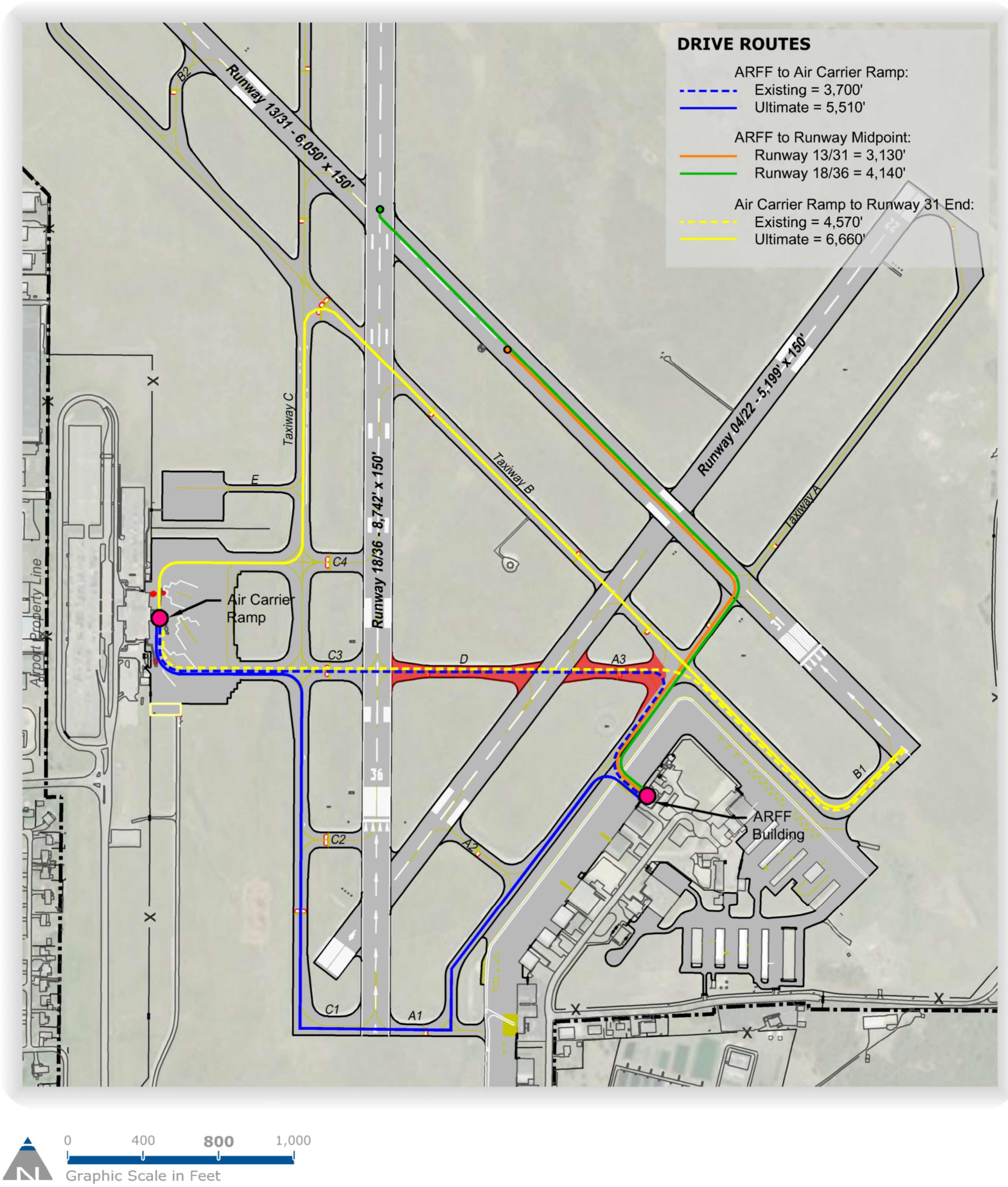

Figure 4-11: **Taxiway A3/D Utilization Study**

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Source: *USGS Earthstar Geographics*

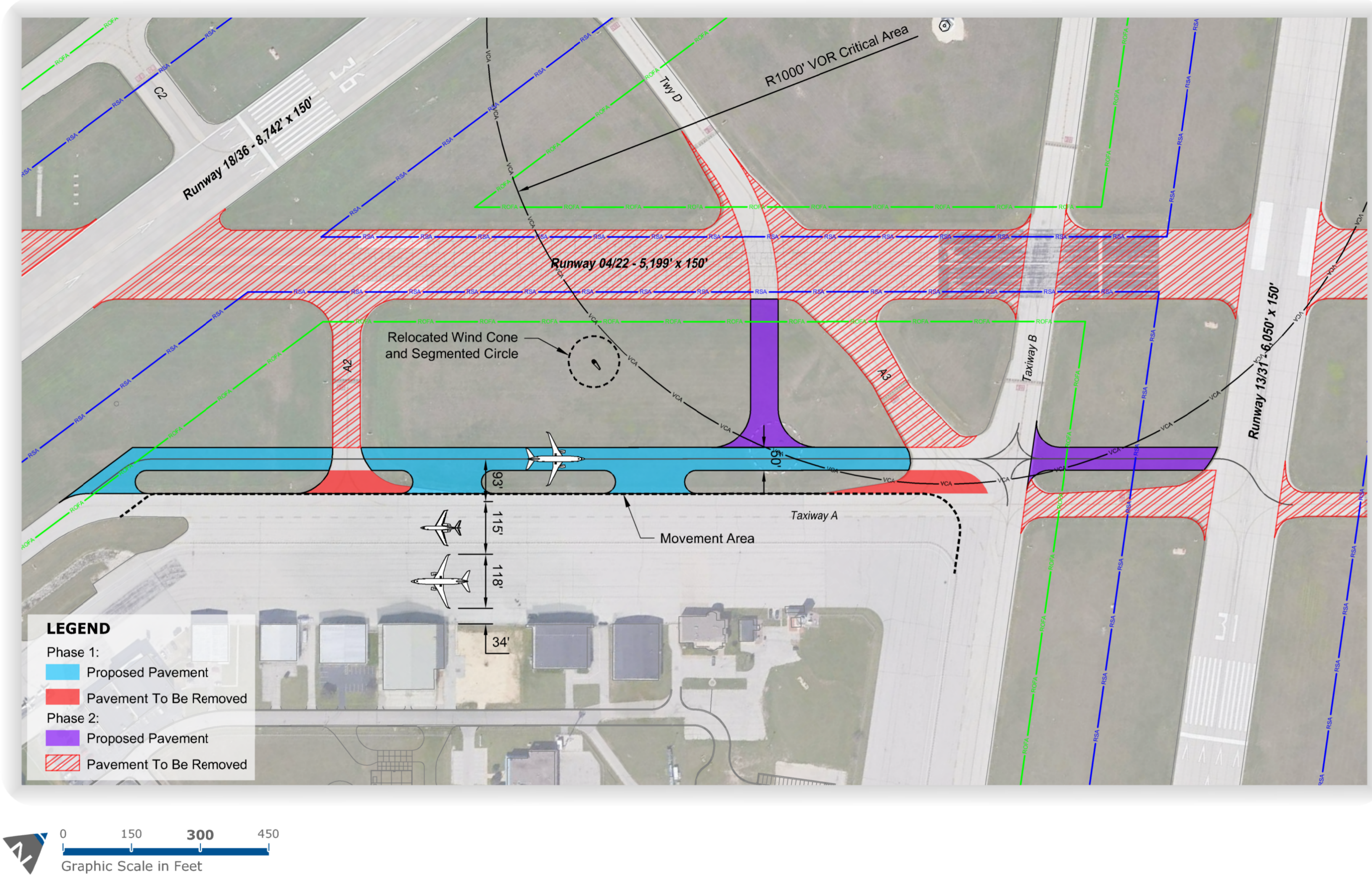

Figure 4-12A: **Taxiway Alternative 2**

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Source: *USGS Earthstar Geographics*

4.4.3. Alternative 3: Convert Runway 04/22 into a Taxiway

This alternative assumes that Runway 04/22 would be closed and decommissioned and seeks to make use of its existing configuration and pavement as a taxiway, as shown in **Figure 4-12B**. The westernmost segment of Taxiway A would be extended north to connect with the edge of Runway 04/22, which would be reduced in width consistent with FAA taxiway standards. This narrowed portion of Runway 04/22 would be reconstructed and converted to a taxiway to provide an alternative path for aircraft to circulate through the area during taxiway and apron closures.

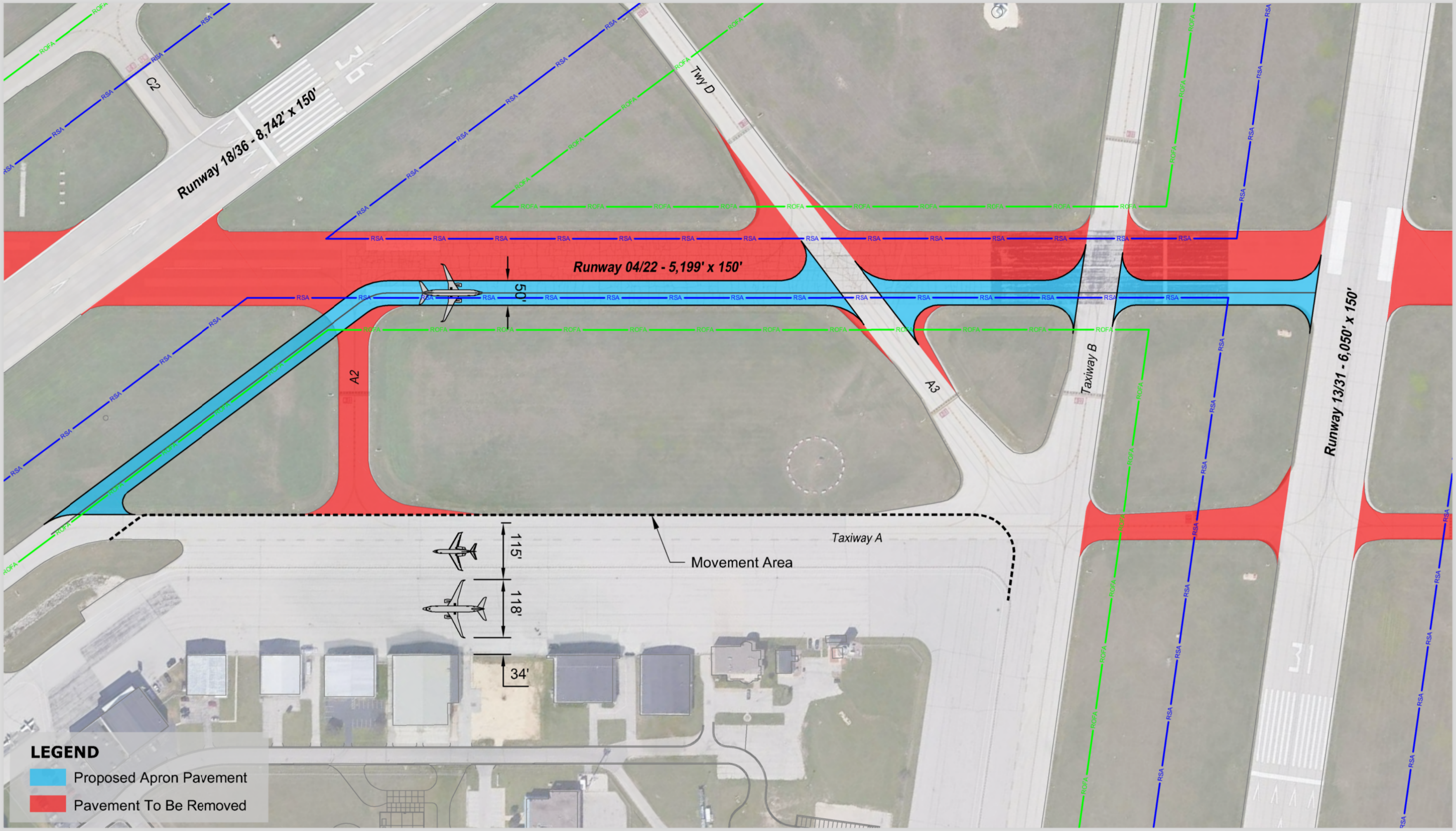
There are some challenges to this approach. Runway 04/22 pavement is in poor condition and the existing pavement would need to be completely removed and replaced to prepare it for larger aircraft. This means that there would be a minimal cost savings even though the proposed taxiway utilizes the footprint of Runway 04/22, with an estimated cost of $5.4 million. In addition, as Runway 04/22 is an established use, the conversion of a runway to taxiway may be confusing to pilots, particularly if they visit LSE infrequently and could mistake the taxiway for a runway. While this alternative would partially maintain the existing footprint of the Airport, it was removed from further consideration because it would result in an unusual layout without any significant cost savings compared to Alternative 2.

4.4.4. Alternative 4: Extend Taxiway from A1 to D

This alternative would extend the westernmost segment of Taxiway A to the north, connecting with Taxiway D as shown in **Figure 4-12C**. This new taxiway segment would provide a shorter taxi route with fewer runway crossings during Taxiway A and south GA apron closures, using a typical taxiway design by paralleling Runway 18/36. The estimated cost of extending the taxiway as proposed by this alternative is $3.1 million. While this alternative provides an improved route compared to existing conditions, it adds complexity to the taxiway system that would need to be mitigated. For instance, the proposed taxiway would cross Runway 04/22 and Taxiway A2 would need to be removed to prevent the creation of a complex intersection. This alternative also would not provide access to all portions of the south GA apron during peak events and would not provide significant cost savings compared to Alternative 2. For these reasons, this alternative was removed from further consideration.

4.4.5. Alternative 5: Relocate Taxiways C3 and C4

This alternative would relocate the portions of Taxiway C3 between the terminal apron and Taxiway C, and remove the portion of Taxiway C4 between Taxiway C and Runway 18/36, so that neither of these taxiways would provide a direct connection from the terminal apron to Runway 18/36, as shown in **Figure 4-13**. The estimated cost of this alternative is $3.4 million. AC 150/5300-13A, Section 401b.(5)(g) states that taxiways should not “lead directly from an apron to a runway without requiring a turn. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway but instead accidently enters a runway.” Although Taxiways C3 and C4 do not currently require a turn between the terminal apron and Runway 18/36, pilots must cross Taxiway C before entering the runway.



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Graphic Scale in Feet

Figure 4-12B: **Taxiway Alternative 3**

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Source: *USGS Earthstar Geographics*

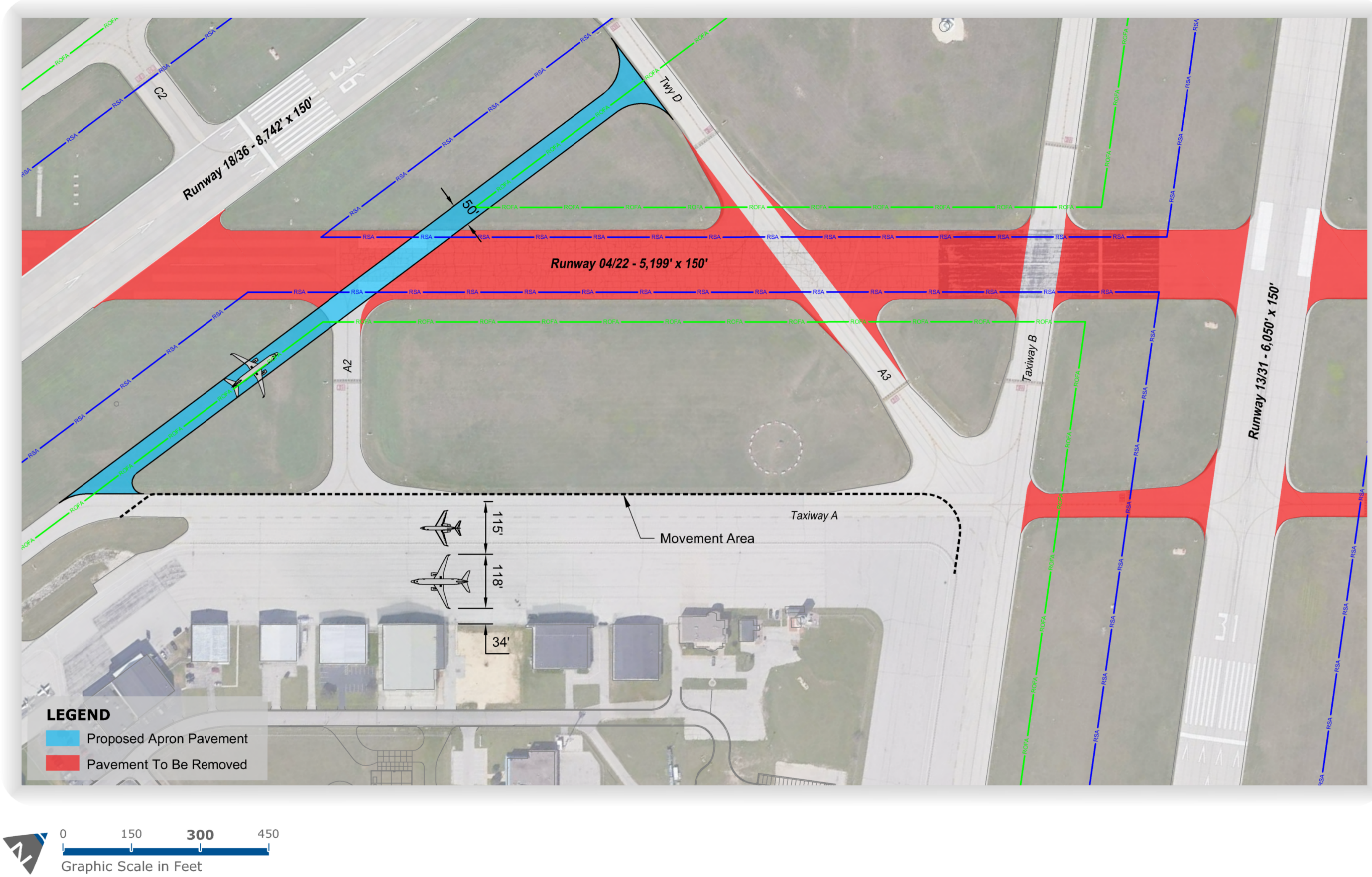

Figure 4-12C: **Taxiway Alternative 4**

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Source: *USGS Earthstar Geographics*

Figure 4-13: **Taxiway Alternatives 5 & 6**

Source: *USGS Earthstar Geographics*

4.4.6. Alternative 6: Construct Mid-field Runway 13/31 Exit Taxiway

This alternative would add a mid-field exit taxiway from Runway 13/31 to Taxiway B located approximately 2,400 feet from the Runway 31 displaced threshold, as also shown in **Figure 4-13**. The estimated cost of this alternative is $1.1 million. Aircraft landing on Runway 31 currently cannot exit the runway until reaching Taxiway C approximately 3,800 feet from the Runway 31 displaced threshold. As a result, small GA aircraft must land and hold short of Runway 18/36, then either cross Runway 18/36 twice, or turn around and back-taxi on Runway 13/31, to reach the south GA hangar area. This alternative would eliminate the need for these additional runway crossings, as well as back-taxiing on Runway 13/31.

4.4.7. Recommended Alternatives

Removing Taxiways A3 and D as proposed by Alternative 1 would eliminate an important Runway 18/36 exit taxiway, increase the taxi distance from the terminal apron to Runway 31 by approximately 50 percent, and increase the distance ARFF vehicles would have to travel to reach the air carrier apron nearly 50 percent. Therefore, these taxiways perform several important functions and should be maintained.

Relocating Taxiway A as proposed by Alternative 2 would allow a parked B737-800, a corporate jet in the ADG II category, and another B737-800 on Taxiway A to simultaneously pass each other with ATC only managing the B737-800 in transit. This alternative is better than Alternatives 3 and 4 because it provides continuity with existing taxi procedures at a similar cost, while avoiding creation of new situational awareness issues. Alternative 2 will be included in the near-term Master Plan CIP.

Relocating a portion of Taxiway C3 and removing a portion of Taxiway C4 as proposed by Alternative 5 would eliminate direct apron-to-runway connections. However, pilots currently must cross Taxiway C before entering the runway, which provides adequate situational awareness. Therefore, relocating these taxiways is not necessary to airfield safety.

Constructing a mid-field Runway 13/31 exit taxiway as proposed by Alternative 6 would reduce Runway 18/36 crossings, as well as back-taxiing on Runway 13/31, for aircraft landing Runway 31. Alternative 6 will be included in the near-term Master Plan CIP.

4.5. Instrument Approach Alternatives

Instrument approaches allow aircraft to operate at an airport during inclement weather and are also used to aid navigation during clear weather conditions. When conducting instrument approaches, pilots fly predetermined routes to navigate around potentially hazardous terrain or obstacles until establishing visual contact with the runway, at which point they can descend and land. This section examines the instrument approaches at LSE for potential improvements.

4.5.1. Instrument Approaches Overview

Approaches at LSE rely on three types of instrument approach technologies: Instrument Landing Systems (ILS), Area Navigation (RNAV) with GPS, and Very High Frequency Omni-Directional Range (VOR). ILS approaches require considerable on-site equipment, including localizer and glideslope antenna systems. Although still used regularly at airports nationwide, very few new ILS systems are being installed due to the advent of GPS systems with comparable performance and lower establishment and maintenance costs. VOR approaches use radio beacons strategically located nationwide to provide approach navigation. The FAA is actively removing VORs across the country to reduce maintenance costs. For these reasons, any improvements to LSE approaches in the near-term would likely be through improvements to RNAV (GPS) approaches. While RNAV (GPS) refers to the type of approach, there are several methods of establishing minimums for these approaches. Relevant RNAV approach minimum types with required equipment and available guidance are shown in **Table 4-8**.

Table 4-8: RNAV Instrument Approach Minimum Types

Short Name	Full Name	Vertically Guided	Additional Aircraft Equipment
LPV	Localizer Performance with Vertical Guidance	Yes	WAAS*
LNAV/VNAV	Lateral Navigation / Vertical Navigation	Yes	WAAS*
LP	Localizer Performance w/o Vertical Guidance	No	WAAS*
LNAV	Lateral Navigation	No	None

*Note: *WAAS = Wide Area Augmentation System*

In practice, regardless of the RNAV (GPS) approach type, aircraft descend from altitudes specified in the approach procedure until they establish visual contact with the runway. However, each approach type offers varying level of precision, may or may not offer vertical guidance along a specified flight path, or may simply offer a minimum safe altitude for each stage of the approach. Many of these approaches also require the use of specialized equipment aboard the aircraft. The RNAV (GPS) approach that requires no additional equipment, but does not provide vertical guidance, is the LNAV approach. Due to the accessibility of this approach, it is one of the most common in the United States. As of February 2016, there were over 6,000 LNAV approaches at 2,747 airports nationwide. Therefore, improvements to one of the LNAV approaches at LSE would offer the greatest improvement for most Airport users.

4.5.2. Preferred Runway Approach

When considering which runway end to improve the existing instrument approaches for, each end should be evaluated. Runway 4/22 is not used by larger aircraft and is used almost exclusively in visual meteorological conditions (VMC), and therefore was not considered. For large business jets and air carrier aircraft, Runway 18/36 already has ILS and RNAV (GPS) approaches with ½-mile visibility minimums to its north end and an RNAV (GPS) approach with 1-mile visibility minimums to its south end. Meanwhile, Runway 13/31 approaches are limited to RNAV (GPS) approaches with a 1-mile visibility minimum to the 13 end and a 3-mile visibility minimum to the 31 end. Runway 31 is a prime candidate for an improved approach due to its poor approach capabilities compared to its length.

One of the first considerations for runway usage is wind coverage. As wind coverage impacts the frequency with which an aircraft may safely use a runway, runways with higher wind coverage are generally the most useful. Wind coverage for Runways 13 and 31 is compared to Runways 18 and 36 in **Table 4-9**. Medium sized aircraft, such as large business jet and regional air carrier aircraft, have a crosswind tolerance of 16 knots; therefore, a 16-knot crosswind component was considered for this analysis.

Table 4-9: Crosswind Coverage (16 knots)

Weather Condition	Runway 18	Runway 36	Runway 13	Runway 31
All Wx	60.80%	51.70%	60.48%	52.57%
VFR	65.93%	57.16%	64.81%	58.77%
IFR	84.20%	83.15%	86.33%	81.19%

Although maximizing wind coverage plays an important role in airfield planning, IFR wind patterns can vary significantly from normal conditions based on the local terrain and weather patterns. IFR weather that limits visibility, such as fog or heavy rain, is often accompanied by less sustained wind. High pressure weather systems are often associated with clear skies, cold air, and strong wind, while low pressure systems, such as those that usually bring IFR weather, are associated with stable cloud layers, warmer air, and calmer wind. This trend is evident in **Table 4-10,** which shows IFR wind velocity frequency at LSE over the past ten years. In 98.9% of IFR conditions, wind velocity is less than 16 knots at LSE. Therefore, user trends are more relevant than IFR crosswind coverage when considering potential approach improvements.

Table 4-10: IFR Wind by Velocity (knots)

Weather Condition	0-3	4-6	7-10	11-16	17-21	22-27	>28
All Wx Conditions	21.7%	38.7%	19.4%	17.0%	2.9%	0.3%	0.0%
VFR Conditions	30.6%	33.4%	17.6%	15.7%	2.6%	0.2%	0.0%
IFR Conditions	72.3%	16.3%	5.8%	4.4%	0.9%	0.2%	0.0%

Notes: Percentages shown account only for that weather condition, e.g., 72.3% of IFR weather observations, not all weather observations, reflect wind velocities of less than 3 knots.
Source: Station: LSE ASOS, Period of Record: 2007 – 2016, Mead & Hunt

Activity data was gathered to determine which runway ends are used most frequently by flights conducted under IFR flight plans. As large narrow-body jet aircraft like the Boeing 737 or A320 cannot use Runway 13/31 for most operations due to inadequate length, only business jet aircraft like the Citation Sovereign or Dassault Falcon 2000 and regional air carrier aircraft like the CRJ 700 or ERJ145 are referenced in this section. Data gathered by the ATCT from August to December 2018 and shown in **Table 4-11** indicate that more IFR approaches are conducted to Runway 31 than Runway 13. This is the case even though Runway 13 already has lower visibility minimums and better wind coverage than Runway 31. Therefore, Runway 31 approach improvements would be most beneficial for Airport users. However, potential improvements to Runway 31, 13, and 36 approaches are discussed in the following sections.

Table 4-11: IFR Approach by Runway End

Runway End	Arrival
Runway 18	60.5%
Runway 36	35.2%
Runway 31	2.6%
Runway 13	1.4%
Runway 22	0.3%
Runway 04	0.0%

Source: LSE ATCT Counts

4.5.3. Runway 31 Instrument Approach Improvements

There are two primary factors to consider when evaluating the utility of potential LNAV approach improvements. One is the minimum altitude an aircraft may descend to while conducting the approach, known as the Minimum Descent Altitude (MDA). The second is the visibility minimum, which is the minimum visibility distance required to successfully conduct the approach. Visibility minimums are most often measured in quarter-mile increments. To improve a given LNAV approach, reducing the MDA and/or visibility minimums is required. To better frame this discussion, the existing Runway 31 RNAV (GPS) instrument approach plate is shown in **Figure 4-14**. As shown in the figure for approach category C/D aircraft, the current MDA is 1,100 feet above touchdown and the current visibility minimum is three statute miles.

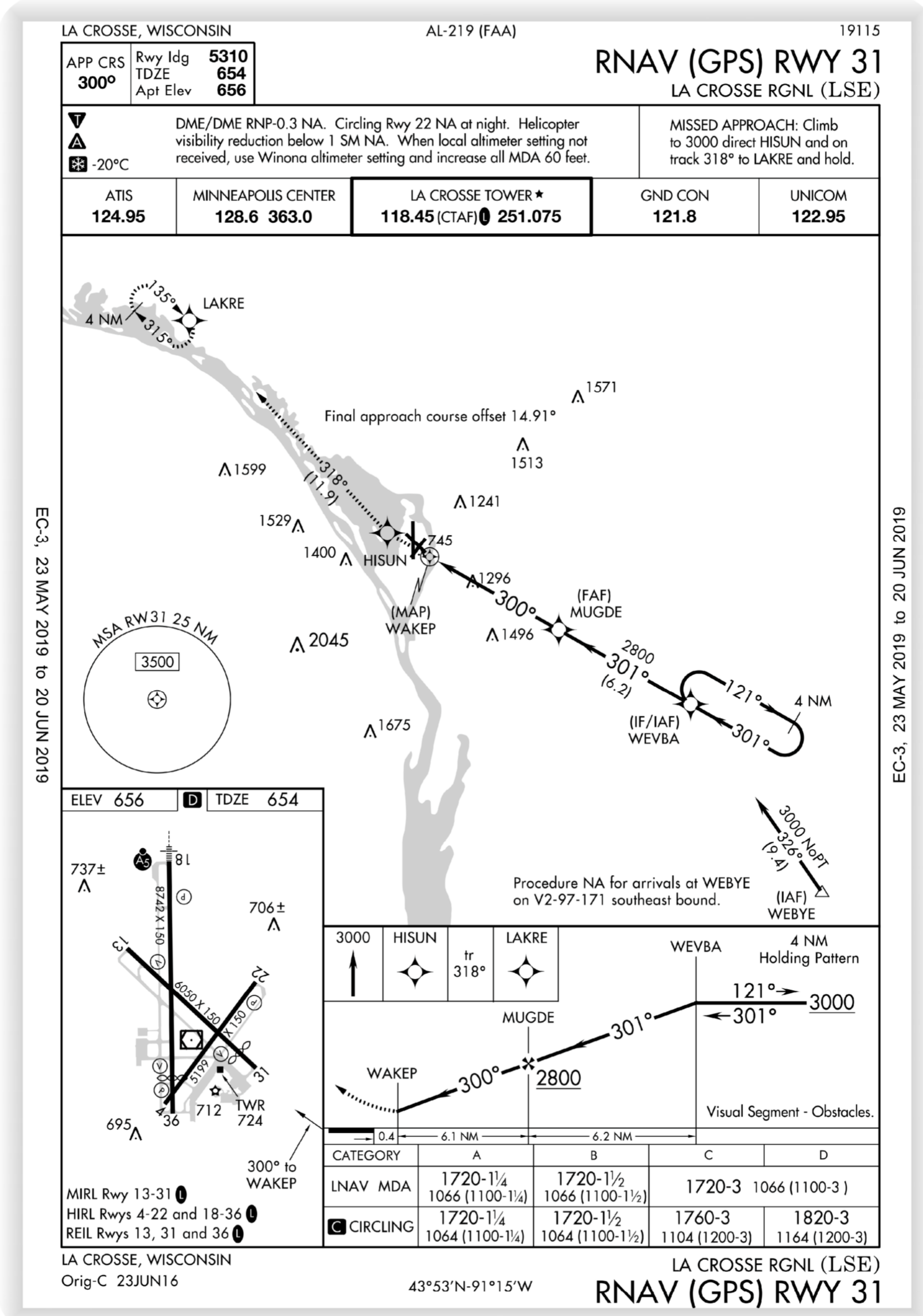

Figure 4-14: **Runway 31 LNAV Approach**

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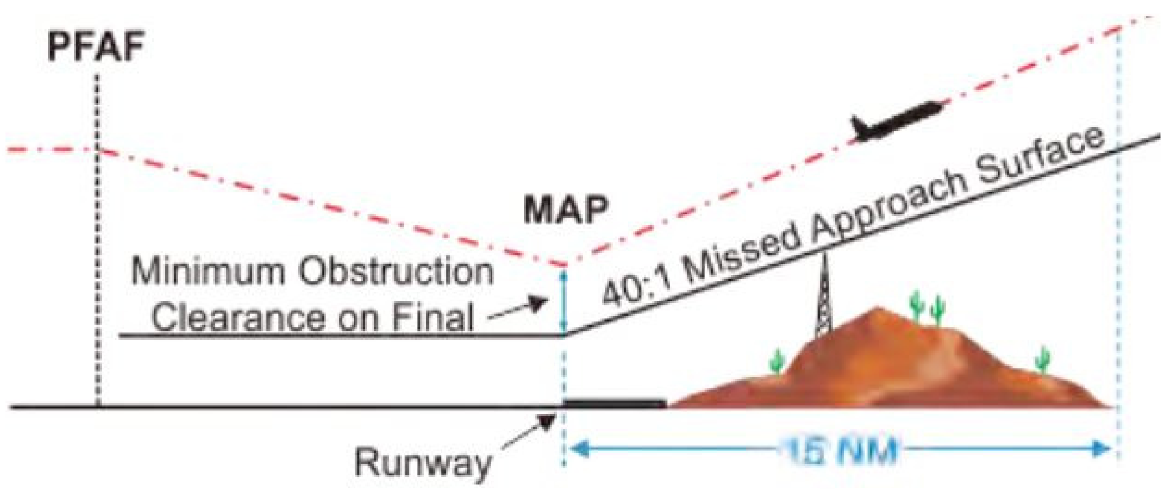
Source: *United States Department of Transportation - Federal Aviation Administration*

4.5.3.1. Minimum Descent Altitude

There are two primary considerations that impact the location of the MDA. The first consideration is the required height above any obstacles during the final approach segment from the Final Approach Fix (FAF) to the Missed Approach Point (MAP), which must be located after the FAF. Aircraft flying under IMC are often greatly limited in their ability to see and avoid surrounding obstacles. Therefore, adequate separation must be provided between aircraft and significant obstacles in the approach area. The required separation between the prescribed altitude of aircraft on approach and obstacles in the approach area is known as the Required Obstacle Clearance (ROC). For the final approach segment, the ROC height above obstacles is between 250 and 500 feet. In practice, this means that aircraft must fly the final approach between 250 to 500 feet above obstacles in the area.

The second consideration is the missed approach surface that accounts for aircraft that cannot land following the approach and must begin climbing again. Similar to the 40:1 departure surface for runway departures, a 40:1 surface also protects the go-around procedure during a missed approach. A clear 40:1 surface must be clear from the MAP, at an altitude that includes the appropriate ROC beneath the MAP, along the flight path until an altitude of 1,000 feet less than the final missed approach altitude is established. This is illustrated below**.** For example, as the existing missed approach requires climbing to 3,000 feet above mean sea level for the current RNAV (GPS) RWY 31 approach, then the 40:1 surface would terminate at 2,000 feet above mean sea level.

These two factors must be considered in combination to provide in the lowest possible MDA while maintaining the necessary ROC above obstacles. This is illustrated in **Figure 4-7** with prominent obstacles labeled.



Source: Figure 2-8-2 FAA Order 8260.3D, United States Standard for Terminal Instrument Procedures (TERPS)

4.5.3.2. Visibility Minimums

Visibility minimums for a straight-in instrument approach procedure are determined by evaluating five relevant factors and picking the most conservative value. This section summarizes each of these factors and identifies the most limiting factors.

1) The first factor considers available facilities for the runway in question as shown below in **Table 4-12.** In this case, most existing facilities on Runway 31 are appropriate for visibility minimums as low as ¾-mile and the only two factors presented in this table at LSE that would require improvement are the runway markings and a survey to support vertical guidance, both of which are minor challenges. However, obstacles in the approach and other factors present additional challenges that result in visibility minimums higher than what Runway 31 could otherwise achieve with these improvements, as explained below.

Table 4-12: Minimum Visibility Based on Available Runway Facilities

Facilities Consideration	Lowest Possible Visibility Minimum (Statute Miles)
Runway does not have a full-length parallel taxiway	1
Edge lighting is not HIRL or MIRL	1
Surface is not asphalt or concrete	3/4
Does not have precision runway markings	3/4
Length is less than 4,200 feet	3/4
Runway survey does not support vertical guidance	3/4

Source: FAA Order 8260.3D, United Sates Standard for Terminal Instrument Procedures, Table 3-3-6

2) The second factor is the distance from the landing point to the MAP. For Runway 31, this distance is 2,626 feet. This distance is then rounded up and converted to statute miles. The applicable visibility minimum for this factor is also ¾-mile. Again, this is lower than the current minimums.
3) The third factor is only applicable if the decision altitude, which is used for LPV approaches, is greater than 3 miles from the landing threshold point. As LPV minimums are not applicable to LNAV approaches, and the distance is less than 3 miles, this factor is not relevant.
4) The fourth factor is the visual obstacle clearance surface (OCS), which begins near the end of the runway and provides a protected area for aircraft using visual flight rules to complete the approach to land. There are two applicable surfaces in this area that, if penetrated, limit the visibility minimums for a runway. These surfaces are shown in **Figure 4-8** and include a 34:1 OCS that, if penetrated, limits visibility to not lower than ¾ mile, and a 20:1 OCS that, if penetrated, limits visibility to not lower than 1 mile. As shown in **Figure 4-8**, the 34:1 OCS is penetrated by the 1,296-foot tower as well as several trees in the area. Therefore, visibility minimums are limited by this factor to 1 mile. Potential obstacle mitigation related to this OCS is discussed later in this section.

5) The final factors to consider are the achievable MDA and available approach lighting system (ALS) type for the runway. The Height Above Threshold (HAT) is the MDA minus the Touch Down Zone Elevation (TDZE). The TDZE often cannot be changed, as it is limited by the runway elevation. However, decreasing the MDA would reduce the HAT and corresponding visibility minimums. Based on existing conditions without an ALS and a HAT value of 1,066 feet, the achievable visibility minimum for large business jet and air carrier aircraft is 3 statute miles. The high HAT and lack of an ALS are currently the most limiting factors for Runway 31 approach visibility minimums. **Table 4-13** identifies achievable visibility minimums based on the HAT and available ALS.

Table 4-13: Minimum Visibility Values (statute miles)

HAT (feet)	Full ALS (FALS)	Intermediate ALS (IALS)	Basic ALS (BALS)	No ALS (NALS)
200 – 260	1/2	3/4	3/4	3/4
261 – 320	1/2	3/4	3/4	7/8
321 – 340	1/2	3/4	7/8	1
341 – 360	5/8	3/4	7/8	1
361 – 380	5/8	3/4	1	1
381 – 400	5/8	7/8	1	1 1/8
401 - 420	3/4	1	1	1 1/8
421 – 440	3/4	1	1 1/8	1 1/4
441 – 460	7/8	1	1 1/8	1 3/8
461 – 500	1	1 1/8	1 1/4	1 3/8
501 – 520	1	1 1/4	1 3/8	1 3/8
521 – 540	1	1 1/4	1 3/8	1 1/2
1,066 (Existing)	**2 1/2**	**2 1/2**	**3**	**3**

Notes: Standards apply to all procedures and category of aircraft except A and B non-precision approach, SA CAT I/II, CAT II/III and helicopters.
NALS: No approach lights or an ALS less than 700 feet in length
IALS: MALSF, MALS, SSALF, SSALS, SALS/SALSF
BALS: ODALS
FALS: ALSF-1, ALSF-2, SSALR, MALSR
Source: FAA Order 8260.3D, United States Standard for Terminal Instrument Procedures (TERPS)

The prescribed HAT for the approach and the availability of an ALS have the greatest impact on Runway 31 approach visibility minimums. Reducing the MDA, which would in turn lower the HAT, and installing an ALS are the most effective strategies for improving the Runway 31 approach. However, each of these strategies have their challenges.

An intermediate ALS (IALS) for Runway 31, such as a Medium-intensity Approach Lighting System with Sequenced Flashing lights (MALSF), could be installed inside the Airport fence as shown in **Figure 4-15**. Due to the displaced threshold, this system would require in-pavement lighting, which would add to the cost and require additional maintenance considerations.

Lowering the MDA could be potentially achieved by removing the 1,296-foot tower and surrounding trees in the Runway 31 approach area shown in **Figure 4-7**. However, the high terrain in the area is expected to prevent meaningful reductions in the MDA, as removal of these obstacles would likely lower the MDA by approximately 75 feet at best. Terrain in this area would need to be further investigated to verify this conclusion.

The combination of lowering the MDA and installing a MALSF would allow for a marginally improved visibility minimum of 2.5 miles for large business jet and air carrier aircraft. Coordination with the FAA is encouraged to determine the feasibility of approach improvements discussed in this section. The costs of this coordination effort and financial investment would likely outweigh the benefits of the marginal improvement in minimums. However, the Master Plan recommends that the Airport protect for a future MALSF because it is likely to be the only viable alternative for reducing Runway 31 minimums.

4.5.4. Runway 13 Instrument Approach Improvements

As discussed previously in Chapter 3, Runway 13 currently has an RNAV (GPS) approach with an LPV enhancement. The minimums for the approach are more restrictive than those for Runway 18/36, but less restrictive than those for Runway 31, with a HAT of 400 feet AGL and visibility minimum of 1 statute mile. Although the non-LPV minimums are higher than the LPV minimums, they are lower than the corresponding minimums for Runway 36.

Airport staff has indicated that Runway 13 approach improvements are desirable. As Runway 13/31 provides superior wind coverage, its approach should have similar capabilities to Runway 18/36. However, the only option for improving minimums to this runway end is to install an ALS (see **Figure 4-16** for a standard MALSF layout for the existing Runway 13 end). Installing an ALS for this runway would be challenging because it would not fit inside the Airport fence if Runway 13 were extended as proposed earlier in this chapter. The ALS may extend near the shore of Lake Onalaska and into areas under the jurisdiction of the federal government. This poses challenges related to environmental clearance and long-term maintenance of the ALS. Furthermore, approach counts provided by the ATCT indicate that Runway 13 is not a preferred runway approach for large business jets and regional air carrier aircraft and installation of an ALS on this runway would likely have limited benefits for these users. For these reasons, planning for a Runway 13 ALS is not recommended by this Master Plan.

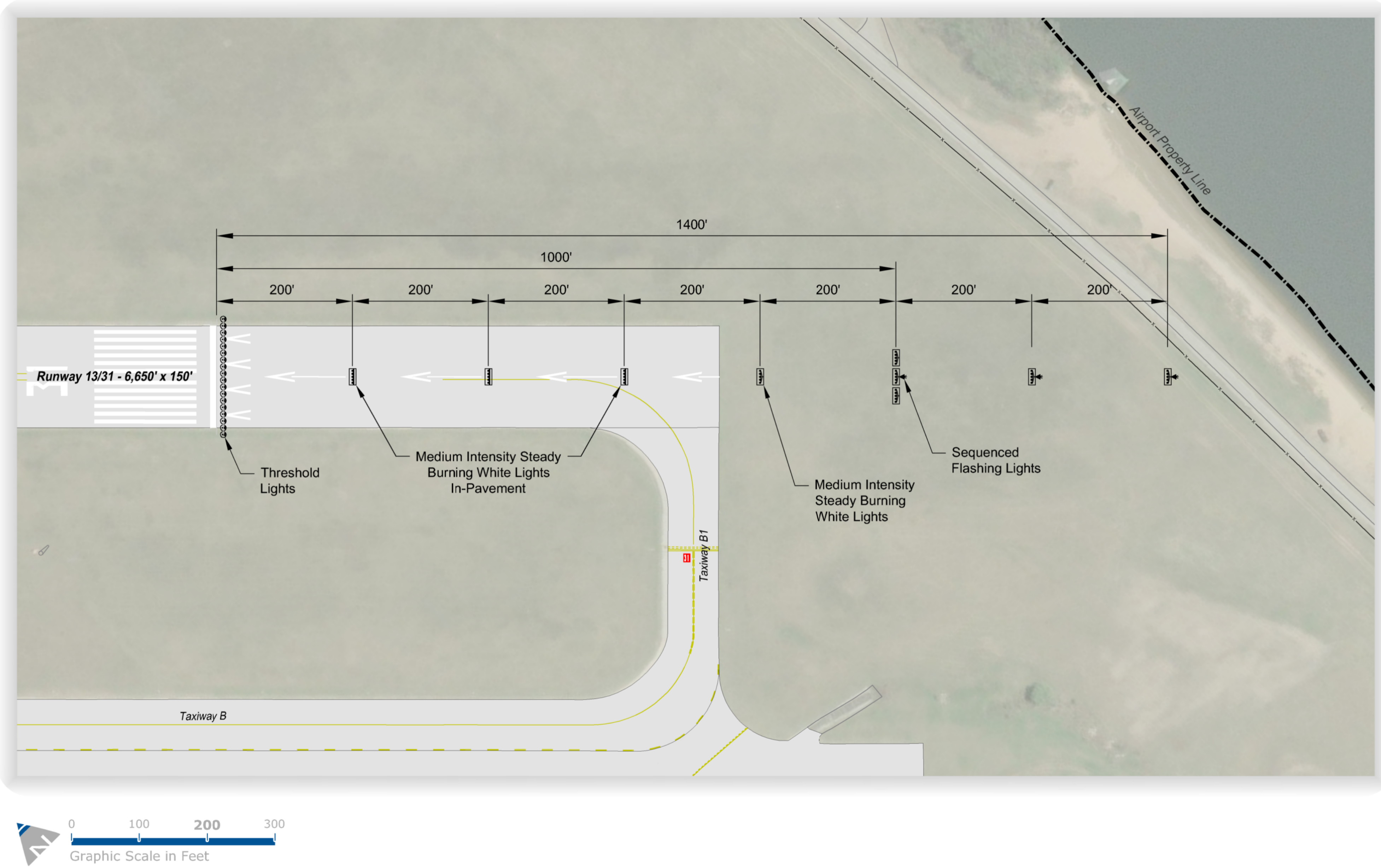


Figure 4-15: **Runway 31 MALSF Conceptual Layout**

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Source: *USGS Earthstar Geographics*

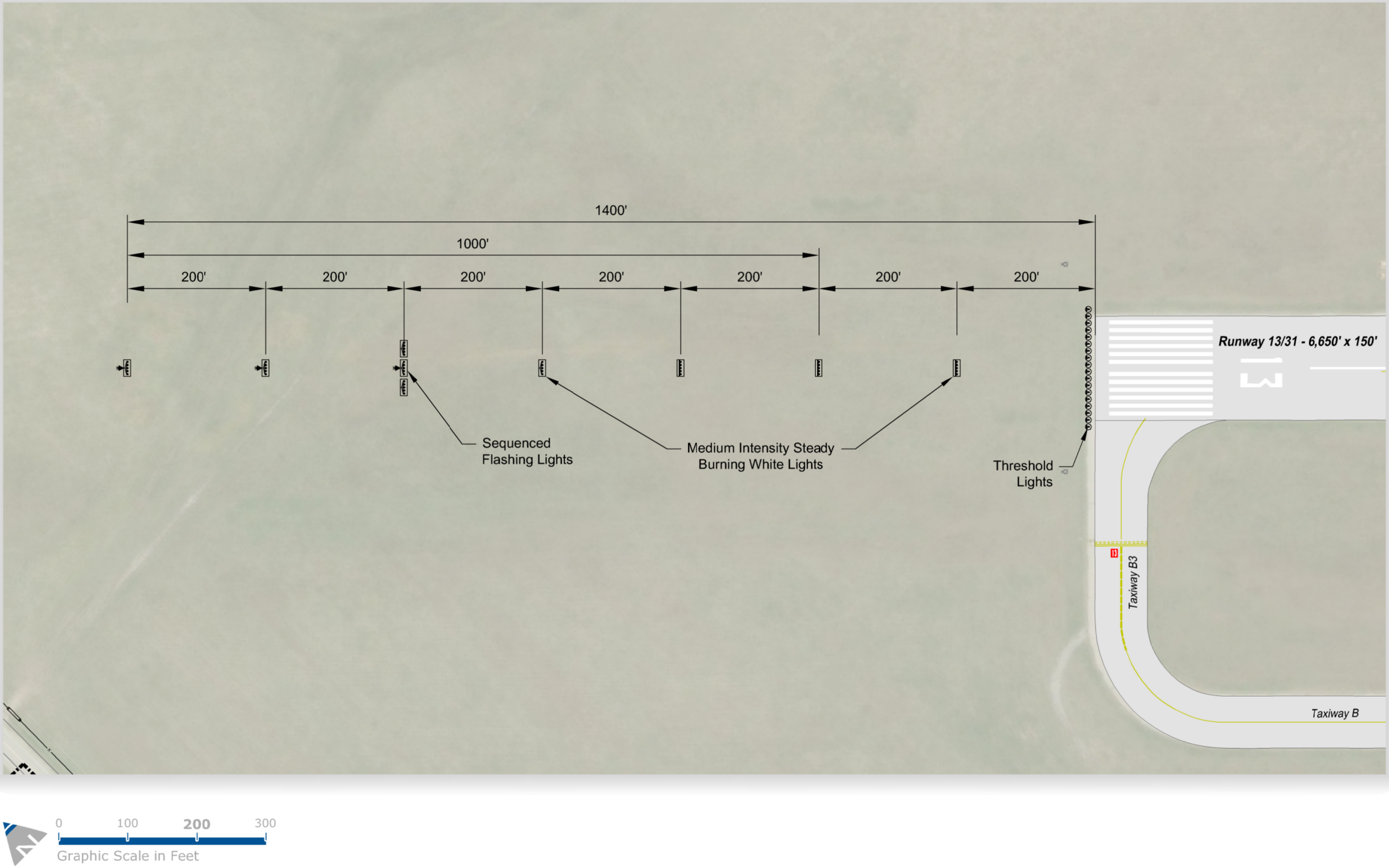

Figure 4-16: **Runway 13 MALSF Conceptual Layout**

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Mead & Hunt

Source: *USGS Earthstar Geographics*

Runway 13 currently has a VASI installed which is outdated and is no longer being replaced by the FAA. A Precision Approach Path Indicator (PAPI) should be installed to improve vertical guidance for the approach. However, this is unlikely to improve approach minimums to this runway.

4.5.5. Runway 36 Instrument Approach Improvements

As previously discussed in Chapter 3, Runway 36 has two non-precision approaches: an RNAV (GPS) approach and a VOR approach. The Runway 36 RNAV (GPS) approach has an LPV enhancement, the highest precision GPS approach currently available. The current Runway 36 LPV minimums include a HAT of 300 feet AGL and visibility of 1 statute mile. The non-LPV minimums are much higher; for example, the LNAV/VNAV minimums include a HAT of 600 feet AGL and visibility of 2 statute miles. A full ALS (FALS) for Runway 36, such as a Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), could be installed inside the Airport fence as shown in **Figure 4-17**. Due to the displaced threshold, this system would require in-pavement lighting, which would add to the cost and require additional maintenance considerations. However, the achievable visibility minimums shown in Table 4-13 indicate that a FALS could potentially reduce the LPV visibility minimum to ½ statute mile, which would be a significant improvement. Visibility minimum reductions of this magnitude would require more restrictive FAR Part 77 and threshold siting surfaces. These more restrictive surfaces will be evaluated as part of the ALP update.

4.6. South General Aviation (GA) Development Area Alternatives

The GA area between the Runway 18 and Runway 31 thresholds supports several types of GA and other aviation-related uses including large corporate traffic, small recreational piston traffic, an ATCT, and Airport support facilities, such as the ARFF and SRE facilities. Alternatives should meet the individual demands of each facility type while also promoting an efficient layout throughout the entire area. As any expansion to one area will likely have impacts to the surrounding facilities, alternatives in this area will be considered as a whole.

This section focuses on facilities south of the GA aprons and potential lateral expansion of the GA aprons. Existing issues in this area include poor circulation of GA aircraft, lack of hangar capacity, and aging hangars. Due to the constrained nature of facilities in this area, proposed layouts are considered in stages, with each stage considering long-term build-out of future facilities while also meeting relevant needs in the near term.

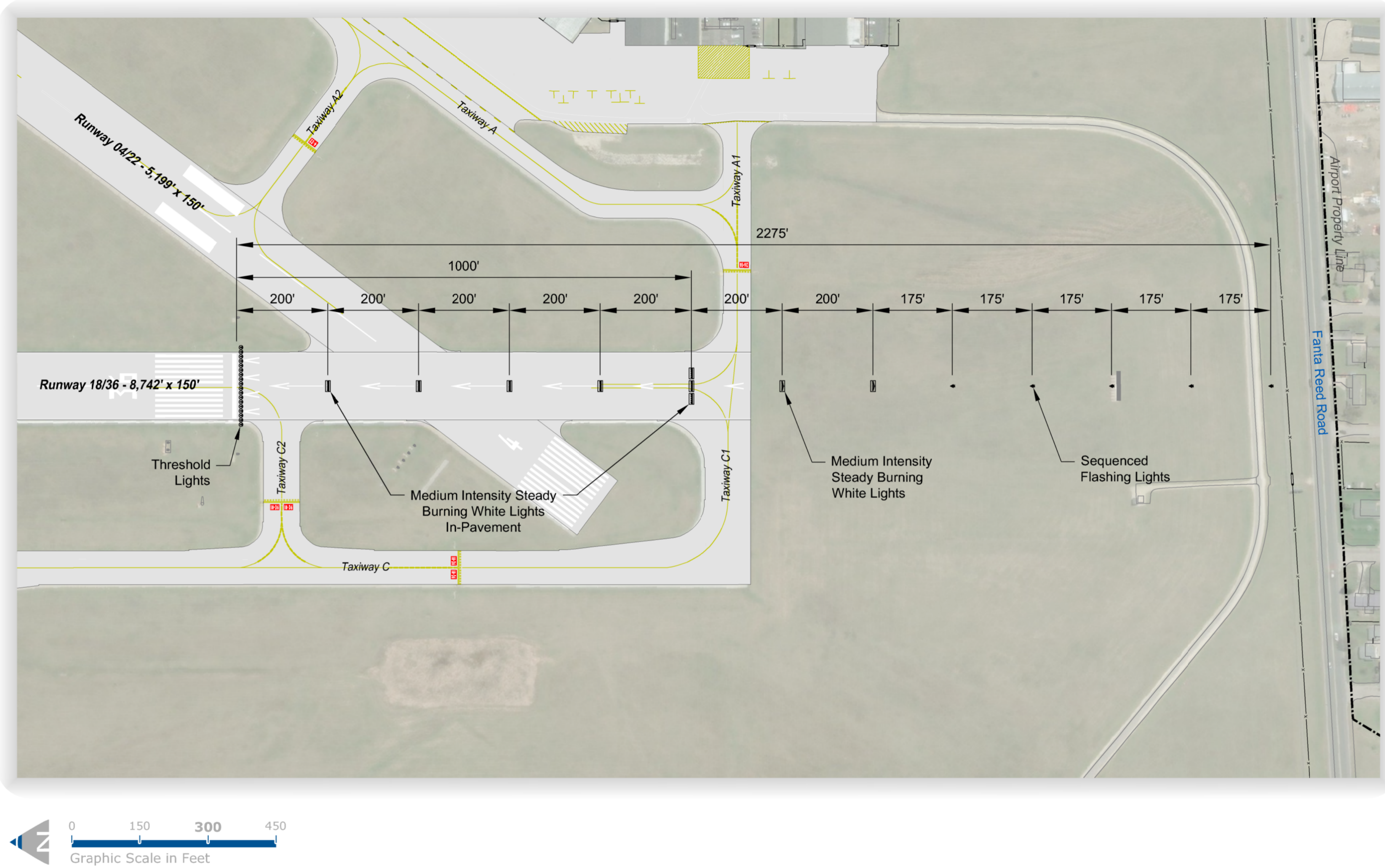

Figure 4-17: **Runway 36 MALSR Conceptual Layout**

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Source: *USGS Earthstar Geographics*

4.6.1. South GA Development: Near-Term Conceptual Layout

The most pressing concern in the south GA area is to provide hangar capacity for larger aircraft, while also removing aging buildings and improving circulation to alleviate existing issues and prepare for additional facilities. The proposed near-term layout for immediate build-out is shown in **Figure 4-18**. Additional landside access points to the hangar area would be made by extending Fanta Reed Road and providing a vehicle turn-around at the end of the road. Vehicles could reach dedicated parking areas near the proposed development areas for future hangars. There are two main development areas. The one east of extended Fanta Reed Road would be available after the two existing T-hangars are removed and could house a large hangar capable of serving regional jets or large corporate aircraft. The development area to the west is intended for smaller 80-by-80-foot hangars for corporate tenants.

Aircraft in these hangars could access the airside using an improved taxiway system. A new taxilane would be constructed around the northern edge of the SRE apron to provide aircraft with access from the corporate hangars to the airside. To further improve airside access, the taxilane to the north of the existing T-hangars would be expanded to allow for ADG II aircraft, which includes aircraft with a wingspan of less than 79 feet, such as the Cessna Citation X, to transit through this area. Both taxilanes would have small temporary bends to maneuver around the sand storage building and existing T-hangar on the southeast edge of the apron, although these would be removed in the intermediate term as discussed in the following section.

4.6.2. South GA Development: Intermediate-Term Conceptual Layout

This alternative would build on the near-term layout as shown in **Figure 4-19**. Although corporate hangars would be added west of the extended Fanta Read Road, the main changes in this phase are additional hangars and taxilanes near the existing T-hangars. Four box hangars would be constructed to the west of the T-hangars, and the pavement would be expanded to accommodate an additional taxilane designed for ADG II aircraft. To the east, a T-hangar would be added with a taxilane on either side designed for ADG I aircraft. The taxilane that supports the corporate hangars and T-hangar area would be improved by the removal of the sand storage building and the T-hangar on the southeast portion of the apron. This would allow for the taxilane to be straightened and simplify aircraft maneuvering. Finally, Fishermans Road would be relocated to the south to provide additional room for future expansion in this area, and two dry retention ponds would be added to accommodate additional stormwater retention due to the additional pavement.

Figure 4-18: **South GA Near-Term Conceptual Layout**

Source: *USGS Earthstar Geographics*

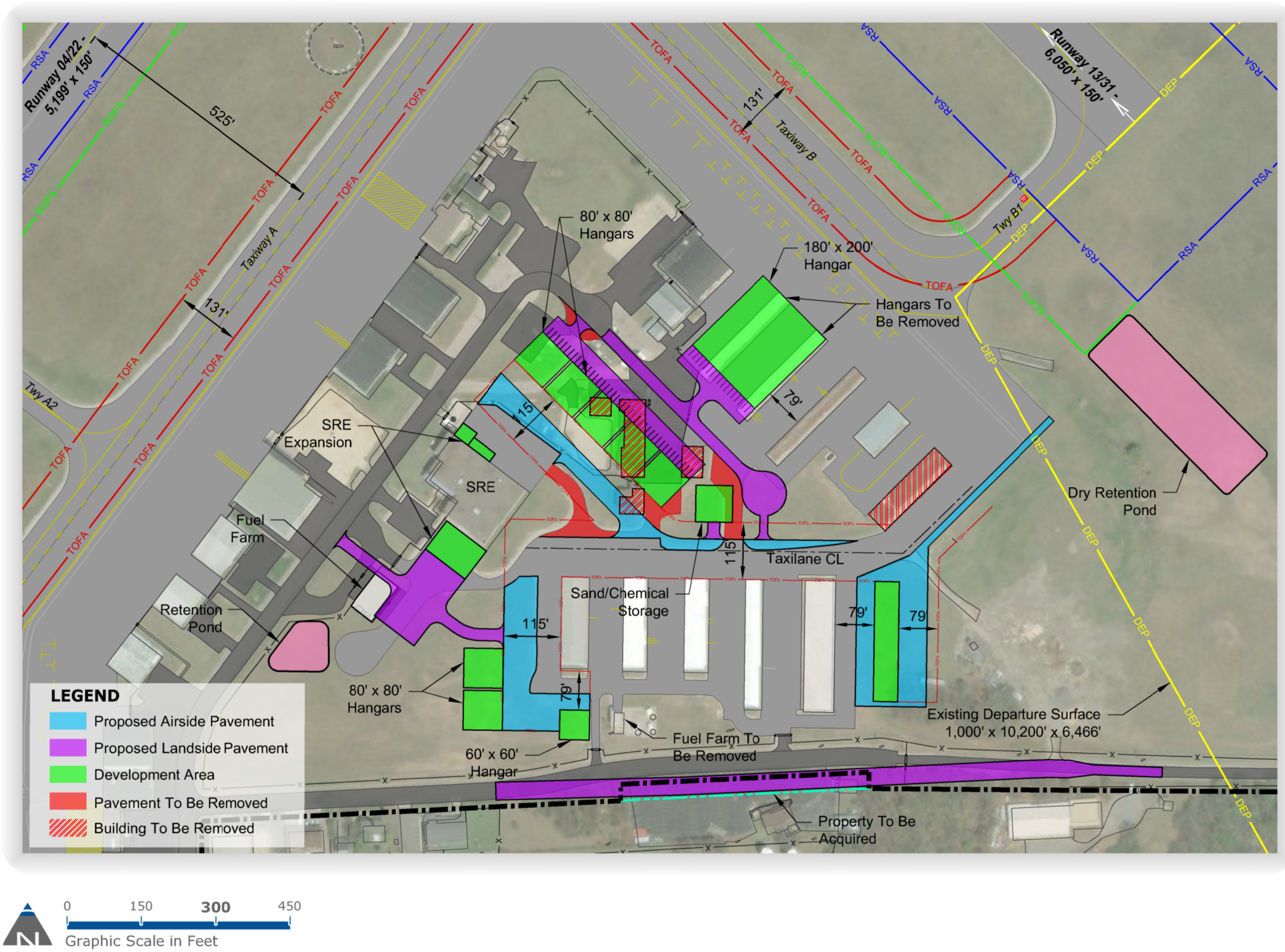

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Figure 4-19: **South GA Intermediate-Term Conceptual Layout**

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Source: *USGS Earthstar Geographics*

4.6.3. South GA Development: Long-Term Conceptual Layout

The long-term development phase would focus on expanding the southernmost section of the south GA hangar area, as shown in **Figure 4-20**. Box hangars would be added to the southwest while the empty area to the east would be developed for large corporate or air carrier hangars. To efficiently accommodate the increase in overall use of the hangar area by different aircraft types, an additional taxilane suited for ADG I aircraft would be constructed south of the T-hangars. This would be possible due to the space created by relocating Fishermans Road in the intermediate term. This taxilane would allow for small aircraft to circulate through the area and reduce congestion for larger aircraft located in the area. This final build-out would also include non-aeronautical development in the southwest corner of this area. This site is not needed or suitable for aeronautical development due to its distance from the apron and the considerable amount of space available elsewhere for aeronautical development. The non-aeronautical development in this area would also benefit from increased visibility at the corner of Fanta Reed Road and Fishermans Road.

4.7. Aeronautical Development Area Alternatives

There is a considerable amount of undeveloped land on the Airport, and the Airport desires to utilize these areas in a way that maximizes revenue while also complementing surrounding land uses. To this end, the consulting firm Explorer Solutions conducted a Highest and Best Land Use (HBLU) study (contained in **Appendix E**) to examine how to best utilize available Airport land. To provide congruence between this Master Plan and the HBLU study, each of the land areas discussed in this section are referred to by the parcel identifiers used in that report.

The proposed land use types recommended for each parcel are shown in **Figure 4-21**. These uses were selected to maximize utility of Airport land and complement nearby land uses. While this figure shows the general type of land use, the specific layouts described below require additional consideration based on the needs of the Airport and potential tenants, once identified. Long-term strategic planning should be conducted to attract meaningful aeronautical uses that further develop and bolster the community's aviation industry talent and connect it with local educational opportunities.

Concepts for parcels identified as aeronautical use in Figure 4-21 are discussed in this section, with non-aeronautical concepts discussed in a subsequent section. For convenience, the alternatives developed for the HBLU study are shown in relevant sections. Additional information on each alternative is available within that report.

4.7.1. Parcels P3 and P3B – South of Terminal

These two parcels are situated approximately a quarter of a mile to the south of the terminal. Parcel P3 is located near the terminal and Runway 36 threshold, a prominent area with easy access from Airport Road. The HBLU study identifies this area for aeronautical development and proposes several 40,000-square-foot hangars with dedicated aircraft parking apron. Hangars of this size could accommodate a CRJ 900 or B737 for maintenance, repair, or other services. This layout is shown in **Figure 4-22**.

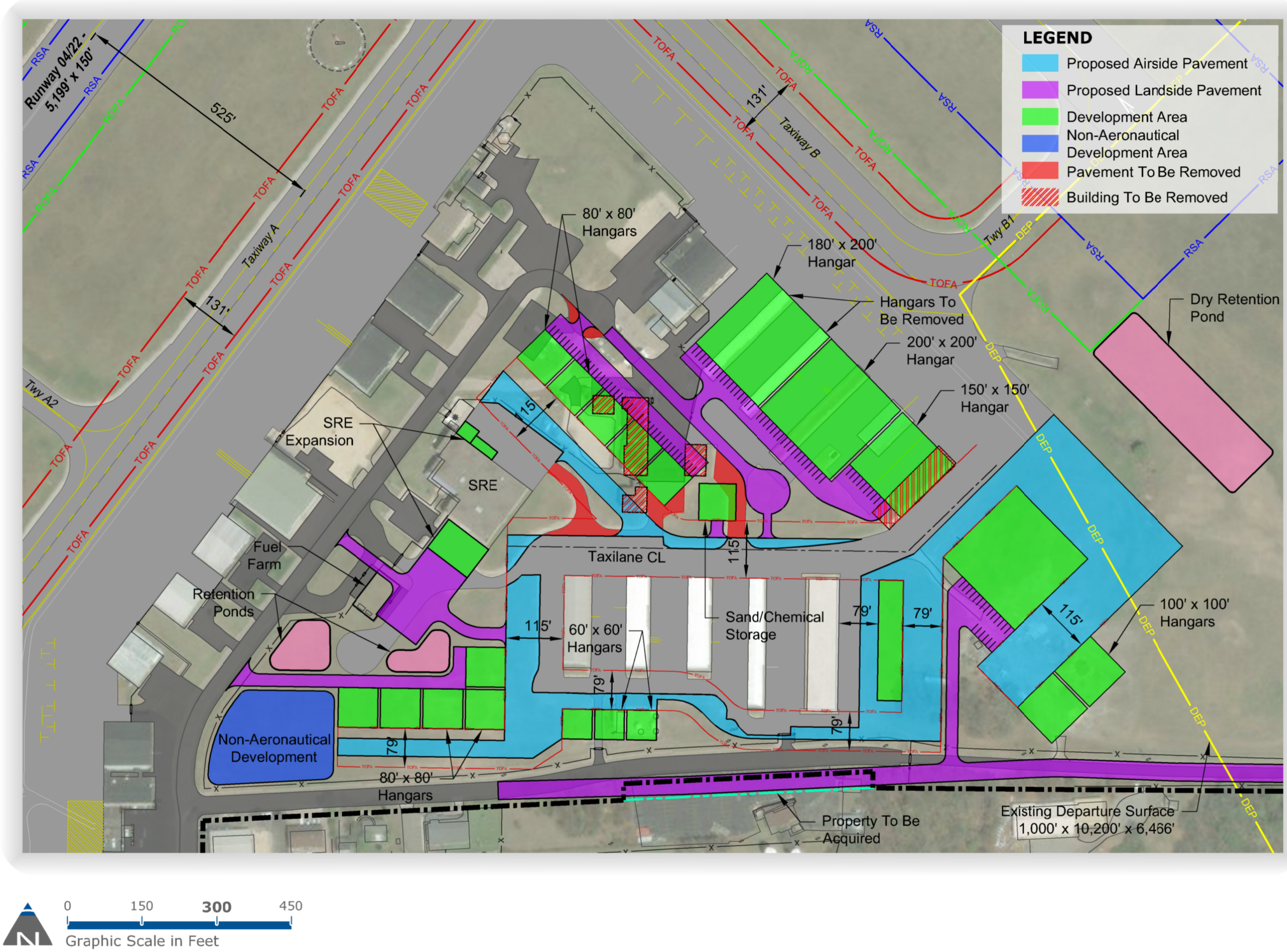

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Figure 4-20: **South GA Long-Term Conceptual Layout**

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Source: *USGS Earthstar Geographics*

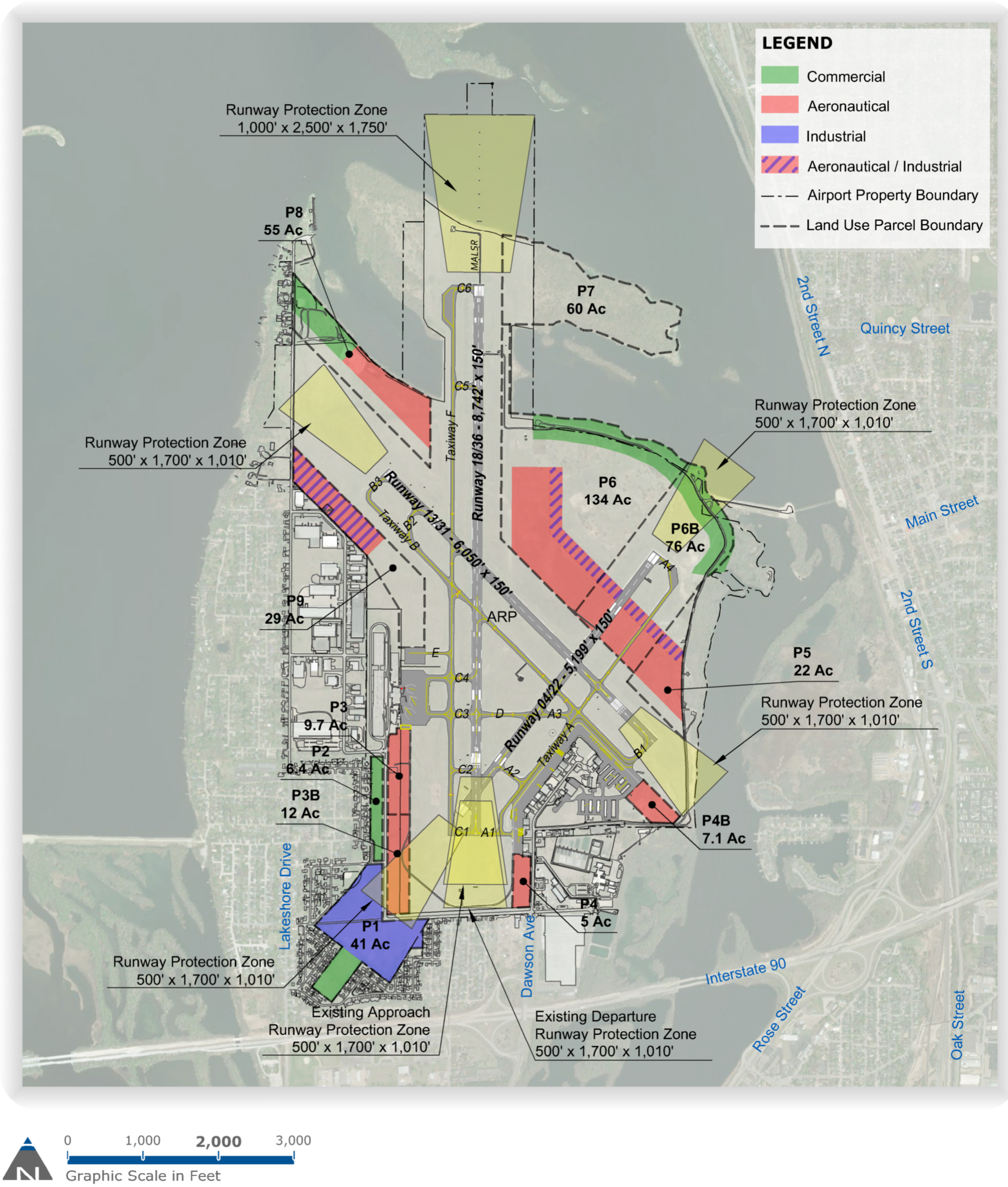
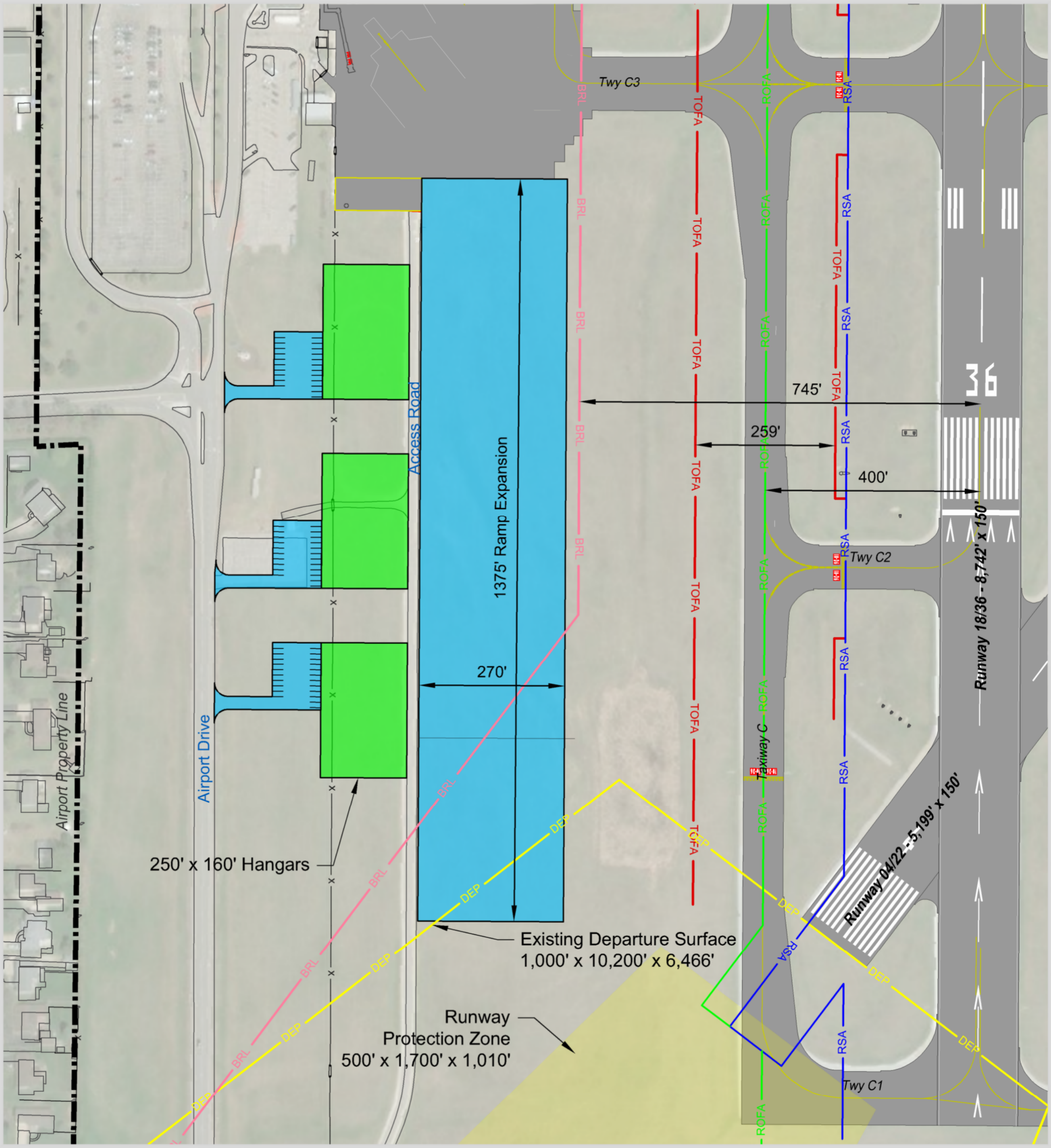


Figure 4-21: **Airport Development Areas**

Source: *USGS Earthstar Geographics*



0 150 300 450

Graphic Scale in Feet

Figure 4-22: **P3 Alternative 1**

Source: *USGS Earthstar Geographics*

Another option for Parcel P3 is to reduce the size of hangars to accommodate business jet use. Several 100-by-100-foot hangars could accommodate large business jet aircraft with additional space on the hangar landside for a public business presence. Ground vehicles would have a dedicated entrance with a gate on either side of the hangars to allow access to the airside for passenger boarding or other services. This undeveloped site would allow adequate apron space for aircraft to be hangared and parked on the adjacent dedicated apron. The size of the apron would depend on the type of aircraft serviced here. Suggested apron sizes based on aircraft lengths are as follows:

- ADG II (up to most corporate/regional jets): 175 feet
- ADG III (up to large corporate/regional jets & many narrow-body jets): 270 feet
- ADG IV (up to large narrow-body jets & some wide-body jets): 350 feet

It is unlikely that ADG IV aircraft would utilize the area, and therefore apron dimensions for ADG II and III are shown in **Figure 4-23**. Two taxiway connections to Taxiway C from the proposed apron would allow for aircraft circulation, and the existing access road would be modified to connect to the end of the apron to allow Airport personnel to transit the area.

Parcel P3B is south of P3, with much of P3B inside the Runway 04 RPZ. Development options for Parcel P3B are dependent on the future disposition of Runway 04/22 but would likely involve an extension of the land use on Parcel P3. If the runway were decommissioned or closed, this parcel could be developed similarly to Parcel P3. If the runway remains in its current configuration, this parcel is likely undevelopable due to airspace zoning and RPZ development restrictions.

4.7.2. Parcels P4 and P4B – South GA Area Addition

Parcels P4 and P4B are located southwest and southeast of the existing south GA development area, respectively. Future development for Parcel P4B was already discussed in Section 4.6. The P4 concept shown in **Figure 4-24** extends the existing hangar frontage line along the south GA apron onto Parcel P4. Due to the visibility and accessibility from Fanta Reed Road, this would be a natural expansion for aeronautical businesses or corporate hangars. While limited by the Runway 18 departure surface and Runway 36 RPZ, there would be adequate space to construct three hangars with business fronts and vehicle parking although specific layouts may vary based on tenant needs.

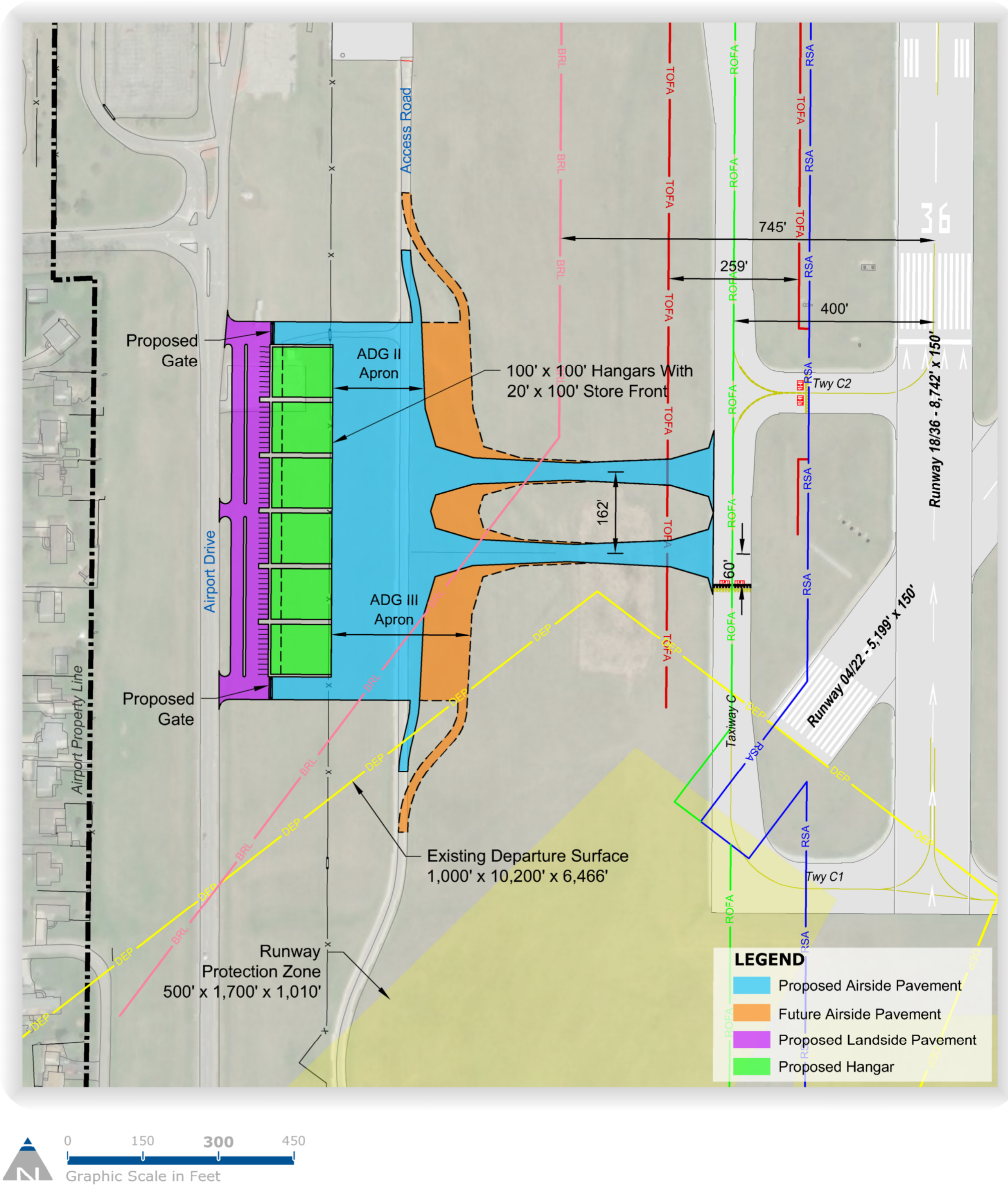


Figure 4-23: **P3 Alternative 2**

Source: *USGS Earthstar Geographics*

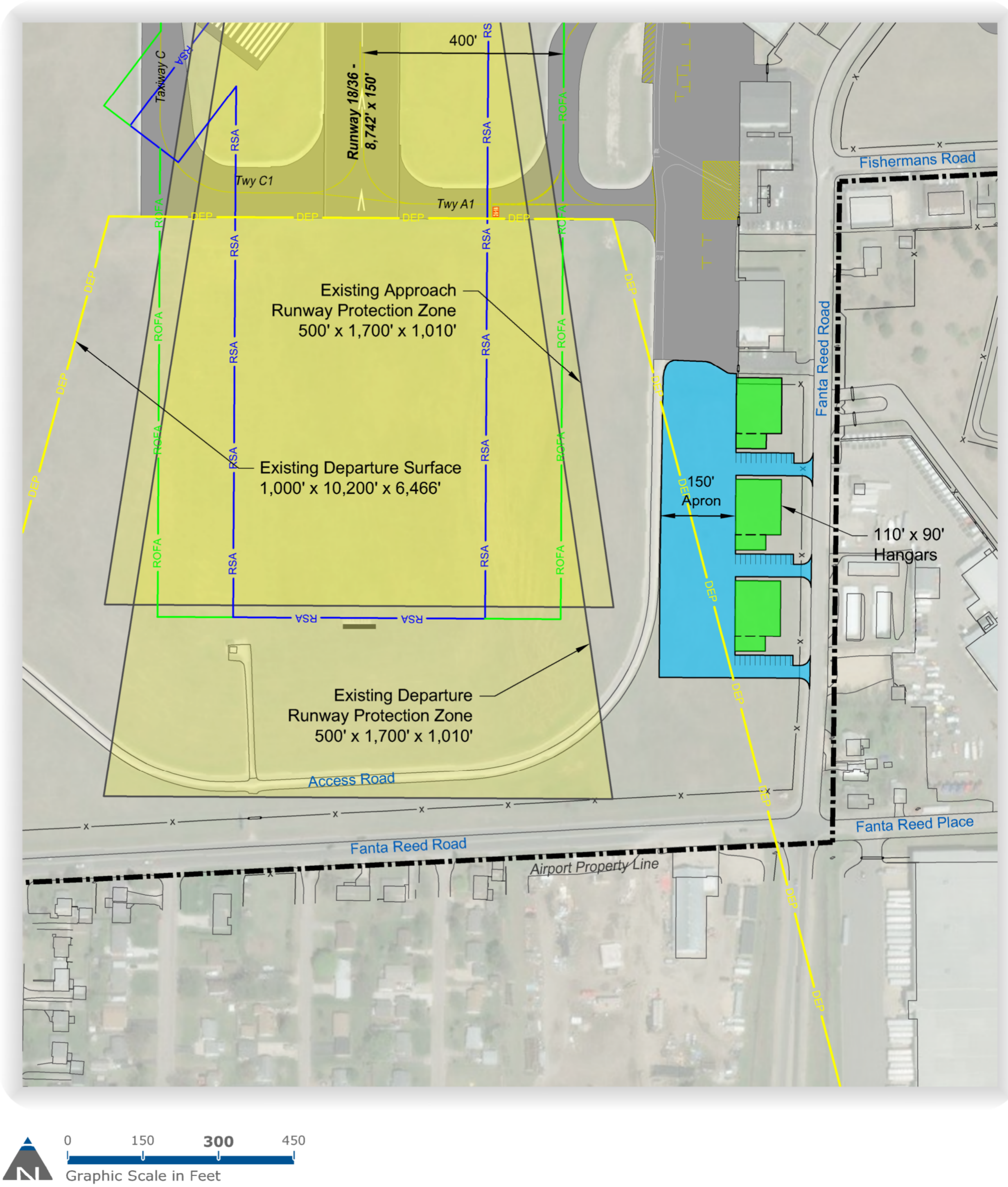


Figure 4-24: **P4 Conceptual Layout**

Source: *USGS Earthstar Geographics*

4.7.3. Parcels P5, P6 and P6B – Northeast Greenspace

These parcels are largely unoccupied but have access from Fisherman's Road and are partially occupied by Runway 04/22. Similar to other parcels, the future disposition of Runway 04/22 would impact the potential layout of facilities on these parcels. Due to other areas available for aeronautical development, it is unlikely that this space would be needed for hangars within the 20-year planning period. These parcels should be reserved for aeronautical use beyond the planning period with specific layouts to be developed based on the needs at that time. These land uses are shown in **Figure 4-25**. It is anticipated that these parcels would be used primarily for small GA activity. Therefore, space is reserved for an apron measuring 175 feet deep, as previously determined for this aircraft size. An area 400 feet deep could be used for aeronautical development, like hangars and supporting taxilanes. While the ultimate depth may vary, it is limited to 400 feet in Figure 4-25 as too many hangars on a single taxilane can lead to congestion. The remainder of the area could be used for non-aeronautical use with ample buffer from aeronautical uses.

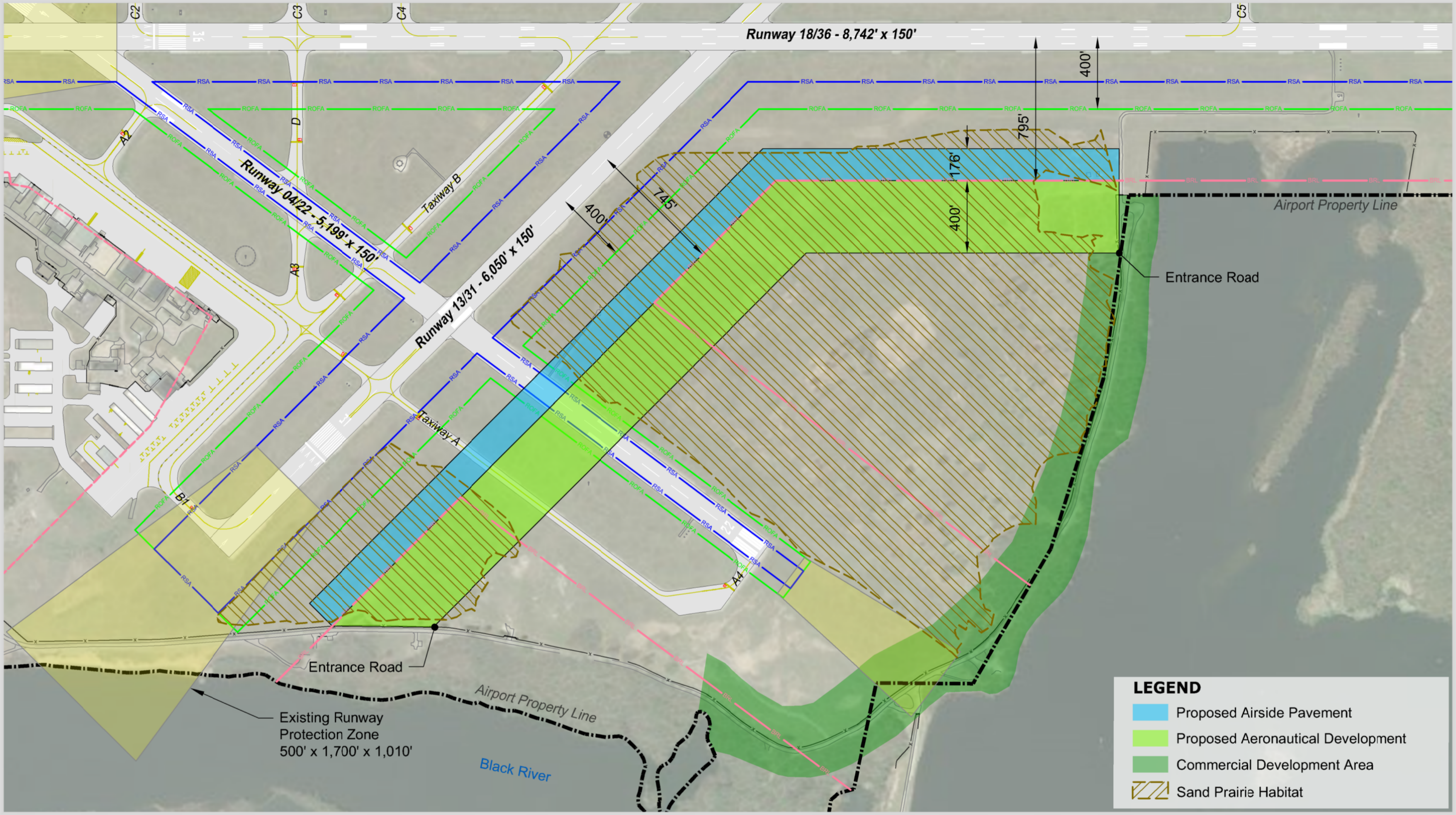
Portions of Parcels P5, P6, and P6B are currently occupied by areas designated by the Wisconsin DNR as ecologically sensitive sand prairie. According to the DNR, sand prairie habitat is "imperiled in Wisconsin because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state." The proposed uses shown in Figure 4-25 would be developed along the perimeter of this sensitive area. Although not protected under special statutes, regulations implementing the National Environmental Policy Act (NEPA) specifically require consideration of impacts to sensitive habitats. While the degree of protection offered this habitat is unclear, design should carefully consider the relationship of proposed uses to the habitat with potential synergy in mind.

4.7.4. Parcel P8 – North of Runway 13 Threshold

Parcel P8 is located north of the Runway 13 threshold and could be accessible from Lakeshore Drive. Similar to the northeast greenspace area by the existing Runway 22 threshold, it is unlikely that this area would be needed to satisfy aeronautical demand within the 20-year planning period. The area further south, closer to the runway threshold, could be used for aeronautical development although the specific layout will depend on the needs of tenants at the time.

4.7.5. Parcel P9 – North of Terminal

Parcel P9 is located north of the existing terminal and near the northern end of Airport Drive. Airport land in this area is unoccupied but adjacent land is occupied by light industrial land uses, such as shipping and manufacturing. Complementary aeronautical use on this parcel could include hangars and facilities oriented toward airborne shipping and receiving. The HBLU concept is shown in **Figure 4-26**, and an alternate conceptual layout developed specifically for this Master Plan is shown in **Figure 4-27**. Although both alternatives have similar land uses, the layouts have some differences. The alternative developed for the Master Plan (**Figure 4-27**) would include shipping facilities readily accessible from both the landside by truck and airside by plane with aircraft parking nearby. Nearby hangars would allow for aircraft storage and taxilanes would provide access to the apron, which would be 147 feet wide and have easy access to the Runway 13 threshold. Additional information on the HBLU alternative is available within that document.



0 400 800 1200
Graphic Scale in Feet

Figure 4-25: **P5 / P6 / P6B Aeronautical Reserve Area**

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Source: *USGS Earthstar Geographics*

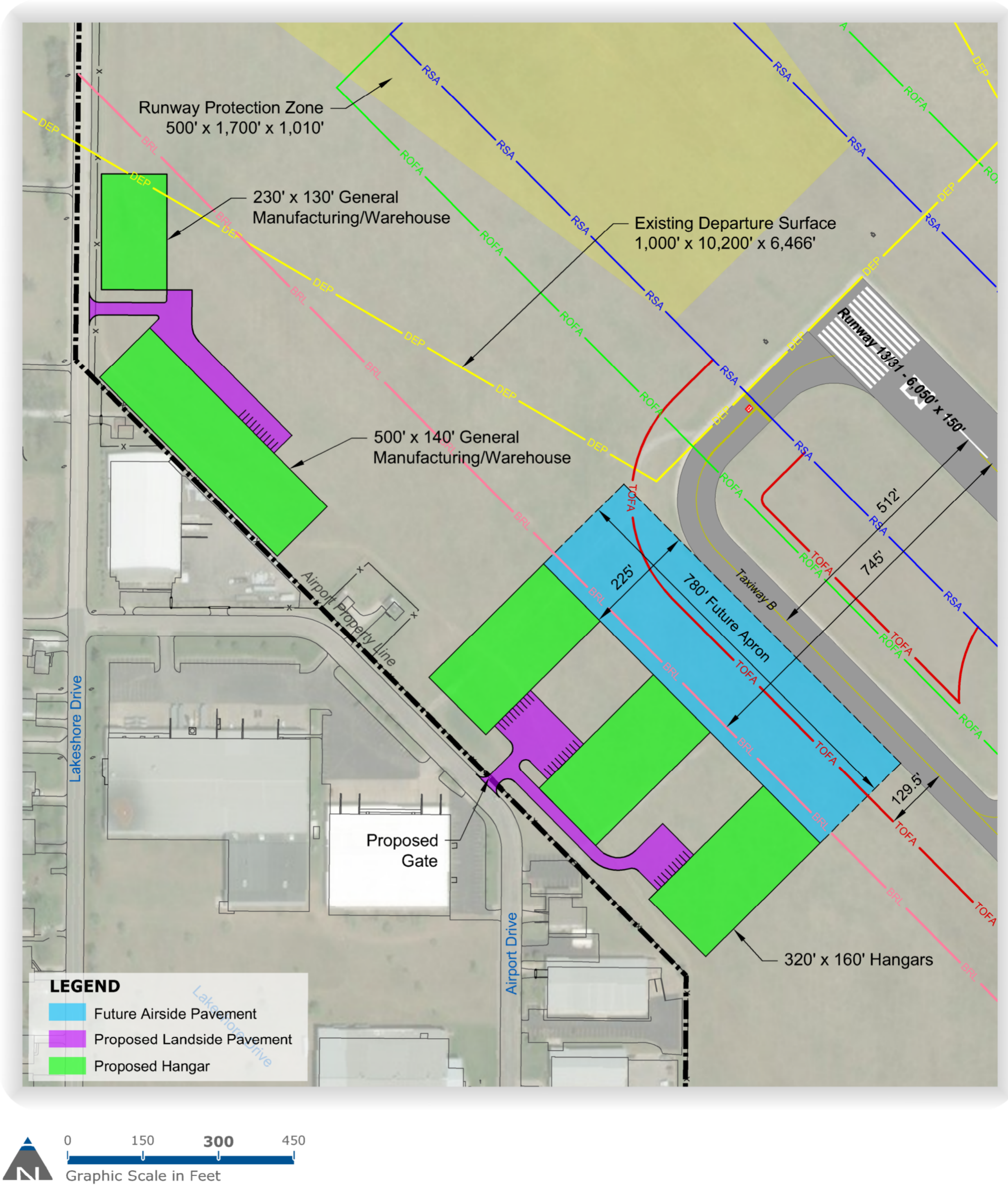
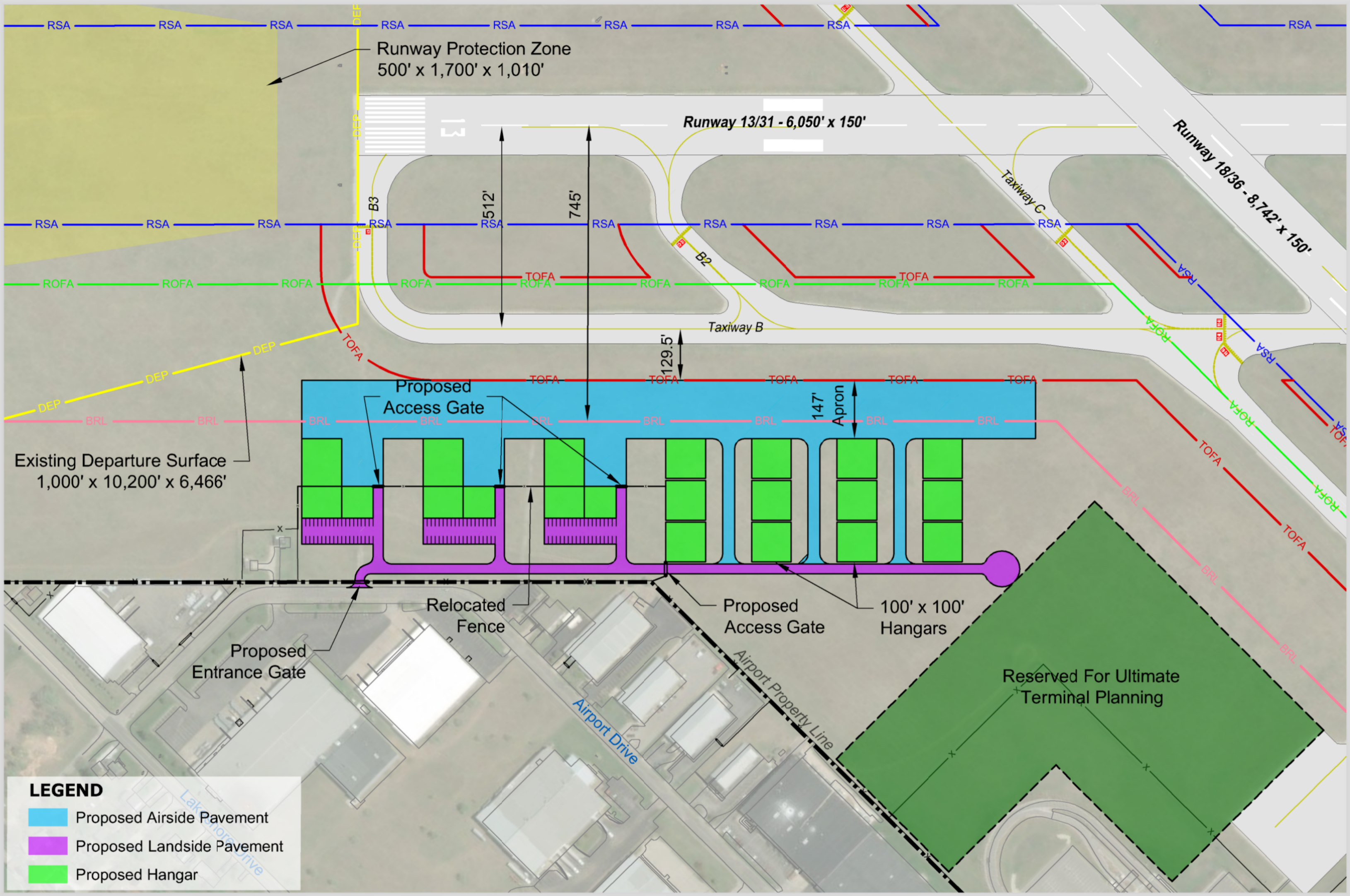


Figure 4-26: **P9 Alternative 1**

Source: *USGS Earthstar Geographics*



0 200 400 600
Graphic Scale in Feet

Figure 4-27: **P9 Alternative 2**

Source: *USGS Earthstar Geographics*

4.8. Non-Aeronautical Development Area Alternatives

When an Airport has more land than is needed to meet anticipated aeronautical demand, some of that land can be used for non-aeronautical use with FAA approval. At LSE, this would generate additional revenue and use land that would otherwise not be utilized. This section discusses areas of the Airport suitable for non-aeronautical development and identifies potential land uses based on their locations. Although discussed in the HBLU study, Parcel P7 on Bell Island is too isolated for development and is not discussed in this section. The concepts presented in this section are preliminary and will likely require changes to City zoning designations. The concepts would be further refined prior to construction to consider context sensitive design so that proposed industrial and commercial uses recognize neighboring residential uses and are designed accordingly.

4.8.1. Parcel P1 – South of Fanta Reed Road

Parcel P1 is in the Runway 4 approach area across Fanta Reed Road and is currently vacant. If the runway were decommissioned or shortened, the restrictions imposed by the approach and departure surfaces would be reduced such that development could occur in this area. The HBLU study proposes developing this area into an industrial park, with a commercial office park on the southwest portion to provide a buffer from the surrounding residential area. In the industrial area, warehouses could act as a distribution center for a convenient shipping location near the Airport. Although the HBLU study did not identify specific types of commercial use for the southwest portion of Parcel P1, this area could be used for local businesses, cafes, or other commercial uses compatible with the surrounding residences. The conceptual layout developed for the HBLU study is shown in **Figure 4-28**.

The nearby area surrounding Parcel P1 is in the Town of Campbell. Although this area consists mainly of private residences, a baseball field is in the northwest corner Parcel P1. A portion of the baseball outfield is on Airport property. The Town of Campbell has expressed interest in acquiring a portion of Airport property to fully incorporate the baseball field into the Town’s property. This would reduce the available space to develop for industrial use, as proposed in the HBLU study.

4.8.2. Parcel P2 – West of Airport Drive

Parcel P2 is a 7-acre vacant area west of Airport Road on Airport property and is in a prominent, highly visible location near the terminal with easy access from Airport Road. The HBLU study proposes an office building and hotel in this location, as shown in **Figure 4-29**. All hotels in the area are located away from the Airport, either south of Interstate 90 or east of the Black River. In addition, the HBLU study found that office vacancy rates in La Crosse are very low. Local real estate experts indicate that most recent office development has been concentrated in the downtown area with limited space for further development. This suggests that additional office space will be needed away from the city center, and Parcel P2 is well-positioned for this type of use.

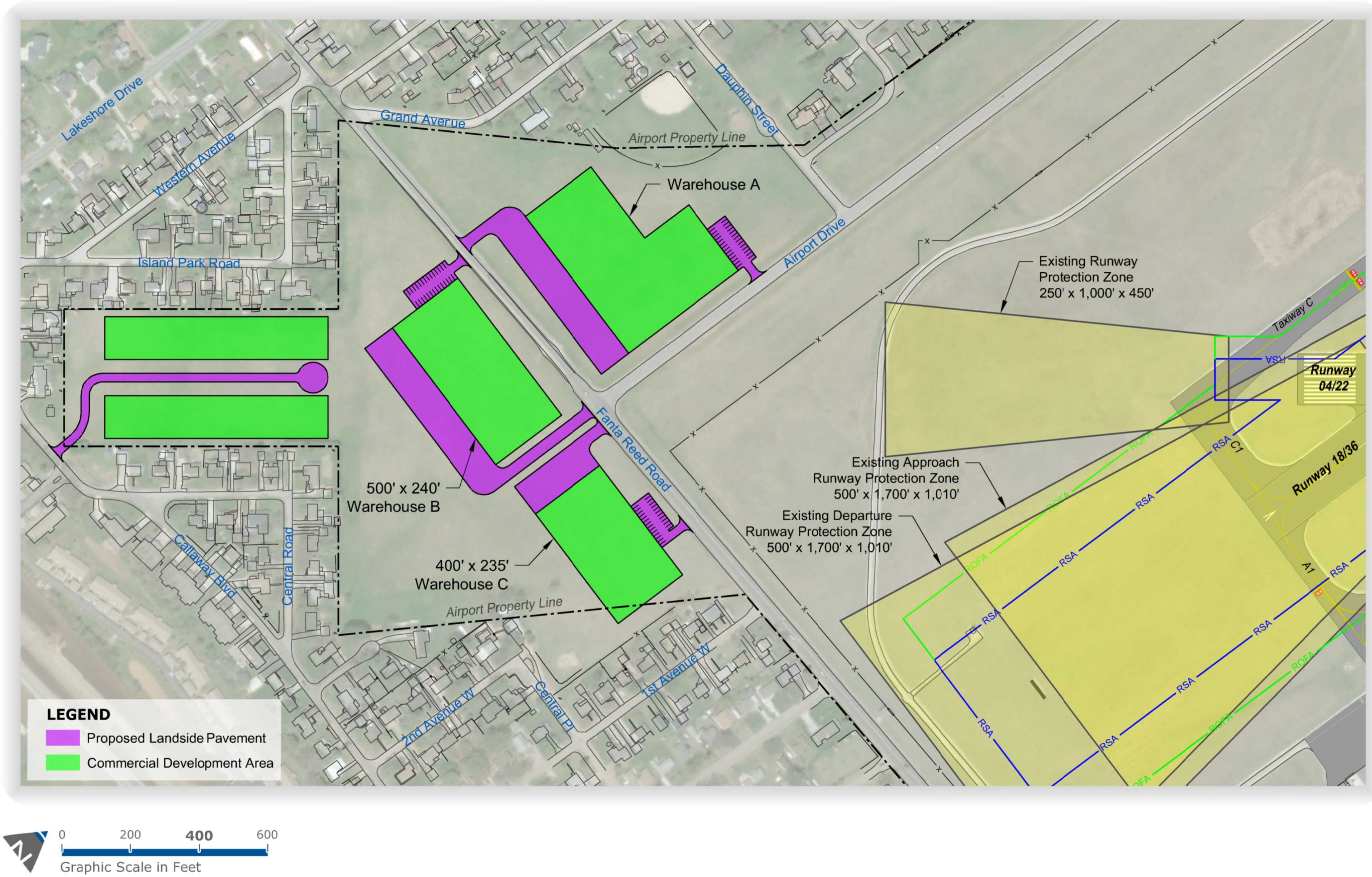


Figure 4-28: **P1 Non-Aeronautical Use Conceptual Layout**

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Source: *USGS Earthstar Geographics*

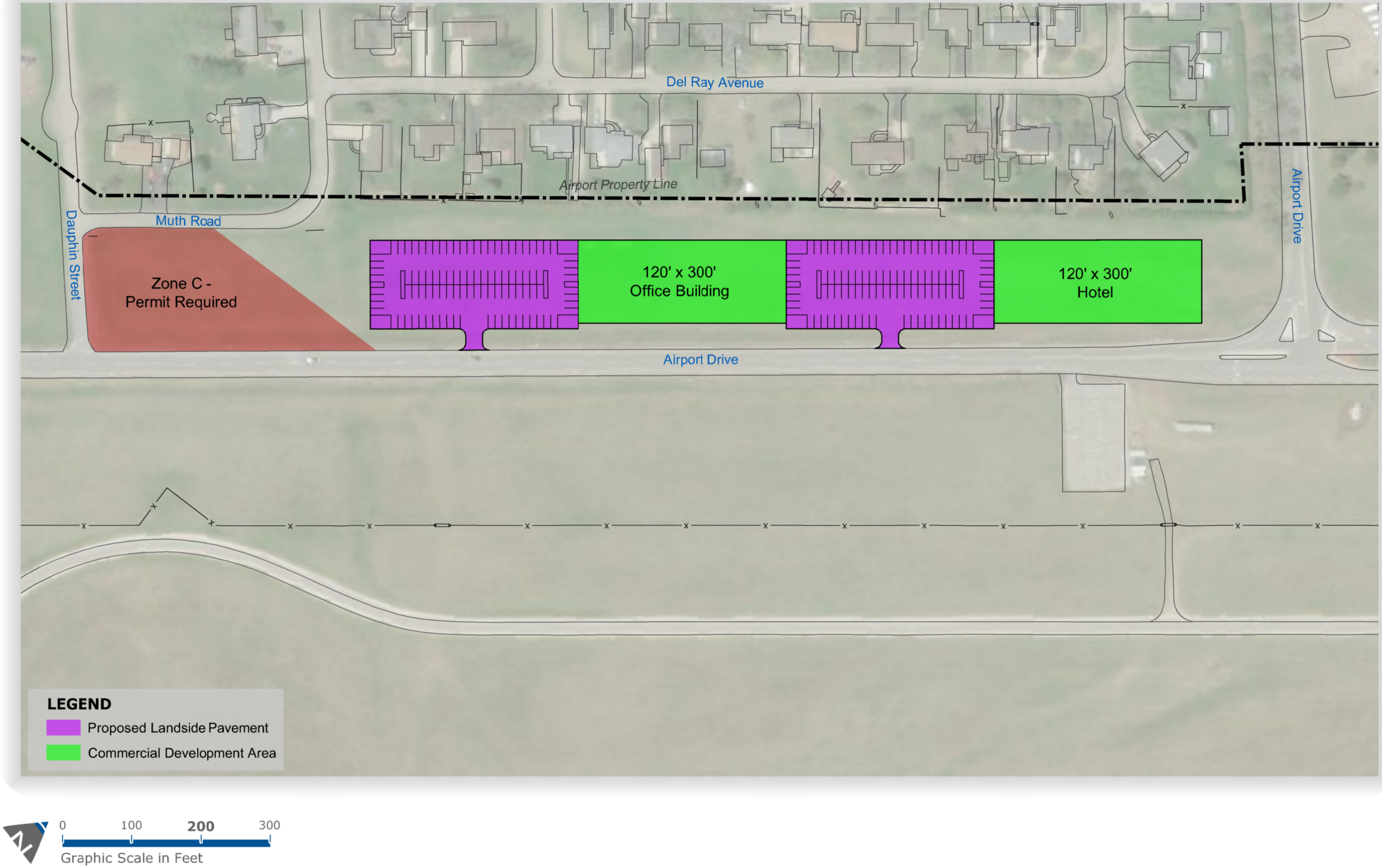

Figure 4-29: **P2 Non-Aeronautical Use Conceptual Layout**

La Crosse Regional AIRPORT

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Source: *USGS Earthstar Geographics*

4.8.3. Parcels P5, P6 and P6B – Northeast Greenspace

The HBLU study proposes developing the area near the water's edge on the east side of Airport property for a complex of commercial, recreational, and entertainment-related uses. This development would align with the City of Onalaska's desire to provide a pathway from near downtown Onalaska to French Island. While this proposed use would provide a variety of attractions to people in the area, it would require a significant infrastructure investment as detailed in the HBLU study. Part of this investment would be the improvement of Fishermans Road, which is in poor condition and does not provide adequate capacity for the increased use likely with this type of development. Necessary road improvements would include raising Fishermans Road to prevent flooding from nearby bodies of water and increasing the road width to support additional traffic while adhering to WisDOT standards. Two conceptual cross-sections for this road are shown in **Figure 4-30**. Both concepts would require widening Fishermans Road to accommodate a standard two-way street with turning lanes, bicycle lanes, sidewalks, and/or planting strips. Developing attractions on French Island would bolster the Airport's presence in the community while also increasing Airport revenues. However, the high cost of investment means that pursuing this option will require a long-term commitment and extensive coordination with potential developers and local officials.

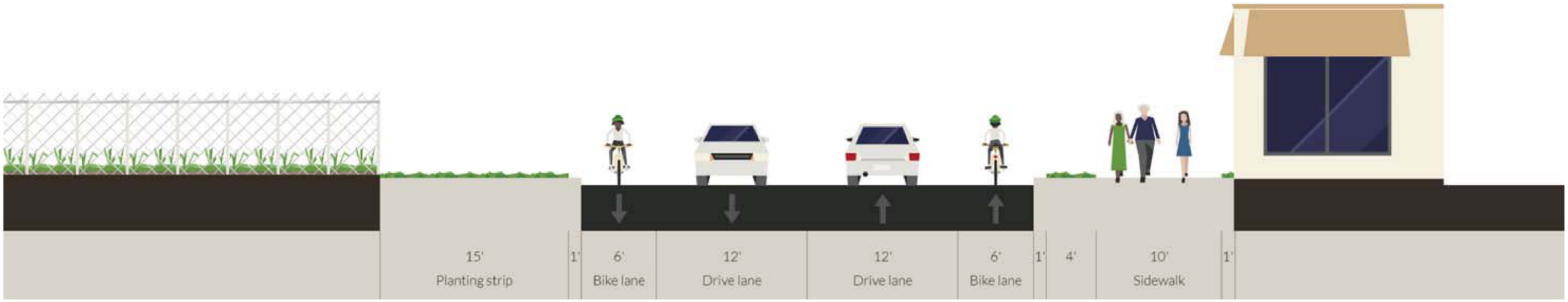
4.9. Snow Removal Equipment (SRE) and Maintenance Facility Alternatives

SRE is stored in a 22,800-square-foot facility nested within the south GA hangar area with immediate access to the unsecure landside area through an access gate near the building. To access runways and taxiways, SRE vehicles transit through the T-hangar area.

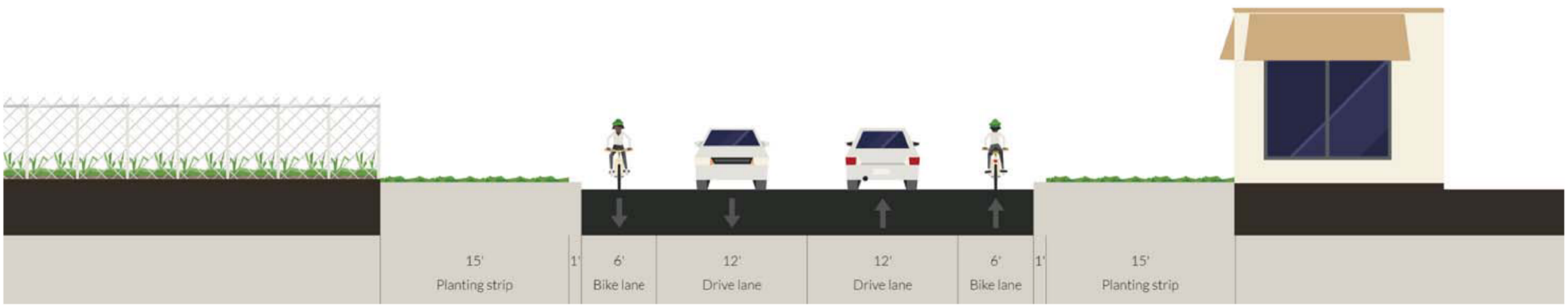
Appendix H includes a detailed space analysis for the SRE and maintenance facility at LSE. The analysis concluded that the existing facility requires expansion due to the inadequate size and layout of the vehicle storage and circulation area. The analysis also identified deficiencies in the maintenance shop, wash bay, and other areas in the existing facility. While there are many areas in the facility that could be expanded to meet the current needs of the Airport, alternatives will focus on expanding areas that are the most time critical and financially feasible for LSE. Opportunities for expanding the existing facility to accommodate these needs should be considered, and construction of a brand-new facility is not necessary, given current capabilities. Three alternatives were considered for the SRE and maintenance facility at LSE and are discussed below.

4.9.1. Alternative 1: Relocate the SRE and Maintenance Facility

The existing SRE and maintenance facility is site-constrained to the north and south due to existing development and space reserved for future development. If a new replacement facility were constructed in an alternate location with fewer site constraints, it would have to be near the passenger terminal because there is not a suitable location in the south GA complex. Relocating the facility to the terminal area would be undesirable for two reasons: 1) available space near the terminal is reserved for long-term passenger terminal and other aeronautical development (see Sections 4.7 and 4.11) and 2) relocation of the SRE and maintenance facility would be costly for the Airport. For those reasons, relocating the SRE and maintenance facility was considered but is not the preferred alternative for this Master Plan.



Fisherman's Road - Multi-Use Trail



Fisherman's Road - No Trail

Figure 4-30: **Fisherman's Road Design Options**

Source: *Streetmix*

4.9.2. Alternative 2: Expand the Existing Facility and Relocate Sand and Chemical Storage

Appendix H discusses several areas of the SRE and maintenance facility that are undersized for Airport needs or inefficient due to their design. Alternative 2 focuses on an intermediate-term conceptual layout for the facility expanding the following areas: wash bay, maintenance bay, vehicle storage, and vehicle circulation. **Figure 4-19** depicts the proposed expansion of the wash and maintenance bay, in addition to the vehicle storage and circulation area. Vehicle circulation would be modified to provide dual drive-through aisles expanded for the existing equipment and includes additional vehicle access doors. Alternative 2 also includes removal of the existing standalone sand storage building and replacing it with a new heated facility to store sand and chemicals during the winter months. **Figures 4-19** and **4-20** identify a new heated sand and chemical sand storage facility location, in addition to the proposed expansion of the existing SRE and maintenance facility. Alternate locations for the sand and chemical storage building were considered that are closer to the existing SRE and maintenance facility but were ruled out because an adequately sized building cannot be provided while also meeting taxiway wingtip clearance requirements.

4.9.3. Alternative 3: Expand SRE and Maintenance Facility for Additional Space Needs

Alternative 3 would further expand the SRE and maintenance facility to include additional space needs identified in **Appendix H**. Expansion to meet additional space needs would include adding office and personnel support space in addition to parts and equipment storage. **Appendix H** identified approximately 1,400 square feet of space needed in these areas to meet existing Airport needs.

This Master Plan recommends that the preferred alternative focus on resolving immediate space constraints the Airport is experiencing. While expansions to personnel support space and parts and equipment storage will be necessary long-term, the Airport is more constrained in the areas identified for expansion by Alternative 2.

4.9.4. Recommended Alternative

Due to the immediate needs and existing site constraints to the SRE and maintenance facility, Alternative 2 is the preferred alternative of this master plan. Expanding the existing facility to accommodate more vehicle storage, circulation, wash, maintenance, and sand and chemical areas will aid the Airport in meeting its most pressing space needs. **Figures 4-19** and **4-20** show the proposed expansion under Alternative 2.

A detailed cost estimate for expanding the existing SRE facility concurrent with Alternative 2 was not developed for this Master Plan. However, the CIP presented in Chapter 6 includes a near-term rehabilitation and expansion project for the existing SRE facility given its age and shortcomings to handle modern equipment.

4.10. Aircraft Rescue and Firefighting (ARFF) Facility Alternatives

LSE currently has two ARFF trucks to meet Index B standards (Chapter 3, Section 3.11). The trucks are stored in the ARFF station located just south of the ATCT. As discussed in Chapter 3, there are no recommendations for expanding to the current ARFF facilities within the planning period. However, the CIP presented in Chapter 6 includes a near-term rehabilitation project for the existing ARFF station. The planned rehabilitation project includes correcting water leakage issues in the exterior walls, replacement of the apparatus bay doors and emergency notification systems, and improvements to bring plumbing and HVAC systems up to current building code requirements.

4.11. Passenger Terminal Alternatives

LSE completed a major terminal renovation project in 2015 that relocated secured seating to the second floor, expanded the capacity of the secure area, connected the secure and non-secure restaurant, and updated the interior of the building. Additionally, two jet bridges were moved to the second floor to accommodate larger aircraft, while access to the third gate was improved by relocating a nearby security screening area. Due to these recent improvements, detailed alternatives for terminal building expansion or relocation were not developed for this Master Plan. If LSE should need to expand or relocate the terminal building during the planning period, a separate study should be conducted to better assess needs at the time of the expansion.

As discussed in Chapter 3, a terminal facility space assessment was conducted considering forecasts for enplaned passengers and air carrier operations as compared to the current number of security lanes, amount of concourse space, number of gates, and other factors. The terminal can currently accommodate two regional jets up to a CRJ900 at the two passenger gates located on the north side of the secure area. A third gate located on the south side of the terminal can accommodate a Boeing 737-800 or similarly sized narrow-body jet aircraft. The terminal space assessment indicates that a fourth boarding gate and approximately 6,000 square feet of secure concourse hold room space may be required by the end of the 20-year planning period. Airport staff also indicate that the layout of the outbound baggage room makes it difficult to utilize the full bag belt due to inadequate turning radii for baggage tugs.

The following sections present alternatives for addressing the outbound baggage room circulation issues in the near term and expanding or relocating the existing terminal building in the long term to address potential secure concourse and gate deficiencies.

4.11.1. Near-Term Passenger Terminal Alternatives

Near-Term Passenger Terminal Alternative 1: Relocate Administrative Space and Expand Outbound Baggage Room

This alternative would relocate the Airport administration space from the passenger terminal to a standalone 4,000-square-foot office building south of the terminal (**Figure 4-31**). The administration space in the terminal could then be repurposed to lengthen the outbound baggage tug drive so that the full length of the baggage belt could be utilized. Total cost for the new administration building is estimated at $1.6 million, and total cost for remodeling the existing 2,000-square-foot administration area as an outbound baggage tug drive is estimated at $350,000. The remodeling estimate includes general demolition, adding overhead doors, infill construction for existing interior and exterior walls, and minor structural modifications. The existing airline ticket offices, baggage screening area, and outbound baggage area would be unaffected. The remodel would need to be designed to avoid impacting structural columns in the current administration space that cannot be removed.

Near-Term Passenger Terminal Alternative 2: New Outbound Baggage Room

This alternative would add approximately 2,300 square feet to the terminal building by expanding to the east with a one-story addition for a new outbound baggage room as shown in **Figure 4-32**. The addition could be structured to accept a second floor in the future that would accommodate expansion of the secure concourse hold room above the new outbound baggage room. To minimize costs, the eastern exterior wall of the terminal would remain in place, and the baggage belt would be relocated outside the existing wall. The existing outbound baggage room could then be re-purposed for general storage, airline ticket office expansion, or some other purpose. The total cost for this alternative is estimated at $1.0 million, which does not include remodeling of the existing outbound baggage room for a different use. The existing airline ticket offices and baggage screening room would be unaffected, there would be minimal changes required for the existing outbound baggage room, and some apron lighting would need to be relocated. This alternative is recommended as the preferred alternative because it is less expensive than Alternative 1 and provides the added benefit of providing the structural foundation for a future expansion to the secure concourse hold room.

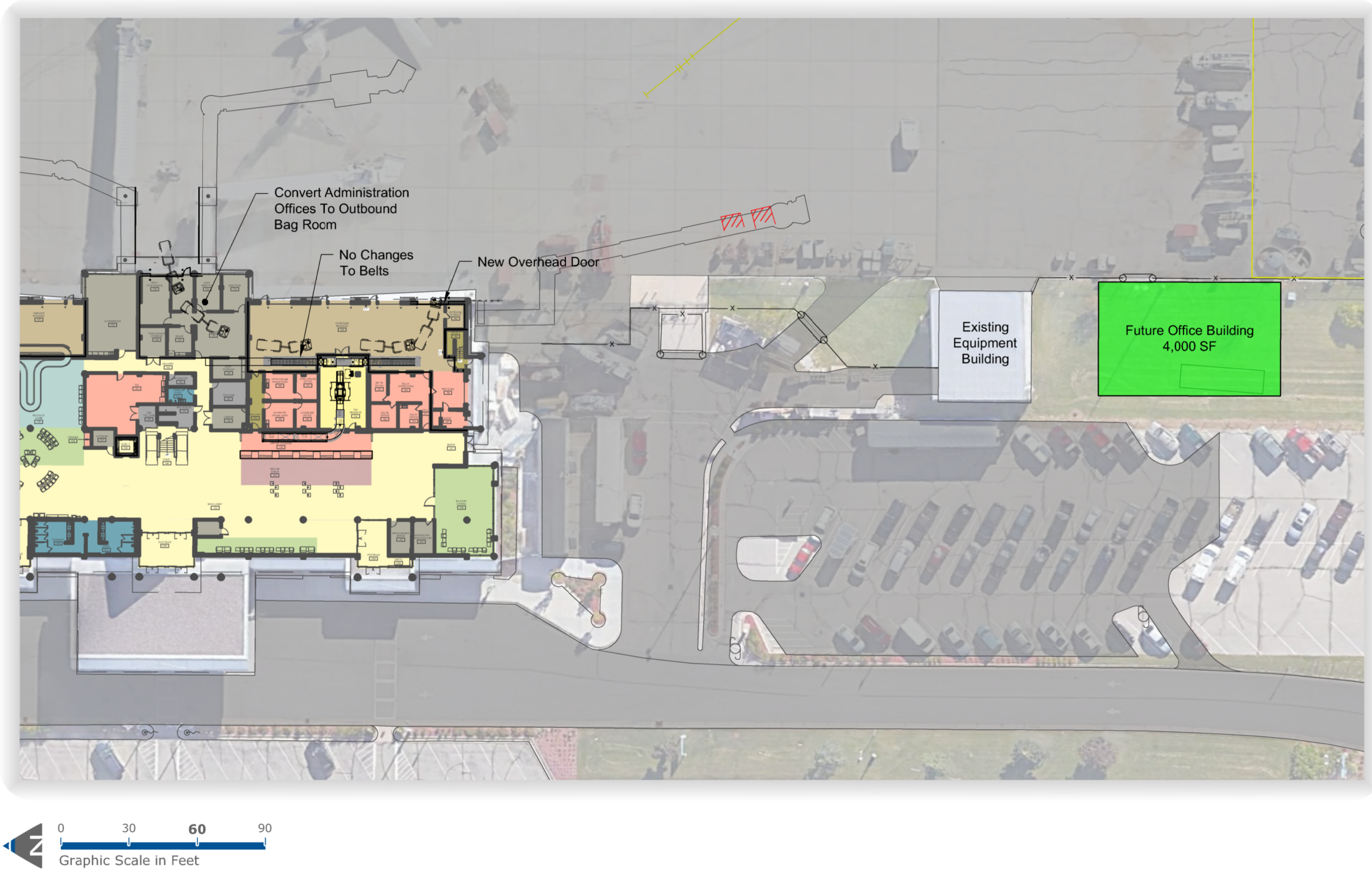


Figure 4-31: **Terminal Office Space / Outbound Baggage Alternative 1**

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Source: *USGS Earthstar Geographics*

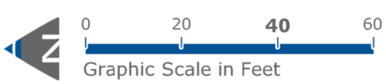

Figure 4-32: **Terminal Office Space / Outbound Baggage Alternative 2**

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Source: *USGS Earthstar Geographics*

4.11.2. Long-Term Passenger Terminal Alternatives

Long-Term Passenger Terminal Alternative 1: Expand Existing Terminal Building

This alternative would add 8,400 square feet to the secure concourse hold room and add a fourth passenger boarding gate capable of accommodating a Boeing 737-800 or similarly sized narrow-body jet aircraft as shown in **Figure 4-33**. The hold room expansion would be accomplished by adding 2,400 square feet above the new outbound baggage room proposed by Near-Term Passenger Terminal Alternative 2 and adding 6,000 square feet with a northerly extension of the existing concourse that accommodates the proposed fourth gate. The northerly extension would take advantage of existing unused terminal apron north of the existing gates but would require relocation of some utility infrastructure and a portion of the rental car parking lot.

The previous ALP showed adding a pier to the concourse, projecting east of the existing building, and accommodating four total gates. This Master Plan recommends amending the ALP concept to reflect this alternative, as it would reduce costs and provide more flexibility for accommodating a wider range of aircraft sizes and types.

Long-Term Passenger Terminal Alternative 2: Relocate Terminal Building

This alternative considers relocating the terminal building to the undeveloped area north of the existing terminal building highlighted in green on **Figure 4-33**. This would allow the Airport to design a terminal building that meets the community's unique needs relatively unencumbered by existing structures and other Airport facilities. Supporting facilities would need to be added and/or significantly reconfigured, including access roads, parking lots, and terminal apron. A detailed layout for a future relocated terminal complex was not developed for this Master Plan because it is not expected to be needed within the 20-year planning period. However, the area shown in Figure 4-33 will be reserved on the ALP for future terminal facility development.

4.12. Solar Feasibility Study

In early 2018, Sustainable Engineering Group (SEG) completed a solar feasibility study for LSE as part of this Master Plan. This study is included in **Appendix F**. The study reviewed the Airport's historical energy usage, as well as space availability and site considerations for installing solar electric generation facilities in various locations on Airport property. The study considered industry-standard guidance, including the FAA Interim Policy on Solar Siting, ACRP Report 108, and the Solar Glare Hazard Analysis Tool (SGHAT). Based on the study findings, SEG proposed three options: a 100-kilowatt (kW) terminal roof-mounted system, a 100-kW short-term parking canopy system, and a 100-kW long-term parking canopy system. In order to obtain FAA Airport Improvement Program (AIP) funding for implementing these proposed systems, SEG recommends that the Airport conduct a Comprehensive Airport-Wide Energy Planning and Assessment Study. The three options will be depicted as future conditions on the ALP.

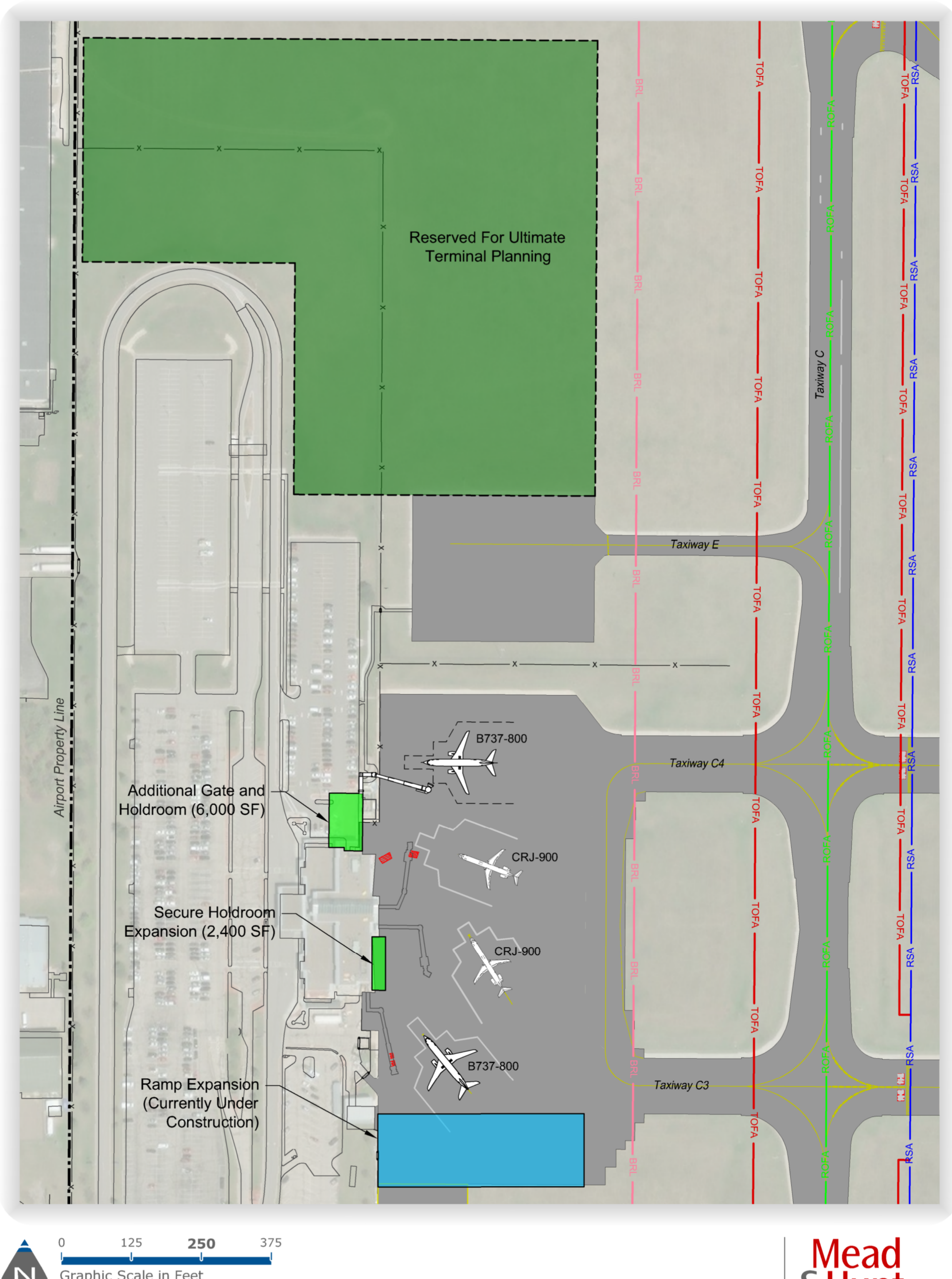

Figure 4-33: **20 Year Terminal Area Plan**

Source: *USGS Earthstar Geographics*

4.13. Summary

The following preferred alternatives (see **Figure 4-34**) will be depicted on the ALP and considered during development of the 20-year Master Plan CIP:

- Decommission and remove Runway 04/22 as proposed by Runway 04/22 Alternative 4.
- Extend Runway 13/31 by 663 feet as proposed by Runway 13/31 Alternative 2.
- Relocate Taxiway A as proposed by Taxiway Alternative 2.
- Construct a mid-field Runway 13/31 exit taxiway as proposed by Taxiway Alternative 6.
- Install a Runway 31 MALSF system as proposed under Section 4.5.3.
- Install a Runway 36 MALSR system as proposed under Section 4.5.5.
- Expand and reconfigure the south GA hangar area as proposed under Section 4.6.
- Update the Airport Land Use Plan to reflect proposed aeronautical and non-aeronautical development areas identified in Section 4.7 and 4.8.
- Expand the existing SRE/maintenance building and apron as proposed by SRE/Maintenance Building Alternative 2.
- Construct a new outbound baggage room as proposed by Near-Term Passenger Terminal Alternative 2.
- Expand the secure terminal concourse and add a fourth passenger gate as proposed by Long-Term Passenger Terminal Alternative 1.
- Reserve space for a future passenger terminal building and supporting facilities as proposed by Long-Term Passenger Terminal Alternative 2.
- Install solar electricity generation systems mounted on the terminal roof and parking lot canopies as proposed by Sustainable Engineering Group in Appendix F.

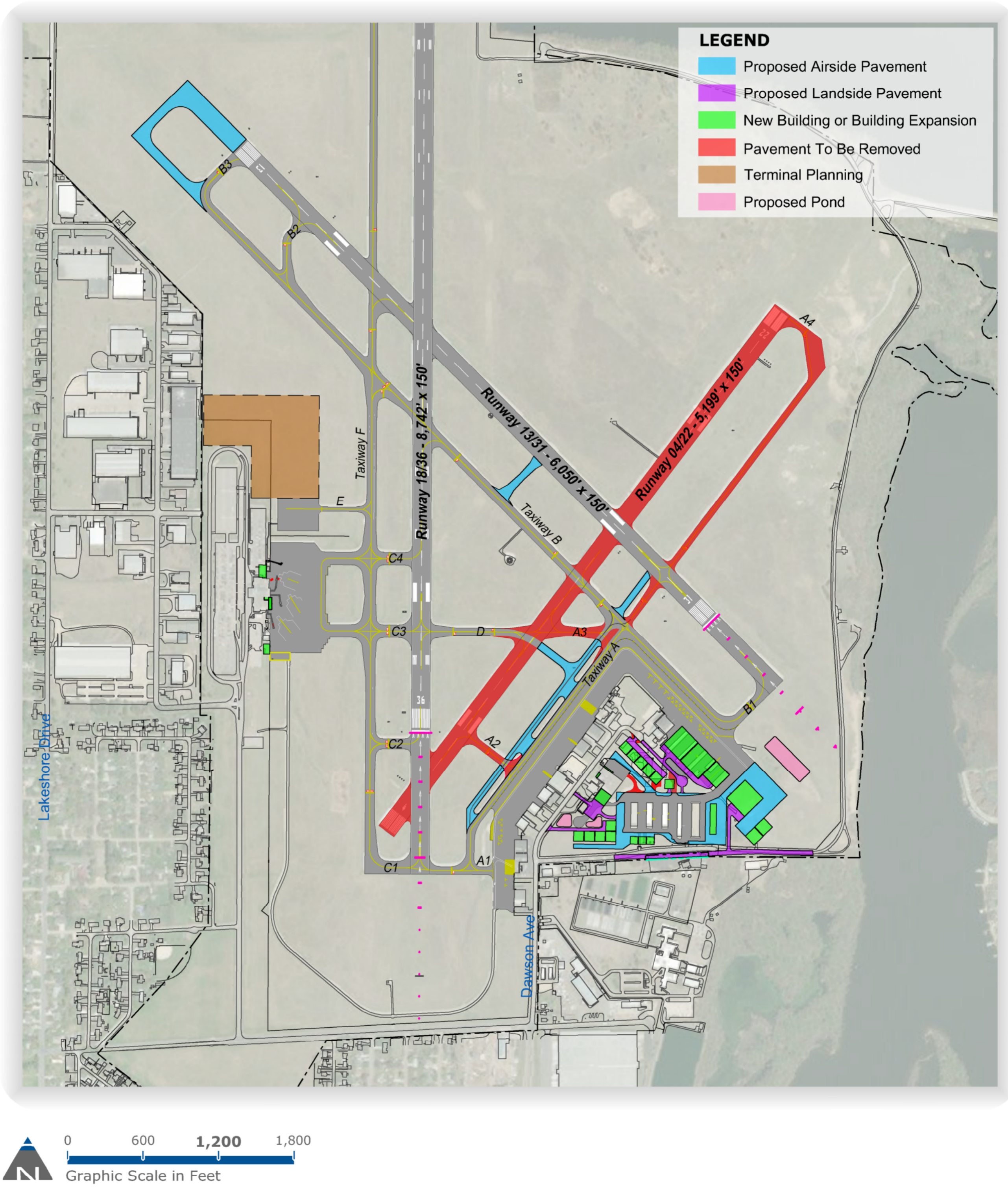

Figure 4-34: **Preferred Alternatives**

Source: *USGS Earthstar Geographics*

CHAPTER 5

Environmental & Land Use Overview

5.1 Introduction

The purpose of this chapter is to present an overview of environmentally sensitive features and land uses on and surrounding La Crosse Regional Airport (LSE or the Airport), and to identify potential impacts resulting from the recommended development plan. Known or readily visible environmental resource categories were assessed in conformance with applicable Federal Aviation Administration (FAA) environmental guidance and applicable federal, state, and local regulations. The environmental overview is not intended as a substitute for a National Environmental Policy Act (NEPA) document. Rather, the intent is to provide information regarding environmental resources for general airport planning purposes. This information is organized in these sections:

- Aircraft Noise
- Compatible Land Use
- Historical and Archeological
- Section 4(f) Resources
- Floodplains
- Water Resources
- Fish, Wildlife, and Plants
- Hazardous Materials and Solid Waste
- Summary

5.2 Aircraft Noise

Noise analysis and planning is essential for an airport to maintain a positive relationship with its neighbors and mitigate noise-related land use compatibility concerns. When the Airport was constructed in 1947 French Island was used primarily for agricultural fields. Currently LSE is surrounded by a variety of land uses, including residential and commercial districts. Because of this, impacts to noise-sensitive land uses around the Airport require consideration.

Noise is defined as any sound that is undesirable or interferes with people's ability to hear other sounds. The degree of annoyance people experience from aircraft noise varies depending on their activities at any given time. Studies by governmental agencies and private researchers, in particular those by the U.S. Department of Housing and Urban Development (HUD) and the FAA, have defined the compatibility of land uses with varying noise levels. Day-night average sound level (DNL), expressed in decibels (dB), is the standard federal metric for determining cumulative exposure of individuals to noise. The compatibility of various land uses with annual DNL is summarized in **Table 5-1**. DNL is a 24-hour measure of total noise, with events occurring at night (10 p.m. to 7 a.m.) treated as 10 dB louder than they are. The 10 dB penalty accounts for the fact that events at night are often perceived as more intrusive because nighttime ambient noise is less than daytime ambient noise. The FAA, U.S. Environmental Protection Agency (EPA), and HUD have established the 65 DNL contour as the threshold indicating significant cumulative noise impacts over noise sensitive areas.

Table 5-1: Land Use Compatibility with Annual Day-Night Average Sound Levels (DNL)

Land Use	Annual DNL in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	YES	NO (1)	NO (1)	NO	NO	NO
Mobile home parks	YES	NO (1)	NO (1)	NO	NO	NO
Transient lodgings	YES	NO (1)	NO (1)	NO (1)	NO	NO
Public Use						
Schools	YES	NO (1)	NO (1)	NO	NO	NO
Hospitals and nursing homes	YES	25	30	NO	NO	NO
Churches, auditoriums, and concert halls	YES	25	30	NO	NO	NO
Government services	YES	YES	25	30	NO	NO
Transportation	YES	YES	YES (2)	YES (3)	YES (4)	YES (4)
Parking	YES	YES	YES (2)	YES (3)	YES (4)	NO
Commercial Use						
Offices, business, and professional	YES	YES	25	30	NO	NO
Wholesale and retail building materials, hardware, and farm equipment	YES	YES	YES (2)	YES (3)	YES (4)	NO
Retail trade (general)	YES	YES	25	30	NO	NO
Utilities	YES	YES	YES (2)	YES (3)	YES (4)	NO
Communication	YES	YES	25	30	NO	NO
Manufacturing and Production						
Manufacturing (general)	YES	YES	YES (2)	YES (3)	YES (4)	NO
Photographic and optical	YES	YES	25	30	NO	NO
Agriculture (except livestock) and forestry	YES	YES (6)	YES (7)	YES (8)	YES (8)	YES (8)

Table 5-1: Land Use Compatibility with Annual Day-Night Average Sound Levels (DNL)						
	Annual DNL in decibels					
Land Use	**Below 65**	**65-70**	**70-75**	**75-80**	**80-85**	**Over 85**
Livestock farming and breeding	YES	YES (6)	YES (7)	NO	NO	NO
Mining and fishing, resource production, and extraction	YES	YES	YES	YES	YES	YES
Recreational						
Outdoor sports arenas and spectator sports	YES	YES (5)	YES (5)	NO	NO	NO
Outdoor music shells and amphitheaters	YES	NO	NO	NO	NO	NO
Nature exhibits and zoos	YES	YES	NO	NO	NO	NO
Amusements, parks, resorts, and camps	YES	YES	YES	NO	NO	NO
Golf courses, riding stables, and water recreation	YES	YES	25	30	NO	NO

Source: FAA Environmental Desk Reference for Airport Actions

Note: *Numbers in parentheses refer to notes; see continuation of Table 5-1 on the next page for notes and key.*

Table 5-1: Notes and Key	
NOTE: The designations in this table do not constitute a federal determination that any use of land is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with local land use authorities. FAA determinations under Part 150 are guidelines and are not intended to substitute for land uses determined to be suitable by local authorities in response to locally determined needs and values in achieving noise compatible land uses.	
Key to Table 5-1	
YES	Land use and related structures compatible without restrictions.
NO	Land use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.
Notes for Table 5-1	
(1)	Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, use of NLR criteria will not eliminate outdoor noise problems.
(2)	Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(3)	Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(4)	Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
(5)	Land use compatible provided special sound reinforcement systems are installed.
(6)	Residential buildings require an NLR of 25.
(7)	Residential buildings require an NLR of 30.
(8)	Residential buildings not permitted.

Source: FAA Environmental Desk Reference for Airport Actions

Noise impact areas for an airport are identified by noise contours. Noise levels are indicated by a series of contour lines superimposed on a map of the airport and its environs. By creating these contours, LSE can identify areas that are most likely to be impacted by aircraft noise and can plan accordingly. Three basic noise impact areas, or "noise corridor zones," are identified by the 2011 *Wisconsin Airport Land Use Guidebook*:

- Severe Noise Impact Areas (70 DNL contour and above)
- Substantial Noise Impact Areas (65 to 70 DNL contour)
- Moderate Noise Impact Area (55 to 65 DNL contour)

FAA Order 1050.1F notes that projects at airports with 90,000 annual piston-powered aircraft operations or 700 annual jet-powered aircraft operations that involve runway relocation, runway strengthening, or a major runway expansion require a noise analysis that includes noise exposure maps. The Aviation Environmental Design Tool (AEDT) is the FAA-approved software system that dynamically models aircraft performance to produce noise estimates. The baseline operations and forecasted operations presented in Chapter 2 were used to develop noise contours. AEDT Version 2d, the most up-to-date version of the software at the time this master plan was developed, was used to model the noise exposure contours for this master plan. Resulting contours are shown in **Figure 5-1**.

The noise analysis shows that in the existing conditions, severe and substantial noise impact areas (65 DNL or higher) are limited to Airport property. When considering NEPA review for future projects, the FAA regards a change in airport related noise as significant if, "The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65dB level due to a DNL 1.5dB or greater increase, when compared to the no action alternative for the same timeframe." The future noise exposure model used activity and fleet forecasts developed in Chapter 2 along with preferred airfield alternatives discussed in Chapter 4, including closing Runway 4/22, to show noise contours projected for the end of the planning period in **Figure 5-2**. In the future condition, severe and substantial noise impacts (65 DNL or higher) remain almost completely on Airport property, except a small portion of the 65 DNL contour that falls into the wildlife area on the northeastern part of French Island. Because noise sensitive areas will not be exposed to levels higher than 65 dB, this means that noise impacts resulting from the future condition are unlikely to be significant for the purposes of NEPA review. Contours signifying moderate noise impacts, 55 DNL and 60 DNL, extend farther from Airport property in the future condition, including residential areas to the south and northwest. Moderate off-airport impacts where the 55 DNL contour extended over the Black River in the existing condition will be reduced northeast of existing Runway 22 end, due to the planned closure of the runway.

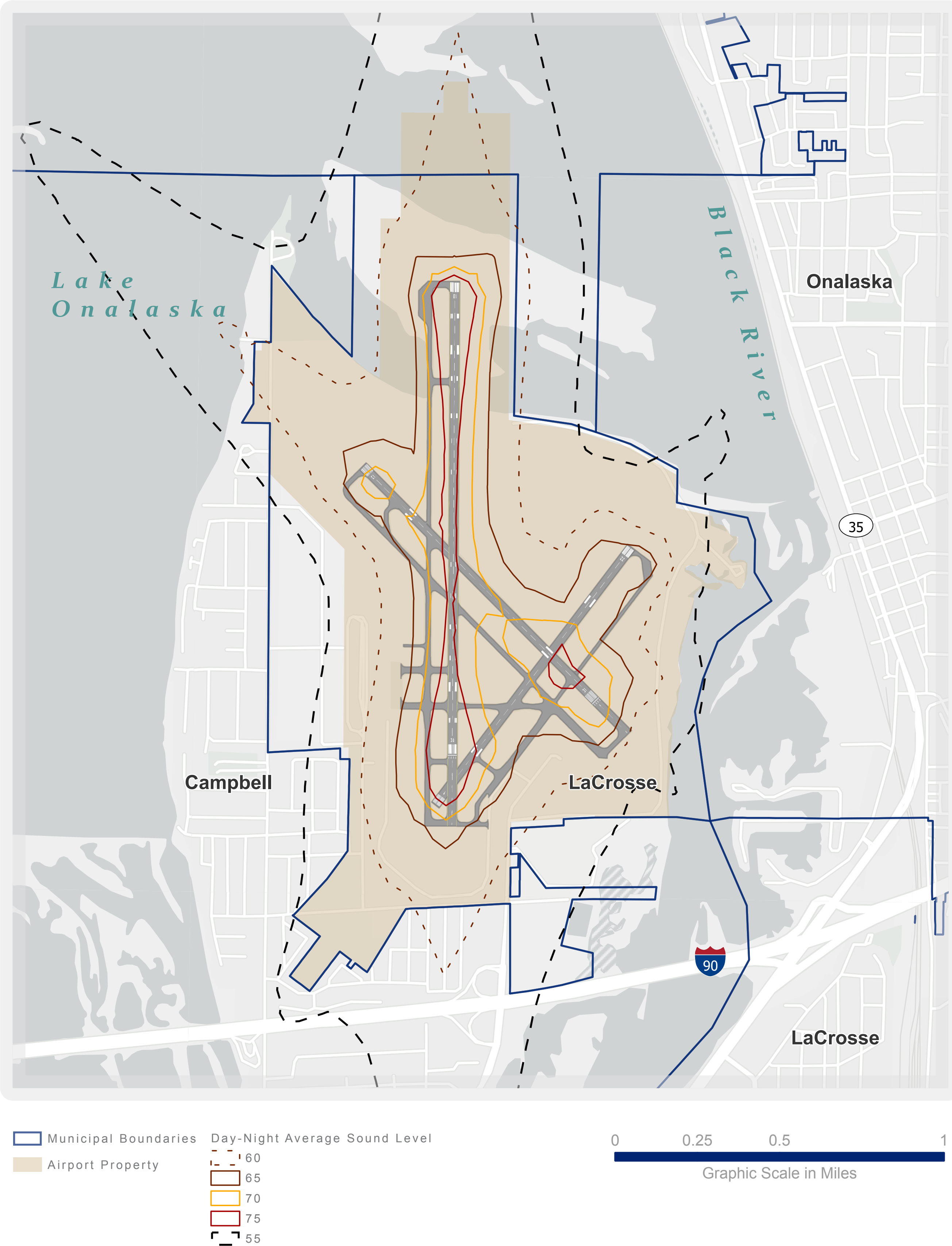

Figure 5-1: Existing Noise Exposure

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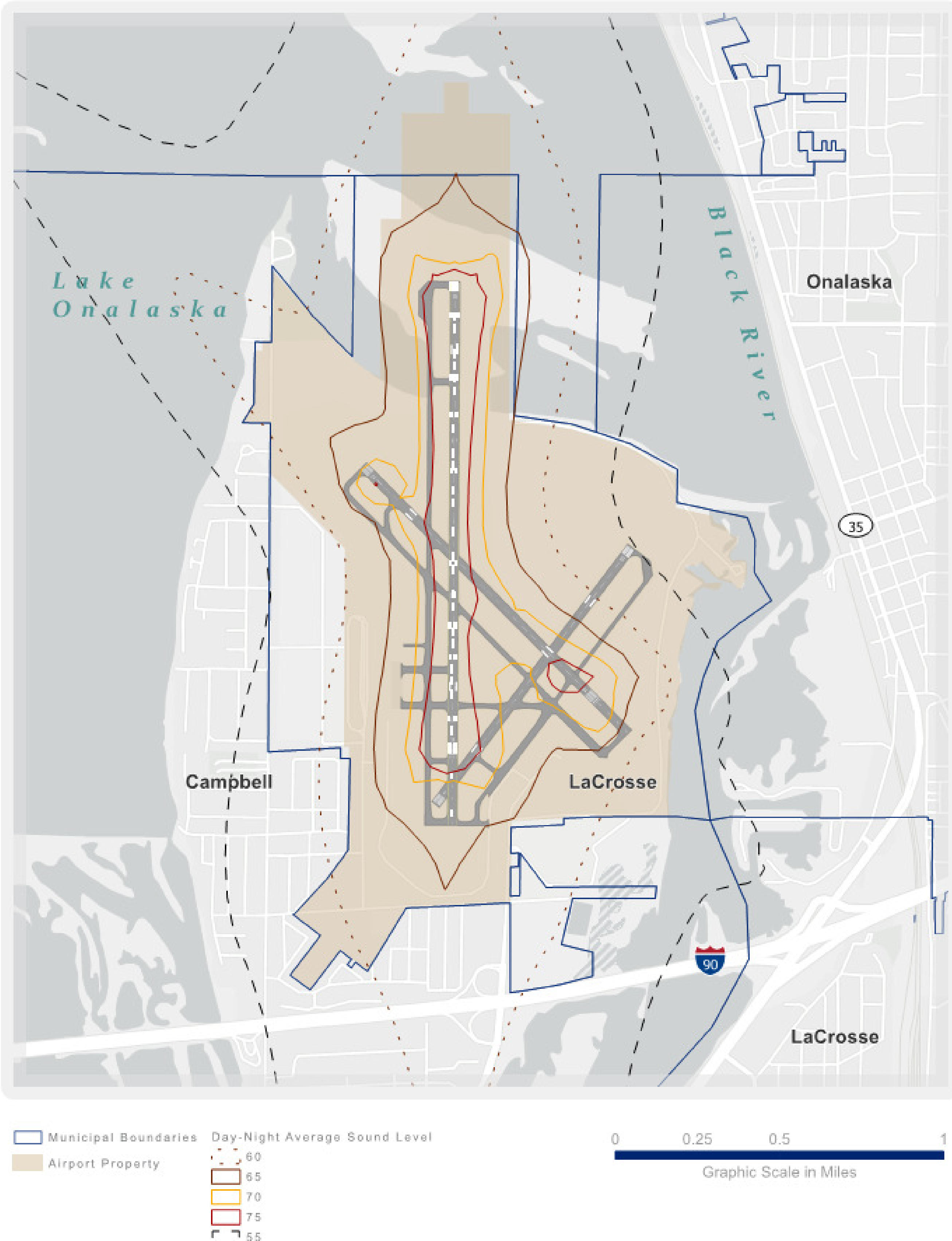


La Crosse Regional AIRPORT

Figure 5-2: Future Noise Exposure

5.3 Compatible Land Use

Laws and policies at state, federal, and local levels encourage compatible land uses near airports and determine what makes a land use compatible. For LSE, policies enacted by the FAA, the Wisconsin Department of Transportation (WisDOT), and local government entities establish the rules and regulations for compatible land use near the Airport.

Under the Airport and Airway Improvement Act of 1982, to receive federal funding for airport actions sponsors must provide assurances to the FAA. Examples of assurances related to land use include:

- Consistency with local plans.
- Mitigation and prevention of airport hazards.
- Public access to project information and the planning process.
- Adoption of zoning laws that increase land use compatibility.

According to the 2011 *Wisconsin Airport Land Use Guidebook*, incompatible land uses are those that hinder safe and efficient airport operations or those that expose people living or working nearby to noise or other aviation hazards. Land uses that are least compatible with airports include densely populated residential or office buildings, streetlamps and structures that emit bright light, dust-producing smokestacks that cause visual and physical obstructions, ponds and large wetlands that attract wildlife, and places where people gather in large numbers. This section discusses land uses near LSE, such as residences and industrial parks.

5.3.1 Zoning and Current Land Use

Several municipalities surround LSE, including the City of La Crosse, the City of Onalaska, and the Town of Campbell. This section provides a summary of zoning districts and land use restrictions near the Airport.

Airport Zoning Overlay

The City of La Crosse adopted a land use ordinance defining building and height restrictions within three miles of the La Crosse Airport property boundary. The provisions of this ordinance were also adopted by reference in the City of Onalaska zoning code. The La Crosse ordinance allows the Town of Campbell and other municipalities within the three-mile jurisdictional boundary of the Airport the authority to administer the airport zoning code. However, because Campbell has not yet adopted a local ordinance that codifies the zoning provisions, La Crosse maintains authority over the implementation and enforcement of the Airport Overlay Zoning District (AOZD) within Campbell and other municipalities without a locally adopted airport zoning ordinance. The AOZD zones and provisions are described below and shown in **Figure 5-3**.

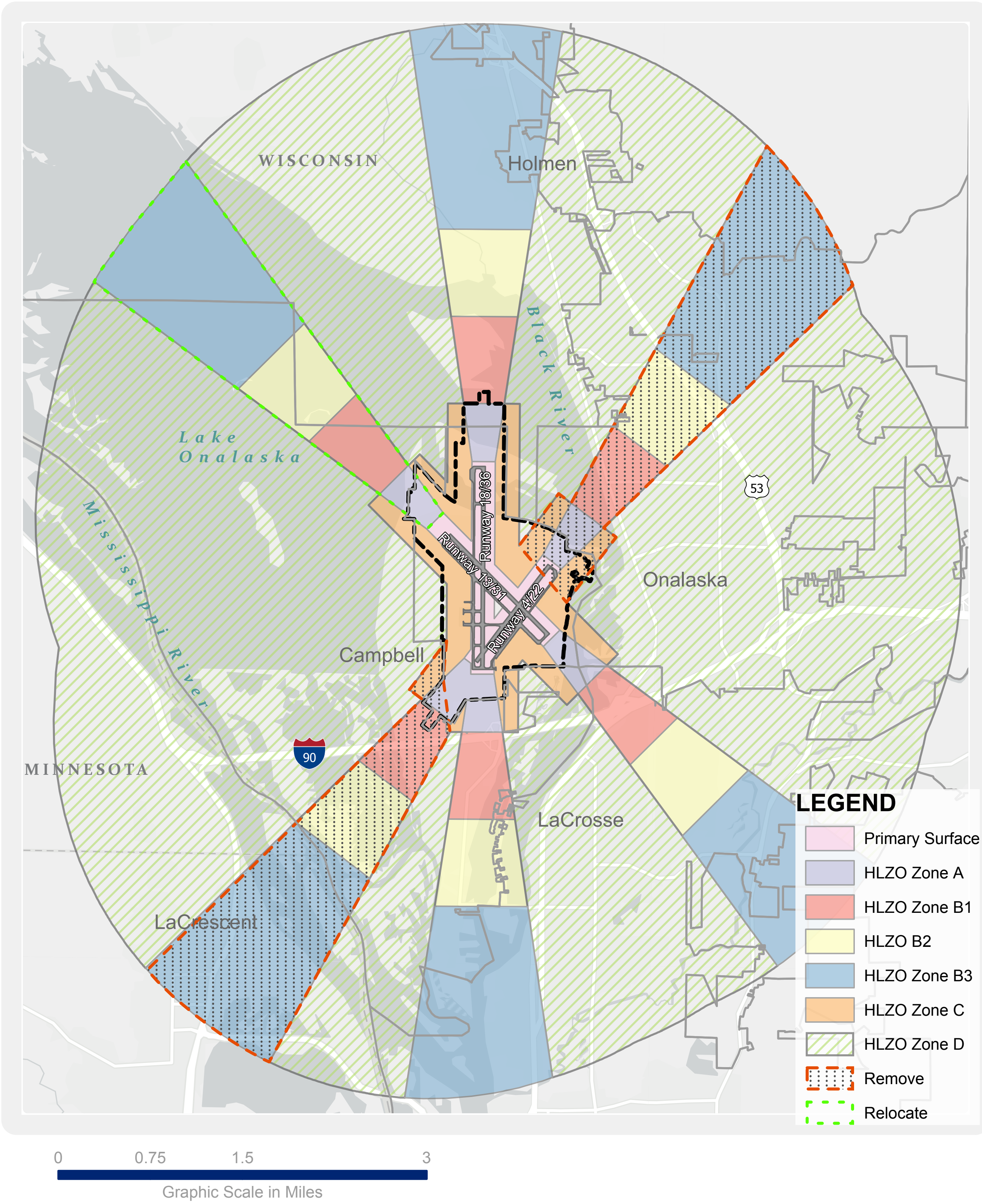


Figure 5-3: **Airport Overlay Zoning Districts**

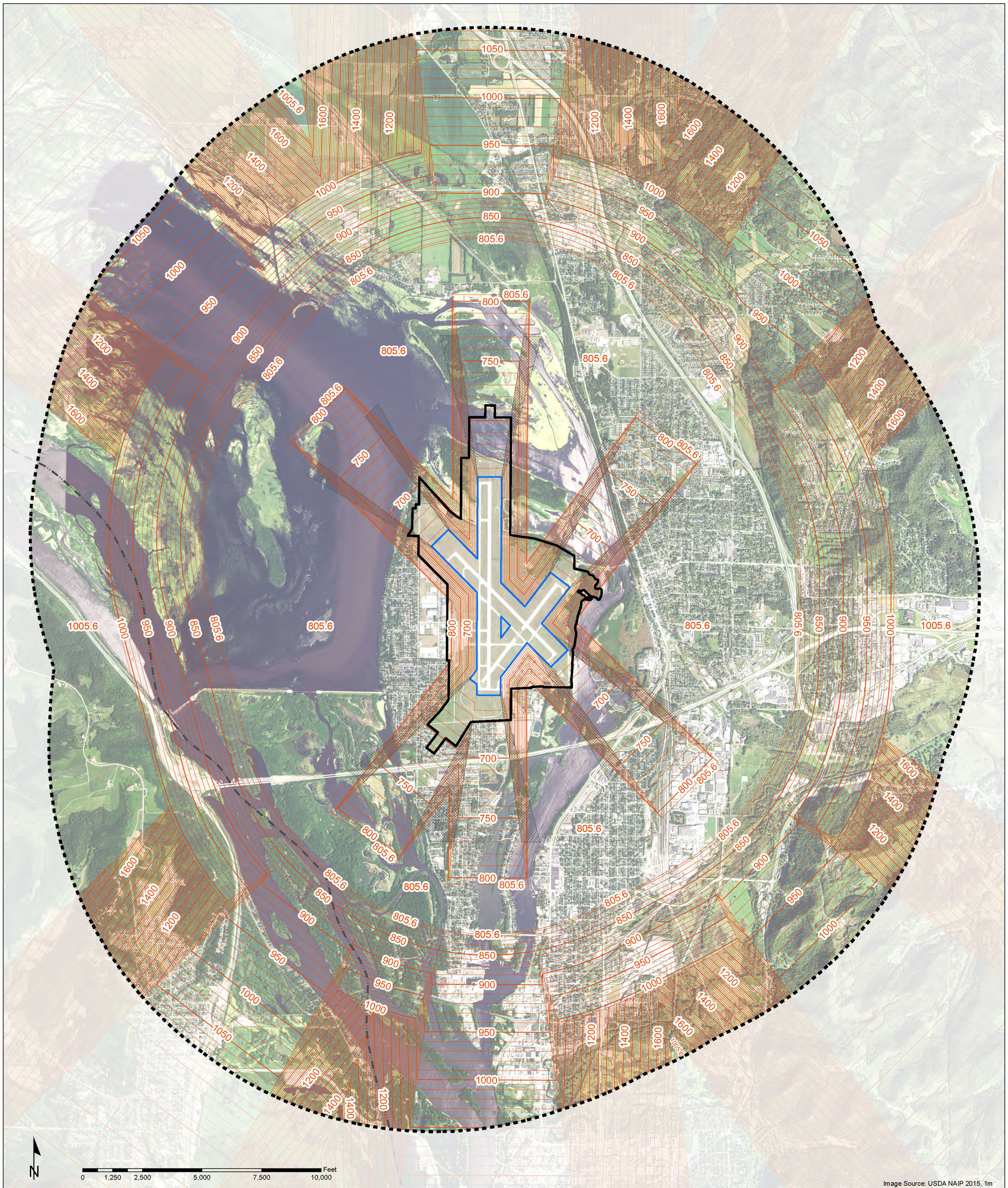
Source:

La Crosse Regional AIRPORT

- **Zone A – RPZ:** Zone A aligns with federal RPZs designed to enhance the safety of people and property on the ground and provide a clear area that is free of above ground obstructions and structures.
    - Zone A only allows animal or plant related uses. A permit is required for any use.
- **Zone B – Approach Surface:** Zone B reflects the approach and departure areas for each runway at the Airport. The size of Zone B depends on the type of approach (visual, non-precision, or precision) and the type and size of aircraft that use a runway. Zone B is divided into three subzones, listed below. Zone B has a 50:1 approach slope.
    - Zone B1 – Extends 3,750 feet long and begins at the end of Zone A.
        - Some low-rise residential, commercial, and industrial uses are allowed with a permit.
        - Self-storage facilities, parking, transportation, and animal and plant uses are permitted by right.
    - Zone B2 – Extends 3,750 feet beyond Zone B1.
        - Most land use types are allowed, but the majority require a permit.
    - Zone B3 – Extends from the end of Zone B2 and terminates at the three-mile jurisdictional boundary.
        - Most land uses are permitted by right, but some types of industrial, institutional, and recreational uses require a permit.
- **Zone C – Transitional Surface:** This surface extends 1,050 feet outward from the edge of the primary surface of the runways up to Zone A.
    - Most uses are not permitted.
    - Low-rise commercial, some industrial, and basic utility uses may be allowed with a permit.
    - Parking, transportation, and animal and plant uses are permitted by right.
- **Zone D – Three-Mile Jurisdictional Boundary:** This surface is formed by rotating a three-mile arc from the outermost property boundaries of the Airport.
    - Most land uses are permitted by right unless restricted by the underlying zoning, but some types of industrial, institutional, and recreational uses require a permit.

Various portions of Zone B and Zone D overlay the City of Onalaska on the east bank of the Black River to the northeast and the City of La Crosse to the south. Most Airport property outside of the primary surface is currently within Zone C, however, the preferred alternative to decommission Runway 4/22 will result in a transition of a portion of the west side of the property to Zone D, opening it to many more uses permitted by the AOZD.

Height restrictions within the AOZD are established by the City of La Crosse on the Height Limitations Zoning Map (**Figure 5-4**). Information about the AOZD and airport related height limitations, including an interactive map, can be found on the Airport website. The URL is https://www.lseairport.com/content/land-use.



Notes:

Refer to of the City of La Crosse, Wisconsin Municipal Code of Ordinances (Code 1980, § 13.01(A)(4)).

Height Limitations are built on US 14 CFR Part 77 regulations. The Part 77 surfaces extend 50,000 feet beyond the runway.

Airport approach protections are limited to three miles beyond the airport property by Wisconsin State Statute Chapter 114 (114.136).

Part 77 surfaces shown beyond the three mile limits are for informational purposes only.

Height limitations shown represent elevations permissible above mean sea level in feet.

- Height Limitations Zoning Elevation Contours
- Airport Primary Surface
- La Crosse Regional Airport Property Boundary
- Permit Required Areas
- Limits of Airport Zoning Ordinances (Three Miles)
- Wisconsin - Minnesota Border

Figure 5-4: **Height Limitations**

Source: *City of La Crosse Height Limitations Zoning Map*

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As the Airport takes steps to decommission Runway 4/22, as outlined in Chapter 4, *Alternatives*, the surrounding jurisdictions should ultimately remove the existing overlays and use restrictions associated with this runway. Additionally, the preferred alternative to extend Runway 13/31 would have implications for the AOZD, and necessary adjustments may require consideration by zoning authorities within the affected jurisdictions at the time the project is implemented.

City of La Crosse

The Airport is located within the city limits of La Crosse; however, most of the city is located south of the Airport. LSE property is zoned as a Public and Semi-Public District. Publicly owned and operated airports and aviation-related facilities are permitted by right within this district. Other types of public facilities are allowed within the district if they comply with the Aviation specific municipal code and Airport Zoning.

An industrial park within the city limits of La Crosse, zoned as Heavy Industrial (M2) and occupied primarily by warehouses and manufacturers, is located adjacent to the Airport's west side. A few commercial and light industrial parcels (C1, C2, and M1) are located to the south along Fisherman Road. Land use zoning districts are shown in **Figure 5-5.**

City of Onalaska

The City of Onalaska is located approximately one-half mile east of the Airport across the Black River. Most areas nearest the Airport are zoned as Zone R2 (Single-Family and/or Duplex Residential District), Zone R4 (Multi-Family Residential District), or Zone P1 (Public and Semi-Public District). There are also intermittent areas of Zone R1 (Single-Family Residential district) and Zone M2 (Industrial District) further inland to the east. Due to the location of Black River these land uses are separated from the RPZ/Zone A but do fall under Zone B. Single-family and multi-family homes are allowed in these areas with a permit although high rise buildings (over 13 stories) are prohibited.

When Runway 4/22 is ultimately decommissioned the zoning authority will likely remove AOZD Zone B that impacts Onalaska, which will remove related height and use restrictions. Eliminating the approach and departure areas from directly over the city will reduce the number of overflights in potentially sensitive or less compatible areas, such as residential districts, that are currently within these zones.

Town of Campbell

The Town of Campbell immediately surrounds the Airport to the west and south. Together, LSE and the Town of Campbell occupy nearly all of French Island. There are residential neighborhoods bordering the south and west of Airport property, including off Runway ends 4, 13, and 36. The town's draft Comprehensive Plan shows future land use around the Airport as primarily single family residential with isolated areas of mixed used, commercial, and public or institutional land uses to the south.

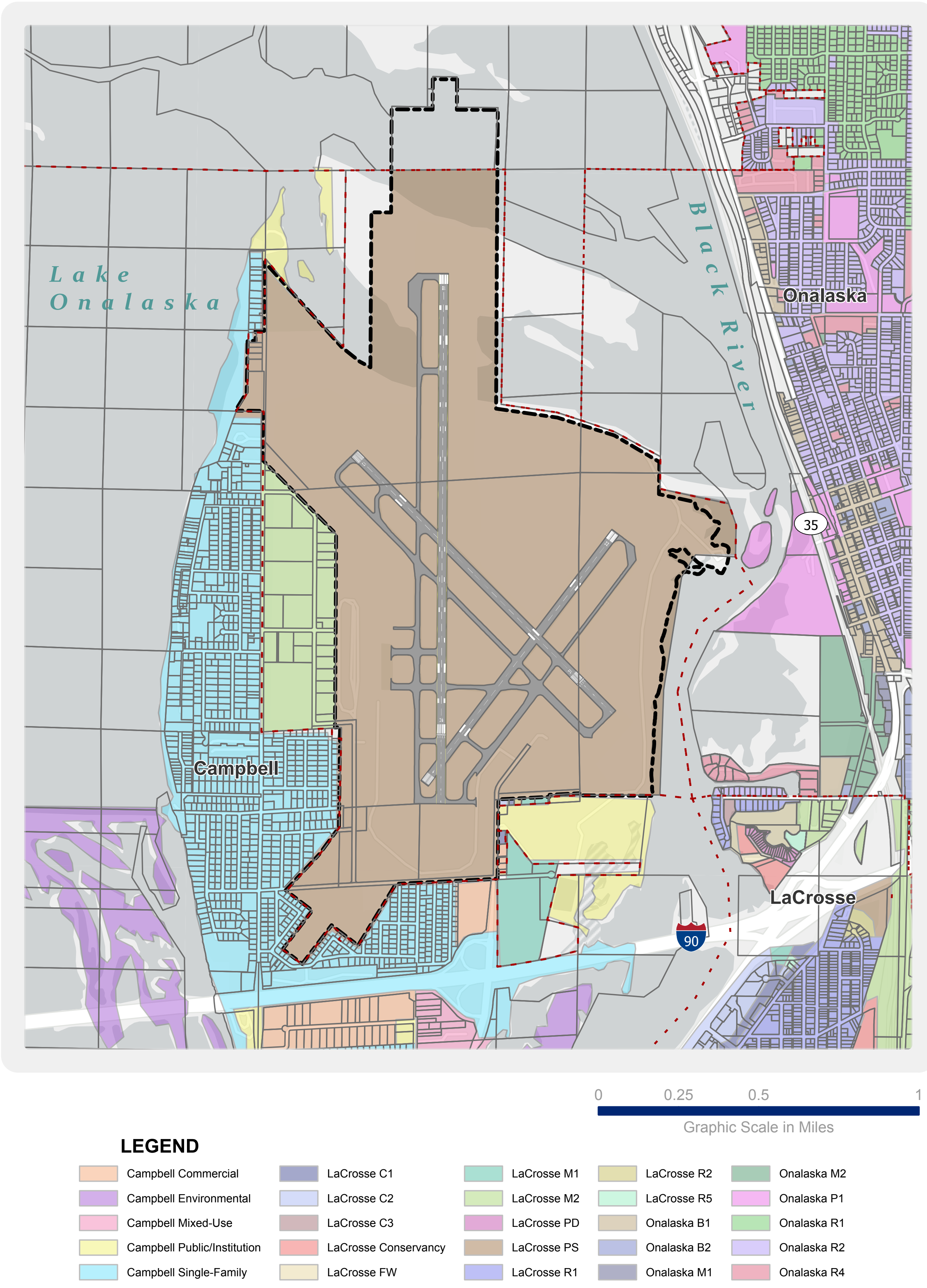

Figure 5-5: **Land Use Zoning**

Source: *City of La Crosse; City of Onalaska; Town of Campbell accessed 2019*

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Similar to Onalaska, when Runway 4/22 is ultimately decommissioned the zoning authority will likely remove AOZD Zone B south of the Runway 4 end, which will remove related height and use restrictions for some parcels. Eliminating this approach and departure area above the affected residential neighborhood will reduce potential land use conflicts with a noise-sensitive use. However, large portions of the Town of Campbell will remain subject to the AOZD due to Runway 18/36 and Runway 13/31.

Because of the proximity of residential areas in Campbell to LSE, future actions affecting land use, noise, and traffic in these neighborhoods should be considered for compatibility. Coordination with the Town should occur to develop any necessary mitigation strategies, and a program for communicating plans and soliciting feedback from Airport neighbors would likely be welcome.

County of La Crosse

Although most of the land surrounding the Airport is municipally managed by the Cities of La Crosse, Onalaska, or the Town of Campbell, there are some areas to the north of the Airport that are managed by the County. These lands are mostly unoccupied recreation and natural resource areas. While there are some residential areas adjacent to the City of Onalaska, similar to the residential areas in the City of Onalaska, these homes are not high rises and do not interfere with Airport zoning.

La Crosse Municipal Airport Land Use Study, 2011

Compatible land use near LSE has been previously explored by the 2011 La Crosse Municipal Airport Land Use Study. The study report recommended the formation of airport zoning overlays and land use compatibility zones, along with a path to implementation of the present-day Airport Zoning Overlay District ordinances across the jurisdictions within the three-mile zoning radius. At that time each zone and potential compatible or incompatible uses were set out and considered in detail, resulting in the permitted uses in those zones today. Considerations included:

- Concentrations of people (density).
- Noise sensitivity.
- Tall structures.
- Visual obstructions.
- Wildlife and bird attractants.

The conclusions of this report were incorporated into the permitted, permit-required, and not permitted uses described in Section 5.3.1 *Airport Zoning Overlay.*

5.3.2 Airport Land Use

The original Airport property consisted of 1,100 acres of land owned in fee simple and approximately 104 acres of avigation easement, which was acquired using airport sponsor funds and/or transferred to the City as federal surplus property. The Exhibit 'A' Property Map indicates that from 1968 to 2002, the Airport acquired additional parcels totaling approximately 226 acres largely using FAA grants. An airport right-of-way grant was acquired from the US Army Corps of Engineers on an additional approximately 29 acres, which was renewed with the Fish & Wildlife Service in 2019 for an additional 50 years. The purpose of the additional land acquisition was primarily airport operations and approach protection.

Along with acquiring property, the Airport has released some parcels, including approximately 105 acres, to the City of La Crosse. The Airport also vacated Fisherman's Road, which was originally on Airport property. The La Crosse Telephone Corporation has a utility easement at the Airport.

Aeronautical Use

Most of Airport property is dedicated to aeronautical land use, including the airfield, terminal area, and south GA area, along with dedicated safety zones. While some areas are not yet developed, they are reserved for potential future demand for aeronautical use. Concepts for development in several areas for aeronautical use within the planning period are described in detail in Chapter 4, *Alternatives*. Some of the areas planned for aeronautical development require consideration of impacts to sensitive habitats, floodplains, wetlands, and cultural resources, which are discussed below in Sections 5.4 through 5.8.

Non-Aeronautical Development

Note: This section was written prior to passage of the FAA Reauthorization Act of 2018, Section 163 of which changed some of the regulations surrounding FAA land releases and releases from aeronautical use.

Other areas on Airport property are used for non-aeronautical purposes. This currently includes a beach available for recreational uses, and a portion of a community baseball field.

LSE currently has undeveloped land that would be desirable for non-aeronautical development. The Airport, along with consulting firm Explorer Solutions, developed concepts in 2018 for additional non-aeronautical development to increase revenue streams and make efficient use of property that is not needed for aeronautical purposes in the foreseeable future. The study analyzed the demand in the region and sought Airport user, potential user, and community input to develop land use alternatives. Proposed uses include commercial and industrial development. These proposals are analyzed in detail in Explorer Solutions' report, *Highest and Best Land Use Study* (HBLU Study, see **Appendix E**), and discussed further in this document in Chapter 4. The 2018 Highest and Best Land Use report noted that the development of non-aeronautical uses would not only benefit LSE by diversifying Airport revenue sources, it would also generate additional tax base for the municipality.

When considering non-aeronautical development on Airport property, it is necessary to consider the compatibility of proposed land uses with airport activities. This includes not introducing uses sensitive to noise or light emissions and avoiding uses that may create hazards for airport users or people on the ground.

In addition, because the FAA requires that property proposed for non-aeronautical use not be needed for aeronautical purposes, it is important to carefully consider foreseeable aeronautical needs before requesting a land release for non-aeronautical development purposes. The 2018 HBLU Study concluded that areas identified and reserved for future aeronautical development have enough space to accommodate reasonably foreseeable needs associated with existing and future based aircraft. Facility requirements considerations for the 20-year planning horizon show that carefully coordinated land release for non-aeronautical use will not prevent the Airport from meeting aeronautical development needs.

Land Release

Non-aeronautical development and airport revenue opportunities are overseen by the FAA. Airport Cooperative Research Program (ACRP) Report 176: *Generating Revenue from Commercial Development On or Adjacent to Airports* notes that four key factors appear to drive the extent of this oversight:

- The nature of applicable FAA grant obligations.
- Airport or airport agency ownership or non-ownership of the property.
- Site planning and vertical limitations.
- The type of access permitted to the airport grounds proper.

Any property defined by an airport layout plan or listed in an Exhibit ‘A’ property map as part of an airport is considered “dedicated” or obligated property for Airport purposes. Federal Airport Improvement Program (AIP) grant assurances require FAA authorization for any proposed non-aeronautical land uses on obligated Airport property. This is typically in the form of a formal release of land from these obligations. A land release for non-aeronautical use is a formal, written authorization relinquishing an airport’s contractual obligation to use Airport property for aeronautical purposes. Before authorizing such a release, the FAA must conclude that the property is not needed for aeronautical purposes.

Releases and all leases and agreements must comply with FAA Order 5190.6B: *FAA Airport Compliance Manual.* The FAA may determine that environmental documentation such as a documented Categorical Exclusion or an Environmental Assessment is required to grant a land release request, along with a boundary survey. Order 5190.6B also requires publication in the Federal Register and a 30-day public comment period. This comment period can be concurrent with environmental review if the type of review undertaken requires it.

Obtaining a land release is a lengthy process requiring many components and dedicated staff or consultants. The application to FAA, the FAA’s review, and the Federal Register publication requirement all contribute to this timeline. Land release requests require the following elements:

- Type of release requested (for example, a transfer of ownership or change in use).
- What agreement(s) with the United States are involved.
- Why the release is requested (for example, if it is excess property or non-contiguous property).
- Facts and circumstances that justify the request.
- Requirements of state or local law or ordinance that need to be carried forward in any agreements.
- Description of property or facilities involved.
- Documentation of how the property was acquired or obtained by the airport owner.
- The present condition and present use of any property or facilities involved.
- Proposed use of the property or facilities.
- Appraisal of fair market value of the property or facilities.
- Proceeds expected from the use of the property and what will be done with net revenues.

- A current ALP that shows the area to be released as being unnecessary for airport use.
- A current Exhibit ‘A’ property map.
- A Metes and Bounds Survey of the subject property to be released.
- Environmental Review (often a Categorical Exclusion, or CATEX).

Implementation Considerations for Non-Aeronautical Use

ACRP Report 176 *Generating Revenue from Commercial Development On or Adjacent to Airports,* notes that an important consideration while marketing airport properties for non-aeronautical use is that FAA grant assurances may apply to the project, including limitations on lease terms, building height limitations, and fair market value requirements. The FAA will review lease terms to confirm compliance with grant assurances, along with reviewing the land release request and any environmental review.

When the land release application has been submitted, the FAA may take several months to review the request, and modifications may then be required in response to FAA comments. After the FAA approves the application, the request is published in the Federal Register and a 30-day comment period is required. The ACRP research found that with proper preparation a land release is possible to complete in 6 to 12 months, but it may take longer.

A complicating factor of implementing a non-aeronautical development plan is that the Airport must have a specific tenant or client identified and be able to describe the proposed use of the property in detail prior to release, typically including a site plan. Stating that a parcel is no longer necessary for airport purposes and would be marketed for non-aeronautical use is not an acceptable level of justification for FAA approval.

Alongside FAA requirements and approval timelines, proposed developers and tenants will likely have scheduling constraints and pressures. The 2018 HBLU Study noted that to implement non-aeronautical development concepts, the Airport will need to synchronize its efforts with key partners, especially the City of La Crosse, the La Crosse Area Development Corporation, and the La Crosse Chamber of Commerce. These partnerships may help smooth the process for potential developers or may function as an arm of a public-private partnership that may be more tolerant of a long permitting and release process.

Zoning Considerations for Non-Aeronautical Development

All development will need to comply with height limitation zoning. The City of La Crosse has a permitting process for development within height restricted zones that expect to exceed height limits by up to ten feet.

Additionally, all development must comply with allowed uses in the zoning district where it falls. These are dictated both by the general land use zoning district, and by the AOZD permitted uses. Because Airport property is currently a Public and Semi-Public zone, uses outside of those allowed by right in the zone will need to apply for a conditional use permit or request that a parcel be rezoned to allow a new use. Uses allowed by right in the Public and Semi-Public district are:

- Governmental offices and facilities.
- Elementary and secondary public and private educational facilities.
- Historical structures.
- Public parks, community gardens and plazas.

- Off-street parking and loading facilities.
- Public auditoriums.
- Hospitals and clinics occupied by a minimum of 25 physicians or dentists practicing medicine or practicing dentistry.
- Post-secondary public and private educational facilities.
- Publicly owned and operated airports and aviation-related facilities as well as non-aviation related facilities.
- Restaurants and concessions that are located on City-owned park land and subject to approval by the Board of Park Commissioners.
- YMCA, YWCA, Boys & Girls Club, and other similar non-profit organizations.

Conditional uses allowed in the Public and Semi-Public District are tourist rooming houses and bed & breakfasts in designated locations.

Petitions for changes to zoning districts must filed with the City Clerk in order to initiate a review and hearing by the City Council. All rezoning requests require written notification by regular mail to the owners of record of land located within a 200-foot radius of the property.

For all uses that require a permit, including those that may exceed height restrictions, a site application and AOZD checklist must be submitted to the Zoning Administrator. Requirements are found in La Crosse Municipal Code of Ordinances Section 8.142 and Section 8.172.

On-airport use must also consider whether a location is within an AOZD zone that restricts allowable uses, such as Zones A and C. Restrictions are described in Section 5.3.1, *Airport Zoning Overlay.* Parcel P8 is within Zone C associated with Runway 13/31. Parcel P2 may also be partially within Zone C for Runway 18/36.

5.4 Historic and Archaeological

According to the Wisconsin Historical Society database, La Crosse County has 63 sites that are listed on either the National or State Register of Historic Places. This includes several historic districts within the City of La Crosse, and many individual sites in and around La Crosse and Onalaska. One such property, the Frank Eugene Nichols House, is located with ¾ mile of the Runway 22 end. Another, the La Crosse County School of Agriculture and Domestic Economy (the site of the present-day Onalaska High School), is located approximately one mile east of the Runway 31 end. Other sites found within the La Crosse city limits are more than two miles south and southeast of the Runway 36 end and are therefore outside the area of impacts for the projects proposed in this master plan study.

Mead & Hunt previously completed archaeology surveys for the Airport in 2007, 2010, 2011, and 2018. A total of nine archaeological sites are known to be on French Island. Most of these sites are located on or within approximately 1,000 feet of Airport property. This includes the Runway 18 end and its surrounding area, areas along Airport Road on the west side of the Airport, and a site approximately 1,200 feet from the Runway 4 end. Sites near the Airport have produced prehistoric scatter, artifacts associated with indigenous woodlands cultures, and the remains of Euro-American building sites.

Alternatives developed for aeronautical development areas using Parcels P3 and P3B, discussed in Chapter 4, Section 4.7.1, are located within 500 feet of an archaeological site. Additionally, the southeastern half of Parcel P8, which is reserved for future aeronautical development, contains an archaeological site. Portions of non-aeronautical development alternatives for Parcel P1 are located within 300 feet of an archaeological site. Because cultural artifacts have been found on and around the Airport, projects that include ground disturbance will likely require further study.

During the NEPA review process it will be necessary to invite American Indian tribal nations that consider the area culturally significant to provide input and assist in identifying cultural resources in project areas. According to the Wisconsin Department of Administration Division of Intergovernmental Relations, there are 11 federally recognized American Indian nations and tribal communities in Wisconsin. According to The Great Lakes Inter-Tribal Council Tribal Map and the Wisconsin State Tribal Relations Initiative, the Ho-Chunk Nation has Trust Lands located approximately 1 ½ miles north of the Airport. No other tribal lands are located near LSE; however, American Indian nations who no longer have lands in La Crosse County may still have a historical interest in the area on and around the Airport.

5.5 Section 4(f) Resources

Airport development can in some circumstances be incompatible with park or recreation land uses due to impacts from noise or other airport activity. Because of this, it is necessary to consider nearby publicly owned parks, recreation areas, or wildlife preserves in the context of Section 4(f) requirements. Section 4(f) of the Department of Transportation Act of 1966 states that, subject to exceptions for *de minimis* impacts, the Secretary of Transportation may approve a transportation program or project requiring the use of publicly-owned land of a park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance, or land of a historic site of national, state, or local significance, only if:

1) There is no prudent or feasible alternative that would avoid using these resources, and
2) The program or project includes all possible planning to minimize harm resulting from the use.

A radius of one mile from Airport property was used to located potential 4(f) resources.

- The Airport is situated directly adjacent to the Upper Mississippi River National Wildlife and Fish Refuge, which is a unit of the National Wildlife Refuge System.
- The Airport borders land owned by the U.S. Army Corps of Engineers (USACE) and designated for recreational use and wildlife management. The USACE St. Paul District manages these lands.
- Rose Park is an approximately 30-acre park in the City of Onalaska that includes softball, baseball, and tennis facilities, enclosed picnic shelters, playground equipment, and open green space. It is next to the Onalaska High School, which has additional sports fields.
- Jaycee Fields and additional sports facilities are associated with the Onalaska Middle School and Onalaska Community Center.
- Onalaska's Northern Hills Elementary School has a playground and a baseball/softball field.
- Park Avenue Park is a small neighborhood park in Onalaska that provides a basketball court and playground equipment.

- Wayside Park, located on the bluffs in Onalaska, provides scenic views of Lake Onalaska and the Black River.
- Hickey Park in La Crosse has a playground, picnic shelter, basketball and volleyball facilities, and open green space.
- Wittenberg Park in La Crosse is approximately 8.5 acres comprised mostly of green space and wetlands. The City considered developing this park for housing in 2018.
- La Crosse's Summit Environmental Elementary School on French Island has a playground.
- Church Drive Park, a small neighborhood park in the Town of Campbell, has a playground, tennis courts, and a picnic shelter.
- The Town of Campbell has two baseball fields within one mile of the Airport.
- Nelson Park is a 35-acre park owned by the USACE and maintained by the Town of Campbell. It provides opportunities for wildlife viewing and fishing, and includes picnic shelters, a boat launch, and shoreland access.
- Airport Beach is a public beach on Airport property. There are no facilities here beyond the shoreline and beach access.
- A portion of the Great River State Trail, managed by the Wisconsin Department of Natural Resources (DNR), passes within one mile of the Airport in Onalaska. This trail, used for walking, bicycling, snowmobiling, cross-country skiing, and snowshoeing, was built on an abandoned Chicago-Northwestern railroad line.
- Several public boat landings with access to Lake Onalaska or the Black River are located near the Airport.

For Section 4(f) to apply, a property must be considered significant. Significance is determined by the entity with jurisdiction over the resource. In this case, many different entities have jurisdiction over the parks and wildlife areas near the Airport, including federal and state agencies and each of the municipal governments surrounding LSE. For a 4(f) resource to be protected from an action, the project needs to constitute a use of the resource. "Use" means either a physical taking of the property, or a constructive use where project impacts would impair or reduce the value of the resource or restrict access in a way that limits public use.

Potential 4(f) resources will be examined further during NEPA review for individual projects. The proximity and number of public parks and wildlife resources within one mile of Airport indicate that this is a resource category that may require in-depth study. If a proposed action will constitute a use of a potential 4(f) resource, agencies with jurisdiction over the property must be consulted during the NEPA review, and a Section 4(f) evaluation exploring feasible alternatives and mitigation efforts may be required.

Some vegetation management associated with future projects and ongoing maintenance of obstructions may occur in publicly owned parkland. Tree removal and vegetation management is detailed in Section 5.8.3, *Vegetation Management and Wildlife Hazards.*

5.6 Floodplains

Most of Airport property, including the terminal and its associated parking areas, is considered an area of minimal flood hazard according to the most up-to-date Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels, which are effective as of January 2012. Much of the runway and taxiway infrastructure is included in a moderate flood hazard area, designated Zone X (shaded), with a 0.2 percent annual chance of flood. The north end of Taxiway F is within Special Flood Hazard Area (SFHA) Zone AE, which indicates a one percent annual chance of flood hazard. Much of the shoreline of French Island is also within Zone AE. A portion of French Island shoreline, including the Airport Beach, is considered a regulatory floodway. Flood zones at and near LSE are shown in **Figure 5-6**.

Base flood elevations for the Black River shown on the FIRM panels range from 644 to 646 feet.

The City of La Crosse Code of Ordinances Section 115 regulates areas within the base flood area and the AE zone.

- Section 115-276 states that floodplain development is not allowed to obstruct flow or cause any increase in the regional flood height due to lost floodplain storage area.
- Regional flood elevation should be determined using Wisconsin State guidance.
- Land uses with low flood damage potential are allowed within floodway and floodplain districts. This includes campgrounds, agriculture, and some nonstructural recreational and commercial uses.

- **Area of Minimal Flood Hazard**: Areas outside a SFHA with elevations higher than the 0.2 percent annual chance of flood. The FEMA flood zone designation is Zone X (unshaded) or Zone C.
- **Base Flood**: A flood having a one percent chance of being equaled or exceeded in any given year. This is the regulatory standard also referred to as the "100-year flood."
- **Base Flood Elevation (BFE):** The elevation to which floodwater is likely to rise during the base flood.
- **Regulatory Floodway:** An area including a watercourse and adjacent land set aside to discharge the base flood without increasing upstream water

Nonaeronautical development alternatives for Parcel P6 described in Chapter 4, Section 4.7.3 include shoreline commercial development within both the 0.2 percent annual chance of flood and 1 percent annual chance of flood areas.

Intermediate and long-term general aviation (GA) area conceptual plans described in Section 4.6.3 also include a relocation and raising of Fishermans Road within both the 0.2 percent annual chance of flood and 1 percent annual chance of flood areas.

Order 1050.1F only considers disturbance or fill within the areas with 1 percent annual chance of flood as a significant floodplain impact. Mitigation of any impacts to the floodplains for the proposed projects in SFHAs will require discussion and analysis during project specific environmental review.

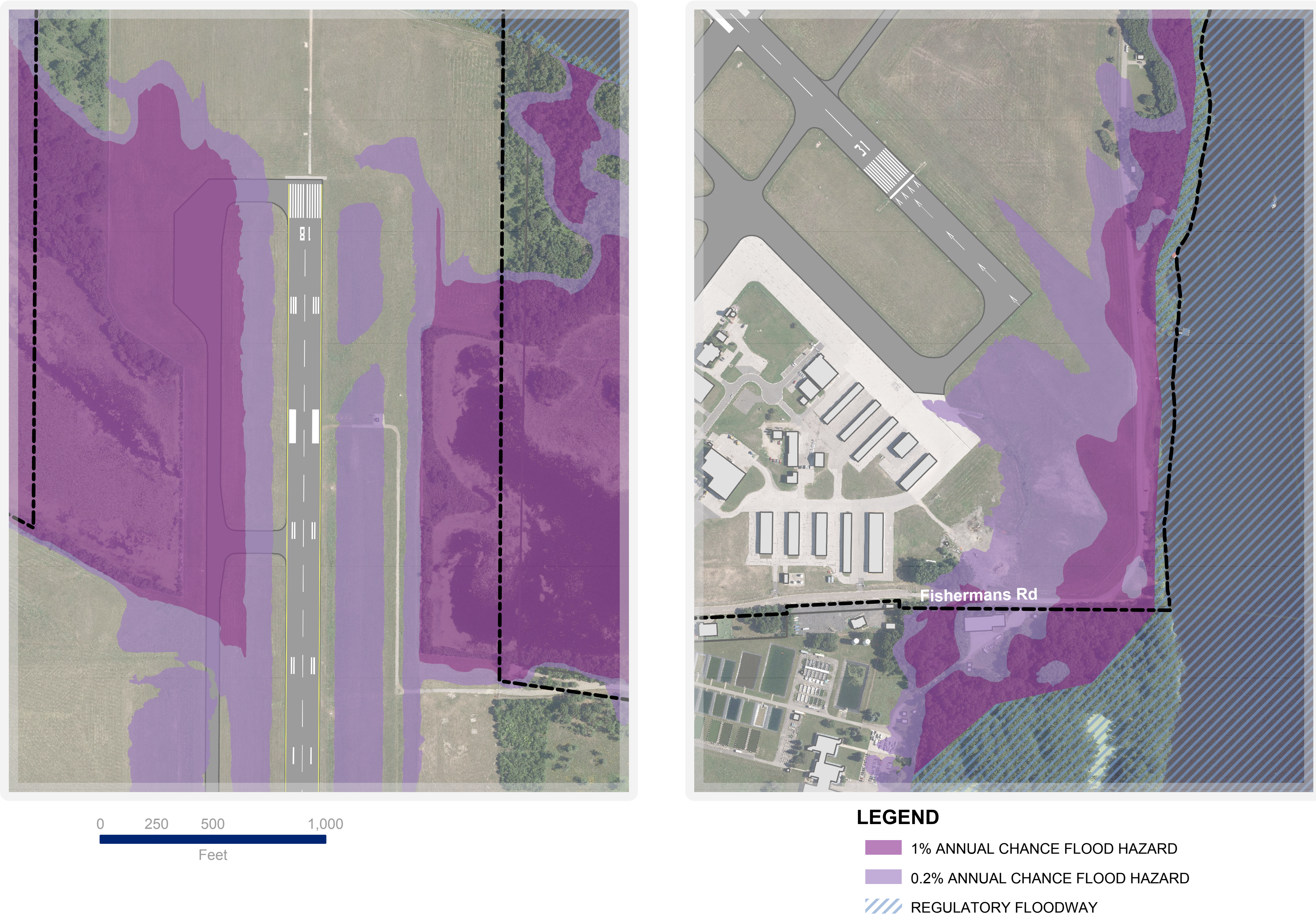

Figure 5-6: **Flood Zones Detail**

Source: *FEMA National Flood Hazard Layer effective 2012*

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5.7 Water Resources

National policy provides guidelines for some water resources based on their value as cultural or recreational assets via the Wild and Scenic Rivers and Nationwide Rivers Inventory programs. Laws and regulations including the Clean Water Act (CWA) address water quality and wetlands from an environmental perspective.

5.7.1 Surface Water and Water Quality

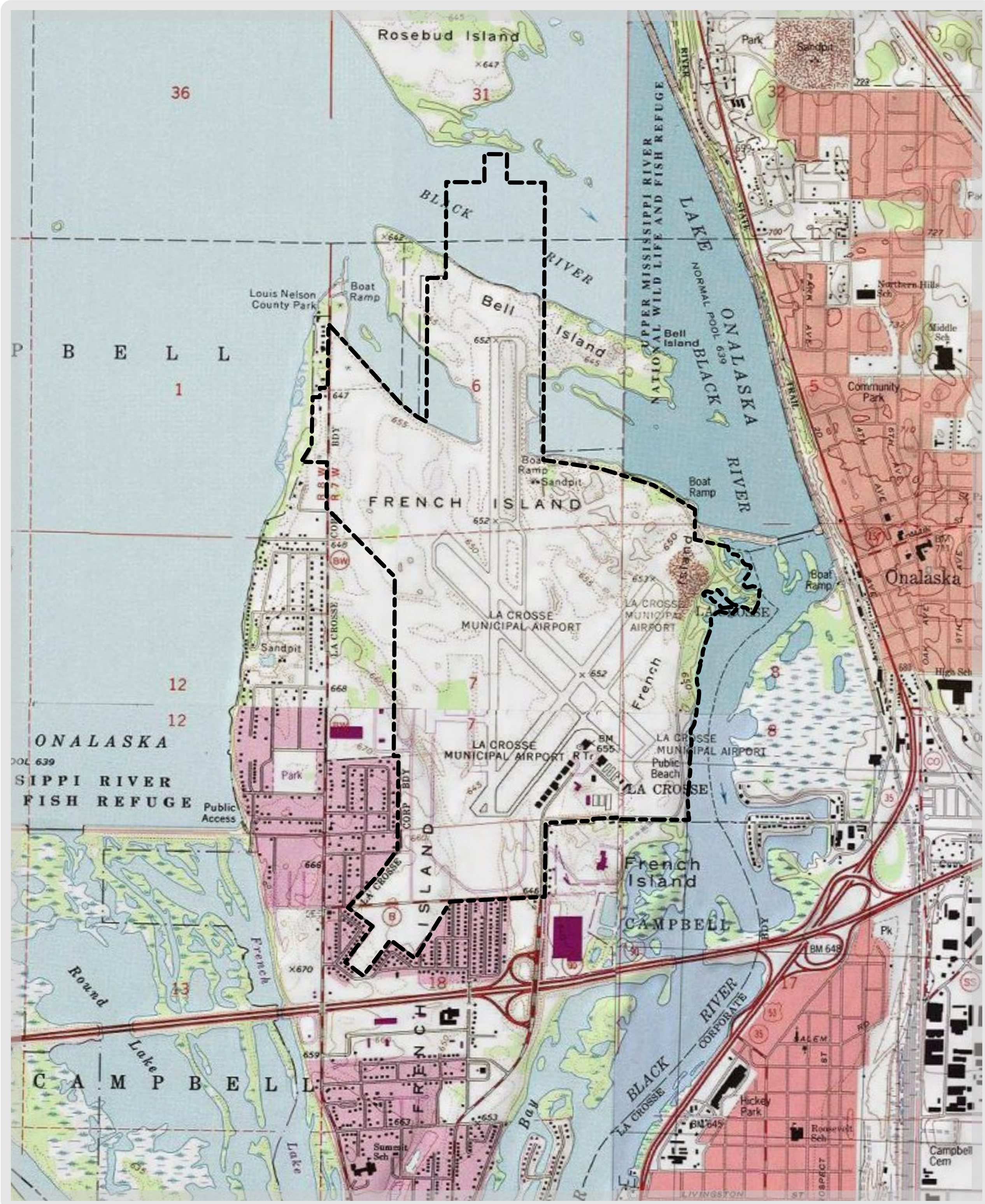
The Clean Water Act provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, and issue permits for discharges (section 402) and for dredged or fill material (section 404). The Fish and Wildlife Coordination Act (FWCA) applies to a proposed federal action that would impound, divert, drain, control, or otherwise modify the waters of a stream or body of water, unless the project is for the impoundment of water covering an area of less than 10 acres. The FWCA requires consultation with the U.S. Fish and Wildlife Service (FWS) and applicable state agencies to identify means to prevent loss and damage to wildlife resources resulting from airport improvements.

Because of the Airport's unique position on French Island, surface water is a major part of the surrounding area of LSE. **Figure 5-7** shows the many water features near the Airport, including the Black River, Lake Onalaska, Round Lake, and the Mississippi River. Stormwater management infrastructure, including ditches, culverts, and other drainage and infiltration structures, are used to treat or contain stormwater on Airport property prior to runoff encountering surrounding water bodies. As of 2019, some of this infrastructure at LSE is beyond its useful life. For this reason, the Airport plans to complete a drainage study to maintain and improve stormwater management. Future projects at LSE that increase the amount of impervious surface and stormwater runoff volume will need to include stormwater management measures to accommodate or treat any potential discharge.

5.7.2 Wetlands

The Clean Water Act defines wetlands as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Federal regulations require that proposed actions avoid, to the greatest extent possible, long-term and short-term impacts to wetlands, including the destruction and alteration of wetland functions and values.

There are wetland areas on and around Airport property (**Figure 5-8**). The National Wetland Inventory (NWI) shows wetlands near the Runway 18 end and Taxiway C. A wetland delineation was conducted in the area prior to construction of this taxiway, and in 2009 a permit was granted to fill wetlands to accommodate the taxiway. Other wetlands shown on the NWI include two small pond areas south and southwest of the Runway 4 and 36 ends, within the perimeter road. Development plans discussed in Chapter 4 avoid these areas, but further study and delineation will be required during environmental review for planned projects to help avoid or minimize potential wetland impacts.



0 0.25 0.5 1

Graphic Scale in Miles

Figure 5-7: **Surface Water**

Source: *National Geographic Society, 2013*

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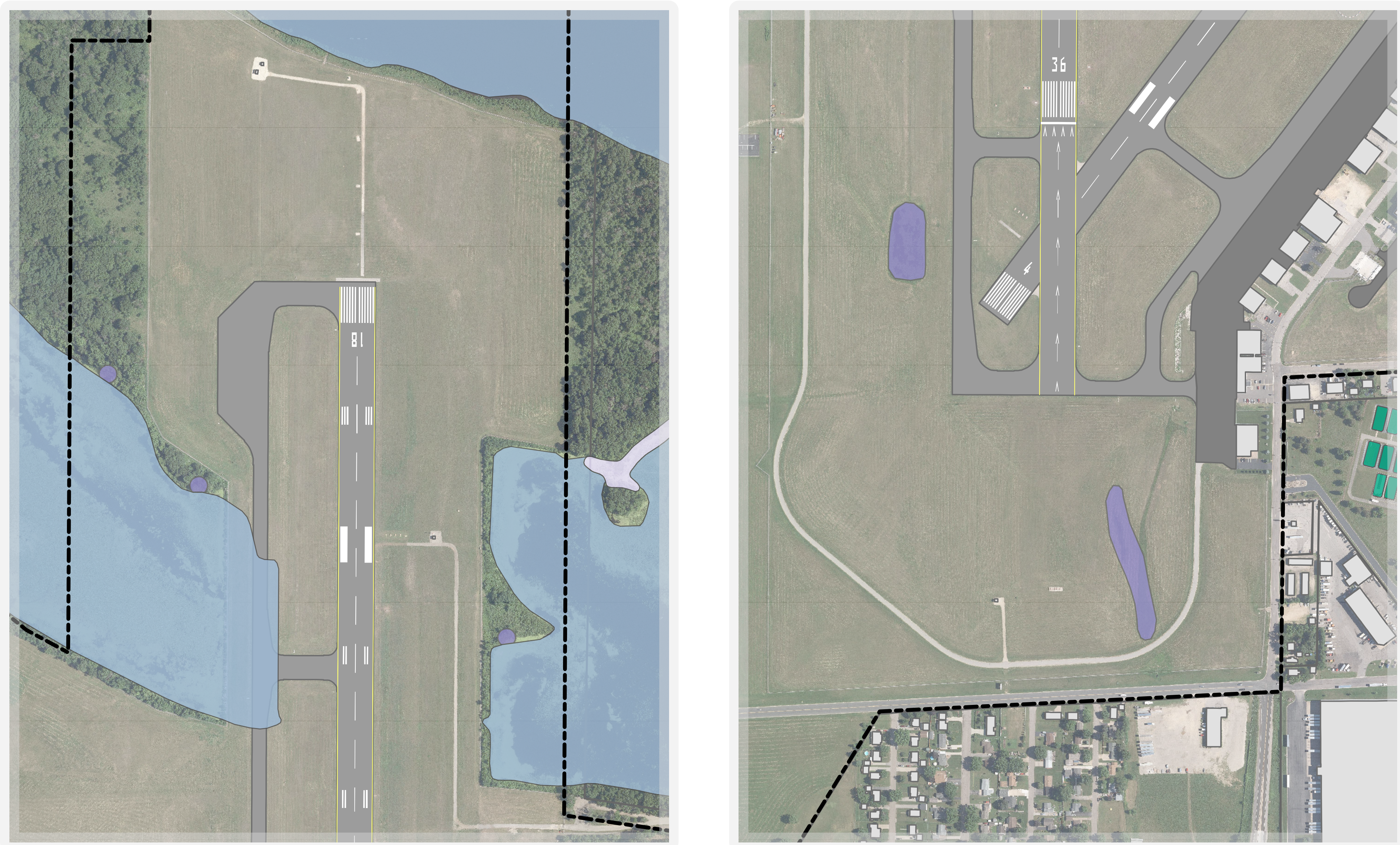

0 250 500 1,000

Feet

LEGEND

FRESHWATER POND	LAKE
EMERGENT	OTHER
FOREST SHRUB	RIVERINE

Figure 5-X: **Wetlands Detail**

Source: *USFWS National Wetland Inventory updated October 2019*

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5.8 Fish, Wildlife, and Plants

5.8.1 Listed Species

A review of the USFWS Information for Planning and Consultation (IPaC) tool, accessed in August 2019, showed a total of three federally listed endangered species and two threatened species potentially located near the Airport.

- Threatened
  - Northern long-eared bat
  - Eastern Massasauga rattlesnake
- Endangered
  - Whooping crane (experimental population)
  - Higgens eye pearly mussel
  - Sheepnose mussel

No critical habitat has been identified near the Airport for these species.

A preliminary search of the Wisconsin DNR Natural Heritage Inventory (NHI) portal indicated that the Airport also overlaps with the Karner Blue Butterfly High Potential Zone and the Rusty Patched Bumble Bee High Potential Zone. Both insects are also federal endangered species. The results indicated that an Endangered Resources Review should be requested to ensure compliance with Wisconsin's Endangered Species Law and the federal ESA.

Threatened Species

The northern long-eared bat (NLEB) is listed as threatened throughout its extensive range including 37 states and multiple southeastern Canadian provinces due to the threat of white-nose syndrome, a fungal disease. During summer, the NLEB typically roosts singly or in colonies under bark, in cavities, or in crevices of living and dead trees. Most hibernate during winter in caves and mines with constant temperatures, high humidity, and no air currents. The "4(d) rule" is one of many tools found within the Endangered Species Act (ESA) for protected species listed as "threatened." The rule directs the USFWS to issue regulations that help to conserve threatened species. The 4(d) Rule for the NLEB may regulate tree removal or other activities if the activities are conducted within one quarter mile of an entrance to a known NLEB hibernaculum (a cave or other feature where NLEBs have been known to overwinter), or within 150 feet of a known NLEB maternity roost tree.

The eastern massasauga rattlesnake is listed as threatened because of habitat loss and fragmentation throughout its range in portions of Illinois, Indiana, Iowa, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario. It lives in shallow wetlands and adjacent upland habitats. No 4(d) rules have been developed for this species.

Endangered Species

Higgins eye mussels and sheepnose mussels are freshwater mussels that have been negatively affected by the loss of free-flowing river habitat to impounded river systems, fragmented habitat, chemicals from pollution in river water, and dredging and waterway traffic that produce silt and sedimentation. The two mussel species are unlikely to be affected by Airport activity due to their underwater habitats.

Whooping cranes breed, roost, and forage in various wetland habitats, including lakes, rivers, and seasonally and semi-permanently flooded palustrine and emergent wetlands. Whooping cranes are in the Wisconsin area in the summer and spend the winter in the southern US. The whooping crane population in this part of Wisconsin is considered a non-essential experimental population. The Wisconsin DNR, along with the Whooping Crane Eastern Partnership (WCEP), is working to restore a migratory population of whooping cranes that migrates between its Wisconsin breeding grounds and its wintering habitat in the southern US. The most recent species management plan published by the DNR in 2006 cites whooping crane sightings in Lake Onalaska and the Upper Mississippi Wildlife Refuge. Reintroduced experimental populations are treated as a threatened population for the purposes of Section 4(d) of the Endangered Species Act. Non-essential experimental populations are treated as if they have been proposed for listing for the purposes of Section 7 of the ESA and are not subject to the formal consultation requirements of that Section unless they are located on a National Wildlife Refuge or National Park. LSE borders the Upper Mississippi River National Wildlife and Fish Refuge, so the more in-depth consultation requirements likely apply for any potential whooping crane population near the Airport.

5.8.2 Sensitive Habitat

Mead & Hunt conducted a study of the sand prairie habitat, including a boundary delineation, on Airport property in 2007 while preparing for construction of Taxiway C and hangar development. When surveyed, two sand prairie areas were delineated, the northern area totaling approximately 134 acres and the southern area totaling approximately 22 acres. While much of the area is high quality prairie, some areas of the sand prairie have previously been used as a source of fill or temporary pavement batch-plant operations and have been degraded. During the study a botanist found that the sand prairie at LSE was among the top four sand prairies in Wisconsin in terms of size, diversity, and condition and is the second-largest prairie of any kind in western Wisconsin. Other sand prairies in Wisconsin include sites near Spring Green and Trempealeau.

During studies of vegetation and fauna in the area at the time of the habitat delineation, some rare species were found, including poppy mallow, prairie ragwort, and the woolly bean (Special Concern plants in Wisconsin), and the grasshopper sparrow, a Special Concern bird in Wisconsin. The poppy mallow is endangered in all other states where it is found. No listed endangered or threatened species in Wisconsin were found during the 2007 studies. However, the DNR maintains the authority to take into account habitat quality during project reviews.

Mitigation of the impacts of taking fill from the sand prairie at the time included restoration of the disturbed areas and haul routes. Any disturbance to the sand prairie in the future is likely to involve coordination with the Wisconsin DNR and similar mitigation and restoration considerations.

5.8.3 Vegetation Management and Wildlife Hazards

The large collection of wetlands in the area and open waters of the Mississippi River, Black River and Lake Onalaska provide notable wildlife attractants. The Airport Facility Directory indicates that wildlife is common in the area with heavy concentrations of waterfowl in the spring and fall. Due to the natural areas surrounding the Airport, deer and other mammals are also common in the area. To help mitigate these wildlife concerns a perimeter fence surrounds the entire Airport. Most of the perimeter fencing has a buried barrier to prevent animals from burrowing. Airport personnel will continue to monitor the fence to maintain its integrity.

Tree removal associated with the proposed alternatives will occur on residential and FWS lands in order to clear approach surfaces from obstructions that may pose a danger to aircraft. The ordinance setting allowable heights for structures around the Airport, discussed in Section 5.3.2, also limits vegetation heights to the same levels. Further evaluation of tree removal, coordination with the FWS, and outreach to property owners will be required as part of the environmental review associated with projects needing vegetation management.

5.9 Hazardous Materials and Solid Waste

Airport activities generate solid waste and likely generate hazardous materials. Municipal solid waste (a form of non-hazardous waste) is discussed in greater detail in **Appendix I: *Recycling, Reuse, and Waste Reduction Plan***.

A Phase I Site Assessment was completed by Mead & Hunt in 2003 for the Taxiway C Relocation project, and in 2012 on the southeastern side of Airport property including the shore of the Black River along the east and Fisherman's Road along the south. Phase I site assessments include reviews of records and aerial photos along with site visits to help determine a property's potential of being contaminated by hazardous materials, such as previous leaks or hazardous material storage.

The 2003 Phase I Assessment concluded that the study area was not likely to contain any direct contamination, but the records review showed sites along Airport Road registered as generators of hazardous waste or previous releases. The 2012 study discovered that fill used in the area may have contained contaminants, creating a potential environmental concern.

Projects proposed by this Master Plan may require further consideration of the potential to encounter hazardous materials during the environmental review process.

5.10 Summary

This chapter provided an overview of land use, zoning, and high-profile environmental resources on and surrounding the Airport that should be considered during the scoping process for projects that will require environmental review. This section summarizes the findings and recommendations of this Environmental Overview for LSE.

- Further study will be required during NEPA and state environmental review for specific projects.
- Severe and significant noise impacts (65 DNL and above) remain primarily on Airport property and are not projected to impact residential areas near the Airport or substantially impact other sensitive areas.
- Zoning changes will be required for Airport related height limits when runway changes are implemented, as well as for land use on Airport property to allow some types of non-aeronautical use.
- A land release process must be pursued with the FAA to allow non-aeronautical uses on LSE property. A tenant must be determined at the time of request.
- Several archeological sites have been found on French Island and near LSE; therefore, development in undeveloped areas or near previously discovered sites may require further investigation and consultation with WI SHPO prior to any construction.
- There is an abundance of public parkland and recreation facilities near and adjacent to LSE that may require further review when off-airport environmental impacts could occur.
- Proposals for Fisherman's Road and Parcel P6 are partially located in designated floodplains and may require mitigation.
- A unique habitat, sand prairie, is present on LSE property, some of which is considered very high quality. The WI DNR requires coordination in the event of development in and near the delineated sand prairie area.

Future improvements at the Airport will require environmental processes and documentation prior to implementation. Consideration and coordination with agencies and regulation prior to development activities will allow LSE to continue to be a good neighbor and steward of the environment.

CHAPTER 6

Financial Analysis

6.1 Financial Analysis Objectives

The primary objective of the Financial Implementation Analysis for the La Crosse Regional Airport (LSE) Master Plan is to evaluate the Airport's capability to fund the Capital Improvement Program and to finance Airport operations. The program is planned for implementation through three phases of development including a five-year Short-Term period (2020-2024), a five-year Mid-Term period (2025-2029) and a ten-year Long-Term period (2030-2039). The analysis includes development of a detailed Financial Implementation Plan. Objectives for developing the Financial Implementation Plan include presenting the results of the implementation evaluation and providing practical guidelines for matching an appropriate amount and timing of financial sources with the planned use of funds.

6.2 Overall Approach

The overall approach for conducting the Financial Implementation Analysis included the following steps:

- Gathering and reviewing key Airport documents related to historical financial results, capital improvement plans, operating budgets, regulatory requirements, City policies, airline agreements and other operating agreements with Airport users
- Interviewing key Airport officials to gain an understanding of the existing operating and financial environment, relationships with the airlines and overall management philosophy
- Reviewing the Aviation Activity Forecast previously developed in the Master Plan
- Reviewing the Capital Improvement Program project cost estimates and development schedules anticipated for the planning period and projecting the overall financial requirements for the program

- Determining and analyzing the sources and timing of capital funds available to meet the financial requirements for operating the Airport and financing the Capital Improvement Program
- Analyzing historical operations and maintenance expenses, developing operations and maintenance expense growth assumptions, reviewing assumptions with Airport management and projecting future operations and maintenance expenses for the planning period
- Analyzing historical revenue sources, developing revenue growth assumptions, reviewing assumptions with Airport management and projecting future airline and non-airline revenues for the planning period
- Completing results of the review in a Financial Analysis Summary that evaluates the financial reasonableness of the Capital Improvement Program.

6.3 Capital Funding Sources

In the past, the Airport has used a combination of FAA Airport Improvement Program (AIP) entitlement and discretionary grants, Passenger Facility Charges, Wisconsin BOA grants, and cash reserves/net operating revenues to fund capital improvements. These funding sources, as well as additional sources of capital funding, will continue to be important to finance the Airport's Master Plan Capital Improvement Program (CIP) during the future twenty-year planning period.

6.3.1 Airport Improvement Grants

The Airport receives grants from the Federal Aviation Administration (FAA) to finance the eligible costs of certain capital improvements. These federal grants are allocated to commercial passenger service airports through the Airport Improvement Program (AIP). AIP grants include passenger entitlement grants, which are allocated among airports by a formula that is based on passenger enplanements and discretionary grants which are awarded in accordance with FAA guidelines. After several years of continuing budget resolutions and other short-term legislative measures implemented by Congress, the FAA Reauthorization Act of 2018 was enacted on October 5, 2018. The Act authorized funding for the AIP through September 30, 2023.

Under current AIP authorization legislation, eligible projects are funded on a 90% AIP grant/10% local match basis for small and non-hub airports. Under this authorization, the Airport is projected to receive current entitlements of about $1.2 million in 2020 and future annual grants which are projected to grow to $1.4 million by 2039 - the end of the planning period. Non-Hub airports (those with annual enplanements between 10,000 and approximately 449,000) can accumulate and carryover up to three years of unspent entitlements plus the current year before the awards are revoked. In 2020, the Airport is anticipated to have no unspent entitlements to carryover for use in 2020. The implementation analysis assumes the application of annual AIP passenger entitlement funds will be about $6.3 million during the Short-Term planning period, $6.6 million during the Mid Term and $13.7 million during the Long Term.

The approval of AIP discretionary funding is based on a project eligibility ranking method the FAA uses to award grants, at their discretion, based on a project's priority and importance to the national air transportation system. In 2009 and 2010, La Crosse received discretionary funds to extend Taxiway F. In 2014 and 2015, La Crosse received discretionary funding to support its terminal building expansion project.

Recently, the Airport received additional discretionary funding for runway and taxiway lighting as well as runway incursion markings. It is reasonable to assume that the Airport will receive additional discretionary funding during the planning period for higher priority, eligible projects, such as runway projects. The implementation analysis assumes that $12 million of AIP discretionary funds will be required during the Short-Term for the rehabilitation of Runway 13-31 as well as Taxiway A and Taxiway B. The implementation analysis also assumes that AIP discretionary grants of about $7 million will be available for the extension of Runway 13-31 during the five-year Mid-Term period. During the Long-Term planning period, the analysis assumes $20.6 million in discretionary grants will be used toward the rehabilitation of Runway 18-36, decommissioning of Runway 04-22, terminal apron reconstruction and acquisition of an ARFF truck. Since the future availability of AIP discretionary grants is not certain until an actual grant is awarded, it should be noted that any CIP projects which have discretionary funds indicated as a funding source in the implementation plan may need to be delayed until such funds actually become available.

Of additional note, the FY 2018 omnibus appropriations bill included an additional amount for ''Grants-In-Aid for Airports'' of $1 billion to remain available through September 30, 2020. This "supplemental" $1 billion is funded through the General Fund of the Federal Government, not the Airports & Airways Trust Fund. Congress directed the FAA to give priority to non-primary airports, that are not located within OMB-determined Metropolitan or Micropolitan areas. Congress also gives priority to projects at small and non-hub airports. The Consolidated Appropriations Act of 2019 included a supplemental amount of $500 million for discretionary grants under the AIP statute which will be awarded by September 30, 2021.

The Airport works with the FAA to identify projects included in its CIP which may be candidates for funding from these additional supplemental appropriations. As the award of such funds remains undetermined, this implementation analysis does not assume the receipt of additional "supplemental" funds. However, should the Airport be awarded funding for projects through supplemental appropriations, it is likely that AIP entitlement funds assumed to fund those projects would be replaced with supplemental funds and made available to fund other eligible projects in the CIP.

The implementation analysis further assumes that the current AIP program will continue to be extended through 2039 and that future program authorizations will provide substantially similar funding levels as it currently does and as it has historically provided since the program was established in 1982.

6.3.2 Wisconsin Bureau of Aeronautics Grants

The Wisconsin Bureau of Aeronautics (WBOA) manages AIP funding provided to airports in the State through either individual AIP grants or through the state block grant program. Additionally, state financial aid is available through the Bureau, and is provided by the issuance of a finding approved by the Governor. Revenue for state appropriations comes from the Transportation Fund; aviation-related contributions include airline property tax, aviation fuel tax and aircraft registration fees. For projects receiving federal financial aid, the Airport and the Bureau share equally the non-federal costs. For projects not involving federal financial aid, the state normally provides 80% of the cost of eligible airside and landside development, and 50% of some planning projects. The Master Plan CIP includes numerous projects during the planning period that are assumed to be partially funded from WBOA Grants. In addition to sharing in local matches to AIP grants, WBOA grants are anticipated to partially fund drainage projects, equipment purchases, a solar array project, terminal generator and baggage conveyor equipment, parking lot and other small pavement projects. During the 20-year planning period, it is assumed that WBOA grants will be needed in the amounts of $7.1 million in the Short-Term, $2.6 million in the Mid Term and $4.2 million in the Long Term.

6.3.3 Passenger Facility Charges

The Aviation Safety and Capacity Expansion Act of 1990 established the authority for commercial service airports to apply to the FAA for imposing and using a Passenger Facility Charge (PFC) of up to $3.00 per eligible enplaned passenger. With the passage of AIR-21 in June 2000, airports could apply for an increase in the PFC collection amount from $3.00 per eligible enplaned passenger to $4.50. The proceeds from PFCs are eligible to be used for AIP eligible projects and for certain additional projects that preserve or enhance capacity, safety or security; mitigate the effects of aircraft noise; or enhance airline competition. PFCs may also be used to pay debt service on bonds (including principal, interest and issue costs) and other indebtedness incurred to carry out eligible projects. In addition to funding future planned projects, the legislation permits airports to collect PFCs to reimburse the eligible costs of projects that began on or after November 5, 1990.

LSE currently collects PFC revenues in an approved open application at the $4.50 collection level. It plans to submit new applications for additional PFC eligible capital projects identified in the Master Plan and to continue collection without interruption of its collection authority. The implementation analysis assumes that the Airport will submit additional PFC applications and amendments, as required, to ensure that the collection of PFC revenues continues beyond the authorized expiration date through the end of the twenty-year planning period in 2039.

At the beginning of 2020, it is anticipated that the Airport will have approximately $1.1 million in unliquidated PFCs. PFC collections at the $4.50 level are estimated to yield approximately $381 - $406 thousand per year in the Short-Term. In the Short-Term of the planning period, approximately $1.1 million of PFCs will be used to retire previously incurred debt service on PFC projects in existing applications. The implementation analysis then assumes that PFCs will be used on a pay-as-you-go basis for projects included in the 20-year CIP to fund approximately $2.0 million in eligible project costs during the Short-Term, $2.0 million in the Mid Term and $4.8 million in the Long Term.

6.3.4 Rental Car Customer Facility Charges

In the last several years, rental car Customer Facility Charges (CFCs) have become common financing tools for landside improvements at airports in the U.S. Such charges are collected by rental car companies that provide services to commercial passengers at the airports they serve. CFCs are collected by the rental car companies on behalf of, and for the benefit of, the airports where they operate. The charge is typically based on a fee per rental car transaction day that is added to rental car contracts.

LSE currently collects a CFC of $4.00 per transaction day. The CFC fee is to be used to support the planning, design and construction of various landside and passenger terminal improvements at the Airport including facilities used by the rental car companies as well as for other valid Airport purposes. Unlike other funding sources, the implementation analysis does not apply CFCs to fund specific capital projects -

instead, the analysis assumes that CFCs will be used to support the cash flow needs of the overall capital program. Current collections are approximately $325 thousand per year growing to about $388 thousand per year by the end of the Long-Term planning period. A portion of those collections are required for the debt service previously incurred to support the construction of a rental car service facility. Therefore, the capital financial plan projects that approximately $354 thousand in CFC revenue will be available to support cash flow during the Short-Term, $825 thousand in the Mid Term and $4.7 million in the Long-Term after the debt is retired.

6.3.5 Other Unidentified Funding

The traditional funding sources described in the previous paragraphs are insufficient to fund the South General Aviation Apron Reconstruction and East General Aviation Apron Reconstruction projects programmed during the Mid-Term planning period, and the Middle General Aviation Apron Reconstruction project programmed during the Long Term. Consequently, non-traditional funding sources will be needed to implement total project costs of about $19.6 million during the twenty-year planning period. If other funding sources cannot be identified and obtained in the time frame needed, the associated project will have to be modified, delayed or cancelled until such funding can be identified.

6.3.6 Cash Reserves/Airport Net Operating Revenue

At the beginning of 2020, the Airport is anticipated to have accumulated about $2.9 million in unrestricted cash reserves available for operations and capital project funding. The implementation analysis assumes that Airport cash reserves/net operating cash flow will be used throughout the planning period to fund about $10.3 million in project costs. This will include costs for projects or equipment which are not eligible for state or federal funding, grant match requirements to state funded projects which cannot be matched with PFC funds, or projects which federal and/or state funding may not be available. The implementation analysis assumes $1.6 million during the Short-Term, $1.1 million in the Mid Term and $7.6 million in the Long Term.

6.4 Financial Analysis and Implementation Plan

This analysis, along with the Schedules presented at the end of Chapter 6, provides the results of evaluating the financial reasonableness of implementing the Master Plan Capital Improvement Program during the planning period from 2020 through 2039.

6.4.1 Estimated Project Costs and Development Schedule

The Capital Improvement Program (CIP) Estimated Project Costs and Development Schedule is derived from previous results of the Master Plan analysis. The CIP for capital expansion and improvement projects is projected on an annual basis for the Short-Term planning period from 2020 through 2024, in total for the Mid-Term planning period from 2025 through 2029 and in total for the Long-Term planning period from 2030 through 2039. For each of these planning periods, Schedule 6-1 (provided at the end of Chapter 6) presents the Capital Improvement Program including estimated costs and anticipated development schedule for the identified projects.

As shown in Schedule 6-1, the total estimated cost of projects is $92,331,000 in 2020 dollars. The estimated costs for projects scheduled during the period 2020 through 2039 are adjusted by an assumed 3% rate of annual inflation. The resulting total project costs escalated for inflation are $118,871,293. **Table 6-1** presents a summary of the Schedule and provides a comparison of 2020 base year costs with escalated costs adjusted for inflation for each of the planning periods.

Table 6-1: Summary of Base Year and Total Escalated Costs for Capital Improvement Program		
Planning Periods	**2020 Base Year Costs**	**Total Escalated Costs**
Short-Term Projects (2020-2024)	$27,181,000	$29,008,985
Mid-Term Projects (2025-2029)	28,870,000	34,985,553
Long-Term Projects (2030-2039)	36,280,000	54,876,755
Total Project Costs	$92,331,000	$118,871,293
Note: Addition errors are due to rounding of calculated amounts. *Source: Leibowitz & Horton AMC analysis*		

6.4.2 Sources and Uses of Capital Funding

Funding sources for the CIP depend on many factors, including AIP and PFC project eligibility, the ultimate type and use of facilities to be developed, management's current and desired levels of the Airport's airline cost per enplaned passenger, the availability of other financing sources and the priorities for scheduling project completion. For master planning purposes, assumptions were made related to the funding source of each capital improvement.

Schedule 6-2 (provided at the end of Chapter 6) lists each of the CIP projects, their estimated costs (escalated annually for inflation) and the assumed funding sources and amounts. During the twenty-year planning period, it was assumed that AIP entitlement grants would partially fund runway, taxiway and taxilane rehabilitation, reconstruction and expansion; terminal and general aviation aircraft parking aprons; aircraft rescue and firefighting (ARFF) and snow removal equipment (SRE); SRE building rehabilitation and expansion, and other eligible improvements. It was assumed that AIP discretionary grants would partially fund the rehabilitation and extension of Runway 13-31, the rehabilitation of Taxiway B, the relocation of Taxiway A, the decommissioning of Runway 04-22, the reconstruction of the terminal apron as well as fund ARFF equipment. It was assumed that WBOA aviation grants would provide a portion of the funding for AIP eligible projects as well as funding for drainage projects, equipment purchases, a solar array project, terminal generator and baggage conveyor equipment, parking lot and other small pavement projects. PFC pay-as-you-go revenues were assumed to fund a portion of the AIP eligible projects, the Airport’s share of WBOA funded projects, SRE equipment and a terminal entrance road project. Available cash reserves were assumed to fund costs for projects or equipment which are not eligible for state or federal funding, grant match requirements to state funded projects which cannot be matched with PFC funds, or projects which federal and/or state funding may not be available, such as minor terminal building improvement or fleet vehicles and maintenance equipment.

A summary of the sources of capital funding by type and uses of capital funding by planning period for the CIP is presented in **Table 6-2**.

Table 6-2: Summary of Sources and Uses of Capital Funding for Capital Improvement Program

Sources of Capital Funding	Short-Term (2020-2024)	Mid-Term (2025-2029)	Long-Term (2030-2039)	Totals
AIP Entitlement Grants	$6,311,239	$6,586,172	$13,734,227	$26,631,637
AIP Discretionary Grants	$12,002,733	$7,034,677	$20,574,976	$39,612,387
WBOA Aviation Grants	$7,102,563	$2,622,933	$4,212,010	$13,937,506
Passenger Facility Charges	$1,994,115	$1,950,367	$4,771,504	$8,715,986
Other Unidentified Funding	$0	$15,646,223	$4,000,000	$19,646,223
Cash Reserves/ Net Ops Cash Flow	$1,598,335	$1,145,180	$7,584,038	$10,327,553
Total Sources	**$29,008,985**	**$34,985,553**	**$54,876,755**	**$118,871,293**
Uses of Capital Funding				
Runway/Taxiway Improvements	$18,909,612	$8,240,449	$14,369,602	$41,519,664
Terminal Apron Improvements	$0	$0	$11,510,808	$11,510,808
Terminal Building Improvements	$2,493,501	$302,958	$756,295	$3,552,754
Terminal Roadway and Parking Improvements	$2,820,997	$0	$0	$2,820,997
General Aviation Facility Improvements	$0	$20,176,982	$20,646,850	$40,823,831
Equipment	$2,745,293	$1,720,800	$7,593,200	$12,059,293
Support Facility Buildings (SRE/ARFF)	$844,132	$2,423,661	$0	$3,267,793
Other Improvements	$1,195,450	$2,120,704	$0	$3,316,154
Total Uses	**$29,008,985**	**$34,985,553**	**$54,876,755**	**$118,871,293**

Note: Addition errors are due to rounding of calculated amounts.
Source: Leibowitz & Horton AMC analysis

6.4.3 Projected Operations and Maintenance Expenses

Operations and maintenance expense projections for the Short-Term (2020 to 2024), the Mid-Term (2025 to 2029) and the Long-Term (2030 to 2039) planning periods are based on the Airport's 2020 preliminary budget, the anticipated impacts of inflation, aviation traffic increases, facility improvements and the recent experience of other airports with similar levels of aviation activity.

Operations and Maintenance Expense Projection Assumptions

Operations and maintenance expense growth assumptions, as reflected in Schedule 6-3, were developed to project the Airport’s operating expenses during the planning period. Actual amounts for 2017 through 2018, budgeted amounts for 2019 and preliminary budgeted amounts for 2020 provide a comparison with expenses that are projected for the period 2021 through 2039.

For each of the following expense categories listed below, projections are based on 2020 preliminary budgeted amounts with an assumed 3% annual rate of inflation beginning in 2021.

- Personnel Expenses
- Legal Expenses
- Professional Services
- Data and Telecommunications
- Electricity
- Water/Sewer
- Natural Gas
- Storm sewer
- Garbage Services
- City Services
- Supplies
- Postage
- Subscriptions
- Fuel, Oil, Gas and Diesel
- Repair and Maintenance – Grounds
- Repair and Maintenance – Buildings
- Repair and Maintenance – Vehicles
- Travel and Training
- Miscellaneous
- Insurance
- Merchant Service (Credit Card Fees)

Projection of Operations and Maintenance Expenses and Operating Expenses Per Enplaned Passenger

The projection of operations and maintenance expenses is provided in Schedule 6-3 (provided at the end of Chapter 6). As shown in the Schedule, total expenses are expected to grow from $2,706,748 as budgeted in 2020 to $3,046,469 in 2024 reflecting an overall growth rate of 3% per year and a total of $14,370,493 during the Short-Term planning period. Mid-Term expenses are projected to total $16,659,340 reflecting a 3% annual growth rate for the five-year period 2025-2029 and Long-Term expenses are projected to total $41,701,500 reflecting a 3% annual growth rate for the ten-year period 2030-2039.

Schedule 6-3 also provides a comparison of La Crosse's total operating expenses per enplaned passenger versus non-hub airports with similar levels of aviation activity. La Crosse's operating expenses per enplaned passenger are projected to increase from $28.09 budgeted for 2020 to an average of $35.59 during the Long-Term planning period. Over the same period of time, the overall non-hub industry average grows from $47.53 in 2020 to $58.71 during the Long Term (Source: Non-Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database). These comparisons show that budgeted and projected operating expenses at La Crosse are substantially lower than other non-hub airports of similar size during all three phases of the twenty-year planning period. This implies that the Airport currently manages operations and controls expenses in a manner that is more cost efficient than other comparable non-hub airports.

6.4.4 Projected Operating Revenues

Operating revenue projections for the Short-Term (2020 to 2024), the Mid-Term (2025 to 2029) and the Long-Term (2030 to 2039) planning periods are based on the Airport's 2020 preliminary budget, current rates and charges methodology, current leasing practices, the anticipated impacts of inflation, aviation traffic increases, facility expansions and the recent experience of other airports with similar levels of aviation activity.

Operating Revenue Projection Assumptions

Operating revenue growth assumptions, as reflected in Schedule 6-4 (provided at the end of Chapter 6), were developed to project the Airport's operating revenues during the planning period. Actual amounts for 2017 through 2018, budgeted amounts for 2019 and preliminary budgeted amounts for 2020 provide a comparison with revenues that are projected for the period 2021 through 2039. This analysis organizes revenues into categories for airline revenues, non-airline revenues and non-operating revenues. Annual revenue growth assumptions for the period 2021 through 2039 are provided in the following sections.

Airline Revenues

Landing fees – Airline landing fee projections beginning in 2021 are based on the Airport's 2020 preliminary budget with growth thereafter at a 3% annual rate of inflation. No increased revenue for growing landed weights was assumed based on the Airport's rate setting methodology – airline landing fee requirements are shared on a residual basis across the airlines based only on recovery of the Airport's budget.

Terminal Rents – Projections for airline terminal rents beginning in 2021 are based on the 2020 preliminary budget with growth thereafter at a 3% annual rate of inflation.

Non-Airline Revenues

Non-Airline revenue projections beginning in 2021 for the following categories are based on the Airport's 2020 preliminary budget plus the annual rate of forecast enplanement growth:

- Rental Car Concession Fees
- Public Parking Fees
- Restaurant Concession Fees

Landing fee revenue projections for other than scheduled airlines are projected to grow, beginning in 2021, based on the 2020 preliminary budget with a 3% annual rate of inflation plus increases in aircraft landed weight assuming one half the annual growth rate of the Master Plan forecast of passenger enplanements.

Non-Airline revenue projections beginning in 2021 for the following categories are based on the Airport's 2020 preliminary budget with growth at a 3% annual inflation rate thereafter:

- Fuel Flowage Fees
- FBO Rents and Fees
- Rental Car Rents and Fees
- Terminal Advertising

- Other Terminal Rents
- Other Aeronautical Rents
- Other Non-Aeronautical Rents
- Fuel Sales (automobile)
- Miscellaneous Operating Revenue

Non-Operating Revenues

Non-Operating revenue projections beginning in 2021 for Investment Income are based on the Airport's 2020 preliminary budget and are assumed to remain flat throughout the planning period.

Projection of Operating Revenues, Airline Cost Per Enplaned Passenger and Operating Revenues Per Enplaned Passenger

The projection of operating revenues is provided in Schedule 6-4 at the end of Chapter 6. As shown in the Schedule, airline revenues are expected to grow from $721,000 budgeted for 2020 to $811,492 projected for 2024 with a total of $3,827,887 during the five-year the Short-Term planning period. During the five-year Mid-Term period, airline revenues are projected to total $4,437,570 and during the ten-year Long-Term period, revenues are projected to total $11,108,083. The overall annual growth rate for airline revenues is 3.0% during the twenty-year planning period. Non-Airline revenues are expected to increase from $1,997,940 budgeted for 2020 to $2,330,510 projected for 2024 with a total of $10,809,672 during the Short-Term period. During the Mid-Term period, non-airline revenues are projected to total $13,081,131 and during the Long-Term period, non-airline revenues are projected to total $35,020,373. The overall annual growth rate for non-airline revenues is 3.91%. Total Airport revenues (including non-operating revenues) are expected to increase from $2,733,940 budgeted for 2020 to $3,157,002 projected for 2024 with a total of $14,712,559 during the Short-Term period. During the Mid-Term period, revenues are projected to total $17,593,701 and during the Long-Term period, revenues are projected to total $46,278,457. The overall annual growth rate for total Airport revenues is 3.66%.

Schedule 6-4 also provides a comparison of the Airport's airline cost per enplaned passenger (CPEP) versus non-hub airports with similar levels of aviation activity. The airline CPEP (all airline fees and rentals divided by enplaned passengers) is a measure airlines use to compare their cost of operations among the airports they serve. La Crosse's airline CPEP is projected to grow from $7.48 as preliminarily budgeted in 2020 to an average of $9.48 during the Long-Term planning period. Over the same period, the overall non-hub industry average grows from $9.40 in 2020 to $11.61 during the Long Term (Source: Non-Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database).

This comparison indicates that airline rates and charges at LSE are slightly lower than the industry average. This indicates that the Airport has room to grow airline rates and charges in the future if there is a need or justification to do so. Currently, the Airport considers its low CPEP as beneficial in its efforts to attract new airlines and increase service. The Airport should continue to monitor their rates in comparison with the non-hub industry average and other comparable peer airports.

Schedule 6-4 also provides a comparison of La Crosse's total operating revenue per enplaned passenger versus an average for other non-hub airports. The Airport's total operating revenue per enplaned passenger is projected to grow from $28.22 as preliminarily budgeted for 2020 to an average of $39.37 during the Long-Term planning period. Over the same period, the overall non-hub industry average grows from $47.84 in 2020 to $59.09 during Long Term (Source: Non-Hub airports, FAA Operating and Financial Summary Report #127 and FAA Air Carrier Activity Information System enplanement database). These comparisons show that both airline and non-airline revenues are lower than the non-hub industry averages throughout the planning period.

LSE does have a diverse source of non-airline revenues including aeronautical and non-aeronautical land/ground rents and building rents and terminal related revenues such as concessions, advertising, parking, and rental car concessions. Upon more detailed analysis, it does not appear that any specific category of non-airline revenues is significantly below that of the non-hub industry average. Parking and rental car revenues per enplanement at LSE are higher than the non-hub average. However, combined concession revenues from food/beverage and news/gift per enplaned passenger at LSE are lower than the non-hub industry average, which is common for non-hub airports with lower enplanements. Other non-airline revenues such as land/ground rents and non-aeronautical rents may be low due to the limited availability of space available to rent given the Airport's location and configuration on French Island.

The Airport's overall policies for setting/negotiating airline and non-airline user fees and rental rates should continue to be reviewed and adjusted over time to establish rates that are more comparable with other airports having similar levels of aviation activity.

6.4.5 Financial Plan Summary for the Master Plan Capital Improvement Program

The Financial Plan Summary presented in Schedule 6-5 at the end of Chapter 6 includes a Capital Cash Flow section that presents a summary of projected capital funding (from Schedule 6-2) and scheduled capital expenditures (from Schedule 6-1) with the cash flow that results from implementing the Master Plan Capital Improvement Program. Schedule 6-5 also includes an Operating Cash Flow section that summarizes totals for operating revenues (from Schedule 6-4) and operating expenses (from Schedule 6-3) with the addition of beginning cash reserve balances to provide the cash flow that results from these activities.

In Schedule 6-1 of the Financial Implementation Analysis, practical approaches were provided for scheduling capital expenditures to match the availability of capital funding. Schedule 6-2 provided practical approaches for matching specific capital funding sources with each of the identified projects. As shown in Schedule 6-5, positive year end cash reserves are projected throughout the twenty-year planning period 2020 to 2039.

Based on the assumptions underlying the Financial Implementation Analysis summarized in the Capital Cash Flow section of Schedule 6-5, implementation of projects in the Master Plan CIP that are scheduled throughout the twenty-year planning period are projected to be financially reasonable if the City can identify approximately $19.6 million in funding for projects with Other Unidentified Funding. If funding sources are not available for these projects and other alternative sources cannot be identified, then development of these projects will not be feasible during the implementation period that is currently planned.

Implementation of other capital projects during the 2020-2039 planning period that have AIP discretionary grants indicated as a funding source are subject to the availability of those grants which are provided at the sole discretion of the FAA. If the identified portion of discretionary funding is not awarded by the FAA, then these projects will need to be delayed until funding is available.

Additionally, the Financial Implementation Analysis relies on achievement of the aviation activity and passenger enplanement forecast. Actual aviation traffic may temporarily vary from the projected levels of activity without a significant adverse impact on the capital program. If decreased traffic levels occur and persist, implementation of all the proposed projects may not be financially feasible. It should also be noted, however, that if the forecast activity levels are not met, then a number of the planned capital improvements may not be necessary.

6.5 Financial Analysis Schedules

Financial analysis Schedules 6-1 through 6-5 are presented on the following pages.

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Capital Improvement Program	Funding Schedule: Short Term 2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

	Capital Project Description	2020 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039	Total Escalated Costs
	Short Term Projects (2020-2024)										
	Capital Projects 2020										
1	Acquire Pull Behind Broom (Replace Unit 42 - AIR-BRM-42)	$350,000	$350,000					$350,000			$350,000
2	Acquire Pull Behind Broom (Replace Unit 43 - AIR-BRM-43)	350,000	350,000					350,000			350,000
3	Acquire Tractor (Replace Unit 22 - AIR-TAC-01)	75,000	75,000					75,000			75,000
4	Acquire Welder (AIR-WLD-01)	10,000	10,000					10,000			10,000
5	Information Technology Equipment	60,000	60,000					60,000			60,000
6	Terminal Facility Upgrades and Rehabilitation	50,000	50,000					50,000			50,000
7	Signage and Landscaping	50,000	50,000					50,000			50,000
8	Employee Lot Electric Vehicle Charging Station	10,000	10,000					10,000			10,000
9	Terminal Loop Road Rehabilitation (surface treatment)	100,000	100,000					100,000			100,000
10	Construct Solar Array Canopy System	1,250,000	1,250,000					1,250,000			1,250,000
12a	Reconstruct and Expand Southeast Taxilanes, Construction	2,473,000	2,473,000					2,473,000			2,473,000
12b	RSAT Electrical Project and Apron Project (Reimbursement)	278,000	278,000					278,000			278,000
12d	Reconstruct and Expand Southeast Taxilanes, Construction, AIP Ineligible Costs	200,000	200,000					200,000			200,000
57	Airfield Drainage (Stormwater) Study	150,000	150,000					150,000			150,000
	Total Capital Projects 2020	$5,406,000	$5,406,000	$0	$0	$0	$0	$5,406,000	$0	$0	$5,406,000
	Capital Projects 2021										
12f	AIP Reimbursement to Wisconsin BOA	$0		$0				$0			$0
62a	Airfield Drainage (Stormwater) Improvements, Phase 1	500,000		515,000				515,000			515,000
13	Install Terminal Generator	300,000		309,000				309,000			309,000
14	Install Terminal Inbound Baggage Conveyor	650,000		669,500				669,500			669,500
15	Terminal Display Monitors Equipment	75,000		77,250				77,250			77,250

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	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
Capital Improvement Program	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**	**2025-2029**	**2030-2039**	**Funding**
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

			Estimated Project Costs and Development Schedule								
		2020									**Total**
		Base Year	Short Term						**Mid Term**	**Long Term**	**Escalated**
Capital Project Description		**Costs**	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**	**2025-2029**	**2030-2039**	**Costs**
16	Terminal Facility Upgrades and Rehabilitation	50,000		51,500				51,500			51,500
17	Joint Seal Taxiway C (South)	400,000		412,000				412,000			412,000
18	Runway 13/31 Rehabilitation, Design	275,000		283,250				283,250			283,250
	Total Capital Projects 2021	$2,250,000	$0	$2,317,500	$0	$0	$0	$2,317,500	$0	$0	$2,317,500
Capital Projects 2022											
19	Acquire Airport Fire Apparatus (Replace Fox 2 - AIR-FRE-19)	$850,000			$901,765			$901,765			$901,765
20	Acquire Skid Steer (Replace Unit 21 - AIR-LDR-21)	50,000			53,045			53,045			53,045
21	Acquire Tar Kettle (AIR-TAR-20)	75,000			79,568			79,568			79,568
22	Acquire Fleet Vehicle (Replace Unit 1 - AIR-CYA-02)	40,000			42,436			42,436			42,436
23	Terminal Facility Upgrades and Rehabilitation	50,000			53,045			53,045			53,045
24	Terminal Carpet Replacement	75,000			79,568			79,568			79,568
25	Avigation Easements and Remove Obstructions	500,000			530,450			530,450			530,450
26	Runway 13/31 Rehabilitation, Construction	5,225,000			5,543,203			5,543,203			5,543,203
27	Taxiway B Rehabilitation, Design	270,000			286,443			286,443			286,443
11	Runway 18 PAPI Replacement	100,000			106,090			106,090			106,090
29	Install Fanta Reed Road Lighting	300,000			318,270			318,270			318,270
	Total Capital Projects 2022	$7,535,000	$0	$0	$7,993,882	$0	$0	$7,993,882	$0	$0	$7,993,882

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Capital Improvement Program	Funding Schedule: Short Term 2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039	Total Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

	Capital Project Description	2020 Base Year Costs	Estimated Project Costs and Development Schedule: Short Term 2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039	Total Escalated Costs
	Capital Projects 2023										
30	Acquire Pickup (Replace Unit 7 - AIR-TFL-17)	$75,000				$81,955		$81,955			$81,955
31	Acquire Operations Vehicle (Replace Unit 3 - AIR-SUV-03)	40,000				43,709		43,709			43,709
32	Terminal Facility Upgrades and Rehabilitation	50,000				54,636		54,636			54,636
33	Terminal Outbound Baggage Expansion	1,000,000				1,092,727		1,092,727			1,092,727
34	Reconstruct South Terminal Parking Lot	1,000,000				1,092,727		1,092,727			1,092,727
35	Taxiway B Rehabilitation, Construction	2,430,000				2,655,327		2,655,327			2,655,327
98	Constuct Connector Between Runway 13 and Twy B	1,120,000				1,223,854		1,223,854			1,223,854
58c	Taxiway A Relocation, Design	485,000				529,973		529,973			529,973
	Total Capital Projects 2023	$6,200,000	$0	$0	$0	$6,774,907	$0	$6,774,907	$0	$0	$6,774,907
	Capital Projects 2024										
37	Acquire Airfield Plow Truck (Replace Unit 10 - AIR-TDS-07)	$550,000					$619,030	619,030			619,030
38	Acquire Wide Area Mower (Replace Unit 27 - AIR-MOW-27)	70,000					78,786	78,786			78,786
39	Terminal Facility Upgrades and Rehabilitation	50,000					56,275	56,275			56,275
40	ARFF Facility Rehabilitation	750,000					844,132	844,132			844,132
63c	Taxiway A Relocation, Construction	4,370,000					4,918,473	4,918,473			4,918,473
	Total Capital Projects 2024	$5,790,000	$0	$0	$0	$0	$6,516,696	$6,516,696	$0	$0	$6,516,696
	Total Short Term Project Costs	$27,181,000	$5,406,000	$2,317,500	$7,993,882	$6,774,907	$6,516,696	$29,008,985	$0	$0	$29,008,985

LA CROSSE REGIONAL AIRPORT (LSE)
City of La Crosse, Wisconsin

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

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Capital Improvement Program	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
	2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

	Capital Project Description	2020 Base Year Costs	Estimated Project Costs and Development Schedule								Total
			Short Term						Mid Term	Long Term	Escalated
			2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	Costs
Mid Term Projects (2025-2029)											
59	Taxiway C North Pavement Repairs & Joint Sealing	$350,000						$0	$424,141		$424,141
55a	Acquire Sand Truck (Replace Unit 12 - TDS-11)	125,000						0	151,479		151,479
64d	Acquire Salt Truck with Plow, Landside (Replace Unit 36 - TDS-08)	125,000						0	151,479		151,479
42	Acquire Tractor (Replace Unit 19 - AIR-TAC-02)	125,000						0	151,479		151,479
43	Acquire Airfield Plow Truck (Replace Unit 13 - AIR-TDS-13)	550,000						0	666,507		666,507
44	Acquire Utility Mower (Replace Unit 29 - AIR-MOW-29)	40,000						0	48,473		48,473
45	Acquire Tractor (Replace Unit 39 - AIR-TAC-05)	70,000						0	84,828		84,828
46	Acquire Operations Vehicle (Replace Unit 4 - AIR-SUV-04)	40,000						0	48,473		48,473
47	Information Technology Equipment	60,000						0	72,710		72,710
48	Terminal Facility Upgrades and Rehabilitation	50,000						0	60,592		60,592
49	Prepare GA Development Site (remove sand storage)	50,000						0	60,592		60,592
50	SRE Building Rehabilitation/Expansion	2,000,000						0	2,423,661		2,423,661
51	Acquire Runway Closure Crosses (AIR-CCG-44/45/46)	75,000						0	90,887		90,887
52	Acquire Pickup (Replace Unit 8 - AIR-TRP-46)	45,000						0	54,532		54,532
53	Terminal Facility Upgrades and Rehabilitation	50,000						0	60,592		60,592
54a	South GA Apron Reconstruction, Phase 1	4,750,000						0	5,756,196		5,756,196
54b	South GA Apron Reconstruction, Phase 2	4,750,000						0	5,756,196		5,756,196
56	Terminal Facility Upgrades and Rehabilitation	50,000						0	60,592		60,592
28	Runway 13/31 Extension Environmental Assessment	200,000						0	242,366		242,366
60a	Acquire Pickup (Replace Unit 6 - TRP-40)	45,000						0	54,532		54,532
61	Terminal Facility Upgrades and Rehabilitation	50,000						0	60,592		60,592
36	Runway 13/31 Extension, Design	625,000						0	757,394		757,394

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Capital Improvement Program	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
	2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

Capital Project Description		2020 Base Year Costs	Estimated Project Costs and Development Schedule								Total Escalated Costs
			Short Term						Mid Term	Long Term	
			2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	
62b	Airfield Drainage (Stormwater) Improvements, Phase 2	1,750,000						0	2,120,704		2,120,704
81	East GA Apron Reconstruction (concrete)	7,100,000						0	8,603,998		8,603,998
64a	Acquire Mower (Replace 2019 Purchase)	40,000						0	48,473		48,473
64b	Acquire Pickup (Replace 2019 Purchase)	40,000						0	48,473		48,473
64c	Acquire Fleet Vehicle, Hybrid (Replace 2019 Purchase)	40,000						0	48,473		48,473
65	Terminal Facility Upgrades and Rehabilitation	50,000						0	60,592		60,592
41	Runway 13/31 Extension, Construction	5,625,000						0	6,816,548		6,816,548
	Total Mid Term Project Costs	$28,870,000	$0	$0	$0	$0	$0	$0	$34,985,553	$0	$34,985,553

LA CROSSE REGIONAL AIRPORT (LSE)
City of La Crosse, Wisconsin

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

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Capital Improvement Program	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
	2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	Funding
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

	Capital Project Description	2020 Base Year Costs	Estimated Project Costs and Development Schedule								Total Escalated Costs
			Short Term						Mid Term	Long Term	
			2020	2021	2022	2023	2024	Total	2025-2029	2030-2039	
	Long Term Projects (2030-2039)										
96	Runway 18/36 Rehabilitation	$7,000,000						$0		$10,588,128	$10,588,128
66	Runway 04/22 Decommissioning/Removal	2,500,000						0		3,781,474	3,781,474
67a	Acquire Blower (Replace Unit 17 - TSN-17)	750,000						0		1,134,442	1,134,442
67b	Acquire Sweeper (Replace Unit 28 - SWP-14)	50,000						0		75,629	75,629
68	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
69	GA T-hangar Taxilane Construction	800,000						0		1,210,072	1,210,072
70a	Acquire SRE Plow (Replace Unit 23 - TDS-23)	550,000						0		831,924	831,924
71	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
97	Terminal Apron Reconstruction	7,610,000						0		11,510,808	11,510,808
73a	Acquire Fleet Vehicle (Replace 2022 Purchase)	40,000						0		60,504	60,504
74	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
75	GA Taxilane (south side) / Fisherman's Road Realignment, Phase 1	1,000,000						0		1,512,590	1,512,590
76a	Acquire Pickup (Replace 2023 Purchase)	45,000						0		68,067	68,067
76b	Acquire Operations Vehicle (Replace 2023 Purchase)	40,000						0		60,504	60,504
77	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
78	GA Taxilane (south side) / Fisherman's Road Realignment, Phase 2	1,000,000						0		1,512,590	1,512,590
79a	Acquire Loader/ATV Forklift (Replace 2019 Purchase)	375,000						0		567,221	567,221
79b	Acquire Wide Area Mower (Replace 2024 Purchase)	70,000						0		105,881	105,881
80	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
82a	Acquire SRE Plow (Replace Unit 14 - TDS-14)	550,000						0		831,924	831,924
82b	Acquire Pull Behind Broom (Replace 2020 Purchase)	350,000						0		529,406	529,406
82c	Acquire Pull Behind Broom (Replace 2020 Purchase)	350,000						0		529,406	529,406

LA CROSSE REGIONAL AIRPORT (LSE)
City of La Crosse, Wisconsin

Master Plan - Financial Implementation Analysis
Estimated Project Costs and Development Schedule

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	Funding Schedule								
	Short Term						Mid Term	Long Term	Total
Capital Improvement Program	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**	**2025-2029**	**2030-2039**	**Funding**
Funds Used for Capital Improvement Projects									
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227	$26,631,638
AIP Entitlements carryover from the prior years	0	0	3,529	0	0	0	0	0	0
AIP Entitlement unspent current year + carryover	(0)	(3,529)	0	0	(0)	(0)	0	(0)	(0)
AIP Discretionary Grants	0	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976	39,612,387
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010	13,937,506
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404	8,684,607
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100	1,148,179
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	0	0	(1,116,800)
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	0	0
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907	9,474,757
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)	(3,621,155)
Other Unidentified Funding	0	0	0	0	0	0	15,646,223	4,000,000	19,646,223
Net Operating Cash Flow	27,192	47,087	68,466	88,788	110,533	342,066	934,361	4,576,956	5,853,384
Funds Available Current Year	4,938,287	2,234,507	7,804,756	6,547,406	6,581,529	28,106,485	35,599,656	56,544,584	120,250,726
Beginning Cash Balance/Funds Carried Over from Prior Year	2,896,887	2,429,174	2,346,181	2,157,056	1,929,554	2,896,887	1,994,387	2,608,490	2,896,887
Funds Used Current Year	(5,406,000)	(2,317,500)	(7,993,882)	(6,774,907)	(6,516,696)	(29,008,985)	(34,985,553)	(54,876,755)	(118,871,293)
Funds Carried Over to Next Year	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319	$4,276,319

		2020	Estimated Project Costs and Development Schedule								Total
		Base Year	Short Term						Mid Term	Long Term	Escalated
Capital Project Description		**Costs**	**2020**	**2021**	**2022**	**2023**	**2024**	**Total**	**2025-2029**	**2030-2039**	**Costs**
82d	Acquire Utility Mower (Replace 2025 Purchase)	40,000						0		60,504	60,504
82e	Acquire Operations Vehicle (Replace 2025 Purchase)	40,000						0		60,504	60,504
83	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
84	East GA Apron Expansion (Phase 1)	1,000,000						0		1,512,590	1,512,590
85a	Acquire Pickup (Replace 2026 Purchase)	45,000						0		68,067	68,067
86	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
87	East GA Apron Expansion (Phase 2)	1,000,000						0		1,512,590	1,512,590
88a	Acquire Airport Fire Apparatus (Replace Fox 1 or 2022 Purchase)	850,000						0		1,285,701	1,285,701
89	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
90	Middle GA Apron Reconstruction (concrete)	8,000,000						0		12,100,718	12,100,718
91a	Acquire Pickup (Replace 2028 Purchase)	45,000						0		68,067	68,067
92	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
93	GA Box Hangar Taxilane (southwest quadrant)	850,000						0		1,285,701	1,285,701
94a	Acquire Mower (Replace 2029 Purchase)	40,000						0		60,504	60,504
94b	Acquire Pickup (Replace 2029 Purchase)	40,000						0		60,504	60,504
94c	Acquire Fleet Vehicle, Hybrid (Replace 2029 Purchase)	40,000						0		60,504	60,504
94d	Acquire SRE Equipment (Replace 2019 Combo Unit Purchase)	710,000						0		1,073,939	1,073,939
95	Terminal Facility Upgrades and Rehabilitation	50,000						0		75,629	75,629
	Total Long Term Project Costs	$36,280,000	$0	$0	$0	$0	$0	$0	$0	$54,876,755	$54,876,755
Total Project Costs		$92,331,000	$5,406,000	$2,317,500	$7,993,882	$6,774,907	$6,516,696	$29,008,985	$34,985,553	$54,876,755	$118,871,293

LA CROSSE REGIONAL AIRPORT (LSE)
City of La Crosse, Wisconsin

LSE - MP - 2019 - 4b

Schedule 6-2

Master Plan - Financial Implementation Analysis
Projected Capital Funding Sources

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Wisconsin BOA Grants	Passenger Facility Charges (PAYG)	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Short Term Projects (2020-2024)										
Capital Projects 2020										
1	Acquire Pull Behind Broom (Replace Unit 42 - AIR-BRM-42)	$350,000			$0	$280,000	$70,000		$0	$350,000
2	Acquire Pull Behind Broom (Replace Unit 43 - AIR-BRM-43)	350,000			0	280,000	70,000		0	350,000
3	Acquire Tractor (Replace Unit 22 - AIR-TAC-01)	75,000			0	60,000			15,000	75,000
4	Acquire Welder (AIR-WLD-01)	10,000			0				10,000	10,000
5	Information Technology Equipment	60,000			0				60,000	60,000
6	Terminal Facility Upgrades and Rehabilitation	50,000			0				50,000	50,000
7	Signage and Landscaping	50,000			0				50,000	50,000
8	Employee Lot Electric Vehicle Charging Station	10,000			0				10,000	10,000
9	Terminal Loop Road Rehabilitation (surface treatment)	100,000			0		100,000		0	100,000
10	Construct Solar Array Canopy System	1,250,000			0	1,000,000			250,000	1,250,000
12a	Reconstruct and Expand Southeast Taxilanes, Construction	2,473,000	982,153		982,153	1,367,197	123,650		0	2,473,000
12b	RSAT Electrical Project and Apron Project (Reimbursement)	278,000	250,200		250,200	13,900	13,900		0	278,000
12d	Reconstruct and Expand Southeast Taxilanes, Construction, AIP Ineligible Costs	200,000			0	100,000			100,000	200,000
57	Airfield Drainage (Stormwater) Study	150,000			0	120,000	30,000		0	150,000
	Totals for 2020	$5,406,000	$1,232,353	$0	$1,232,353	$3,221,097	$407,550	$0	$545,000	$5,406,000
Capital Projects 2021										
12f	AIP Reimbursement to Wisconsin BOA	$0	$1,243,547		$1,243,547	-$1,243,547			$0	$0
62a	Airfield Drainage (Stormwater) Improvements, Phase 1	515,000			0	412,000	$103,000		0	515,000
13	Install Terminal Generator	309,000			0	247,200			61,800	309,000
14	Install Terminal Inbound Baggage Conveyor	669,500			0	535,600	133,900		0	669,500
15	Terminal Display Monitors Equipment	77,250			0				77,250	77,250
16	Terminal Facility Upgrades and Rehabilitation	51,500			0				51,500	51,500
17	Joint Seal Taxiway C (South)	412,000			0	329,600	82,400		0	412,000
18	Runway 13/31 Rehabilitation, Design	283,250		254,925	254,925	14,163	14,163		0	283,250
	Totals for 2021	$2,317,500	$1,243,547	$254,925	$1,498,472	$295,016	$333,463	$0	$190,550	$2,317,500
Capital Projects 2022										
19	Acquire Airport Fire Apparatus (Replace Fox 2 - AIR-FRE-19)	$901,765	$811,589		$811,589	$45,088	$45,088		$0	$901,765
20	Acquire Skid Steer (Replace Unit 21 - AIR-LDR-21)	53,045			0	42,436			10,609	53,045
21	Acquire Tar Kettle (AIR-TAR-20)	79,568			0				79,568	79,568
22	Acquire Fleet Vehicle (Replace Unit 1 - AIR-CYA-02)	42,436			0				42,436	42,436
23	Terminal Facility Upgrades and Rehabilitation	53,045			0				53,045	53,045
24	Terminal Carpet Replacement	79,568			0				79,568	79,568
25	Avigation Easements and Remove Obstructions	530,450		477,405	477,405	26,523	26,523		0	530,450
26	Runway 13/31 Rehabilitation, Construction	5,543,203	358,481	4,630,401	4,988,882	277,160	277,160		0	5,543,203
27	Taxiway B Rehabilitation, Design	286,443		257,799	257,799	14,322	14,322		0	286,443
11	Runway 18 PAPI Replacement	106,090	95,481		95,481	5,305	5,305		0	106,090
29	Install Fanta Reed Road Lighting	318,270			0	254,616			63,654	318,270
	Totals for 2022	$7,993,882	$1,265,551	$5,365,605	$6,631,155	$665,450	$368,398	$0	$328,879	$7,993,882
Capital Projects 2023										
30	Acquire Pickup (Replace Unit 7 - AIR-TFL-17)	$81,955			$0				$81,955	$81,955
31	Acquire Operations Vehicle (Replace Unit 3 - AIR-SUV-03)	43,709			0				43,709	43,709

LA CROSSE REGIONAL AIRPORT (LSE)
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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Wisconsin BOA Grants	Passenger Facility Charges (PAYG)	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
32	Terminal Facility Upgrades and Rehabilitation	54,636			0				54,636	54,636
33	Terminal Outbound Baggage Expansion	1,092,727			0	874,182	218,545		0	1,092,727
34	Reconstruct South Terminal Parking Lot	1,092,727			0	874,182			218,545	1,092,727
35	Taxiway B Rehabilitation, Construction	2,655,327	800,218	1,589,576	2,389,794	132,766	132,766		0	2,655,327
98	Constuct Connector Between Runway 13 and Twy B	1,223,854		1,101,469	1,101,469	61,193	61,193		0	1,223,854
58c	Taxiway A Relocation, Design	529,973	476,975		476,975	26,499	26,499		0	529,973
	Totals for 2023	$6,774,907	$1,277,193	$2,691,045	$3,968,238	$1,968,821	$439,003	$0	$398,845	$6,774,907
Capital Projects 2024										
37	Acquire Airfield Plow Truck (Replace Unit 10 - AIR-TDS-07)	$619,030	$557,127		$557,127	$30,951	$30,951		$0	$619,030
38	Acquire Wide Area Mower (Replace Unit 27 - AIR-MOW-27)	78,786			0				78,786	78,786
39	Terminal Facility Upgrades and Rehabilitation	56,275			0				56,275	56,275
40	ARFF Facility Rehabilitation	844,132			0	675,305	168,826		0	844,132
63c	Taxiway A Relocation, Construction	4,918,473	735,468	3,691,158	4,426,626	245,924	245,924		0	4,918,473
	Totals for 2024	$6,516,696	$1,292,595	$3,691,158	$4,983,753	$952,180	$445,701	$0	$135,061	$6,516,696
	Total Short Term Project Funding	$29,008,985	$6,311,239	$12,002,733	$18,313,972	$7,102,563	$1,994,115	$0	$1,598,335	$29,008,985

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Wisconsin BOA Grants	Passenger Facility Charges (PAYG)	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Mid Term Projects (2025-2029)										
59	Taxiway C North Pavement Repairs & Joint Sealing	$424,141	$381,727		$381,727	$21,207	$21,207		$0	$424,141
55a	Acquire Sand Truck (Replace Unit 12 - TDS-11)	151,479			0				151,479	151,479
64d	Acquire Salt Truck with Plow, Landside (Replace Unit 36 - TDS-08)	151,479			0				151,479	151,479
42	Acquire Tractor (Replace Unit 19 - AIR-TAC-02)	151,479			0	121,183			30,296	151,479
43	Acquire Airfield Plow Truck (Replace Unit 13 - AIR-TDS-13)	666,507			0		666,507		0	666,507
44	Acquire Utility Mower (Replace Unit 29 - AIR-MOW-29)	48,473			0				48,473	48,473
45	Acquire Tractor (Replace Unit 39 - AIR-TAC-05)	84,828			0				84,828	84,828
46	Acquire Operations Vehicle (Replace Unit 4 - AIR-SUV-04)	48,473			0				48,473	48,473
47	Information Technology Equipment	72,710			0				72,710	72,710
48	Terminal Facility Upgrades and Rehabilitation	60,592			0				60,592	60,592
49	Prepare GA Development Site (remove sand storage)	60,592			0	48,473	12,118		0	60,592
50	SRE Building Rehabilitation/Expansion	2,423,661	2,181,295		2,181,295	121,183	121,183		0	2,423,661
51	Acquire Runway Closure Crosses (AIR-CCG-44/45/46)	90,887			0		90,887		0	90,887
52	Acquire Pickup (Replace Unit 8 - AIR-TRP-46)	54,532			0				54,532	54,532
53	Terminal Facility Upgrades and Rehabilitation	60,592			0				60,592	60,592
54a	South GA Apron Reconstruction, Phase 1	5,756,196	1,317,141		1,317,141	73,175	73,175	4,292,706	0	5,756,196
54b	South GA Apron Reconstruction, Phase 2	5,756,196	1,324,274		1,324,274	73,571	73,571	4,284,780	0	5,756,196
56	Terminal Facility Upgrades and Rehabilitation	60,592			0				60,592	60,592
28	Runway 13/31 Extension Environmental Assessment	242,366		218,130	218,130	12,118	12,118		0	242,366
60a	Acquire Pickup (Replace Unit 6 - TRP-40)	54,532			0				54,532	54,532
61	Terminal Facility Upgrades and Rehabilitation	60,592			0				60,592	60,592
36	Runway 13/31 Extension, Design	757,394		681,655	681,655	37,870	37,870		0	757,394
62b	Airfield Drainage (Stormwater) Improvements, Phase 2	2,120,704			0	1,696,563	424,141		0	2,120,704
81	East GA Apron Reconstruction (concrete)	8,603,998	1,381,735		1,381,735	76,763	76,763	7,068,737	0	8,603,998
64a	Acquire Mower (Replace 2019 Purchase)	48,473			0				48,473	48,473
64b	Acquire Pickup (Replace 2019 Purchase)	48,473			0				48,473	48,473
64c	Acquire Fleet Vehicle, Hybrid (Replace 2019 Purchase)	48,473			0				48,473	48,473
65	Terminal Facility Upgrades and Rehabilitation	60,592			0				60,592	60,592
41	Runway 13/31 Extension, Construction	6,816,548		6,134,893	6,134,893	340,827	340,827		0	6,816,548
	Total Mid Term Project Funding	$34,985,553	$6,586,172	$7,034,677	$13,620,849	$2,622,933	$1,950,367	$15,646,223	$1,145,180	$34,985,553

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	Capital Improvement Projects	Total Escalated Costs	AIP Entitlement Funding	AIP Discretionary Funding	Total AIP Funding	Wisconsin BOA Grants	Passenger Facility Charges (PAYG)	Other Unidentified Funding	Cash Reserves/ Net Revs	Total Funding
Long Term Projects (2030-2039)										
96	Runway 18/36 Rehabilitation	$10,588,128	$1,338,824	$8,190,491	$9,529,315	$529,406	$529,406		$0	$10,588,128
66	Runway 04/22 Decommissioning/Removal	3,781,474		3,403,327	3,403,327	189,074	189,074		0	3,781,474
67a	Acquire Blower (Replace Unit 17 - TSN-17)	1,134,442			0	907,554	226,888		0	1,134,442
67b	Acquire Sweeper (Replace Unit 28 - SWP-14)	75,629			0	60,504	15,126		0	75,629
68	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
69	GA T-hangar Taxilane Construction	1,210,072	1,089,065		1,089,065	60,504	60,504		0	1,210,072
70a	Acquire SRE Plow (Replace Unit 23 - TDS-23)	831,924	748,732		748,732	66,554	16,638		0	831,924
71	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
97	Terminal Apron Reconstruction	11,510,808	2,200,000	8,159,727	10,359,727	575,540	575,540		0	11,510,808
73a	Acquire Fleet Vehicle (Replace 2022 Purchase)	60,504			0				60,504	60,504
74	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
75	GA Taxilane (south side) / Fisherman's Road Realignment, Phase 1	1,512,590	1,361,331		1,361,331	75,629	75,629		0	1,512,590
76a	Acquire Pickup (Replace 2023 Purchase)	68,067			0				68,067	68,067
76b	Acquire Operations Vehicle (Replace 2023 Purchase)	60,504			0				60,504	60,504
77	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
78	GA Taxilane (south side) / Fisherman's Road Realignment, Phase 2	1,512,590	1,361,331		1,361,331	75,629	75,629		0	1,512,590
79a	Acquire Loader/ATV Forklift (Replace 2019 Purchase)	567,221			0	453,777			113,444	567,221
79b	Acquire Wide Area Mower (Replace 2024 Purchase)	105,881			0				105,881	105,881
80	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
82a	Acquire SRE Plow (Replace Unit 14 - TDS-14)	831,924			0		831,924		0	831,924
82b	Acquire Pull Behind Broom (Replace 2020 Purchase)	529,406			0		529,406		0	529,406
82c	Acquire Pull Behind Broom (Replace 2020 Purchase)	529,406			0		529,406		0	529,406
82d	Acquire Utility Mower (Replace 2025 Purchase)	60,504			0				60,504	60,504
82e	Acquire Operations Vehicle (Replace 2025 Purchase)	60,504			0				60,504	60,504
83	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
84	East GA Apron Expansion (Phase 1)	1,512,590	1,361,331		1,361,331	75,629	75,629		0	1,512,590
85a	Acquire Pickup (Replace 2026 Purchase)	68,067			0				68,067	68,067
86	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
87	East GA Apron Expansion (Phase 2)	1,512,590	1,361,331		1,361,331	75,629	75,629		0	1,512,590
88a	Acquire Airport Fire Apparatus (Replace Fox 1 or 2022 Purchase)	1,285,701	335,700	821,431	1,157,131	64,285	64,285		0	1,285,701
89	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
90	Middle GA Apron Reconstruction (concrete)	12,100,718	1,419,452		1,419,452	78,858	621,714	4,000,000	5,980,693	12,100,718
91a	Acquire Pickup (Replace 2028 Purchase)	68,067			0				68,067	68,067
92	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
93	GA Box Hangar Taxilane (southwest quadrant)	1,285,701	1,157,131		1,157,131	64,285	64,285		0	1,285,701
94a	Acquire Mower (Replace 2029 Purchase)	60,504			0				60,504	60,504
94b	Acquire Pickup (Replace 2029 Purchase)	60,504			0				60,504	60,504
94c	Acquire Fleet Vehicle, Hybrid (Replace 2029 Purchase)	60,504			0				60,504	60,504
94d	Acquire SRE Equipment (Replace 2019 Combo Unit Purchase)	1,073,939			0	859,151	214,788		0	1,073,939
95	Terminal Facility Upgrades and Rehabilitation	75,629			0				75,629	75,629
	Total Long Term Project Funding	$54,876,755	$13,734,227	$20,574,976	$34,309,203	$4,212,010	$4,771,504	$4,000,000	$7,584,038	$54,876,755
Total Project Funding		$118,871,293	$26,631,637	$39,612,387	$66,244,024	$13,937,506	$8,715,986	$19,646,223	$10,327,553	$118,871,293

LA CROSSE REGIONAL AIRPORT (LSE)
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LSE - MP - 2019 - 4b

Schedule 6-3

Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operations & Maintenance Expenses

16-Aug-19

Operations & Maintenance Expenses	Actual 2017	Actual 2018	Budget 2019	Short Term – Projected 2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039
Personnel Expenses	$1,242,137	$1,211,858	$1,385,962	$1,400,000	$1,442,000	$1,485,260	$1,529,818	$1,575,712	$7,432,790	$8,616,641	$21,569,093
Legal Expenses	438	4,295	5,000	5,000	5,150	5,305	5,464	5,628	26,546	30,774	77,032
Professional Services	191,573	246,988	226,700	226,700	233,501	240,506	247,721	255,153	1,203,581	1,395,280	3,492,652
Data and Telecommunications	44,664	59,911	50,820	50,820	52,345	53,915	55,532	57,198	269,810	312,784	782,958
Electricity	121,607	120,910	147,350	135,000	139,050	143,222	147,518	151,944	716,733	830,890	2,079,877
Water/Sewer	6,463	5,257	10,000	13,400	13,802	14,216	14,643	15,082	71,142	82,474	206,447
Natural Gas	26,297	33,255	42,350	42,350	43,621	44,929	46,277	47,665	224,842	260,653	652,465
Stormsewer	9,606	9,552	10,000	10,000	10,300	10,609	10,927	11,255	53,091	61,547	154,065
Garbage Services	5,688	4,024	10,400	10,400	10,712	11,033	11,364	11,705	55,215	64,009	160,228
City Services	95,813	91,256	96,500	300,000	309,000	318,270	327,818	337,653	1,592,741	1,846,423	4,621,949
Supplies	2,321	4,560	6,000	6,000	6,180	6,365	6,556	6,753	31,855	36,928	92,439
Postage	1,821	1,388	2,500	2,500	2,575	2,652	2,732	2,814	13,273	15,387	38,516
Subscriptions	13,142	12,630	10,000	10,000	10,300	10,609	10,927	11,255	53,091	61,547	154,065
Fuel, Oil, Gas and Diesel	27,481	54,061	80,000	80,000	82,400	84,872	87,418	90,041	424,731	492,379	1,232,520
Repair and Maintenance - Grounds	135,294	91,922	110,000	110,000	113,300	116,699	120,200	123,806	584,005	677,022	1,694,714
Repair and Maintenance - Buildings	123,332	121,036	115,000	115,000	118,450	122,004	125,664	129,434	610,551	707,796	1,771,747
Repair and Maintenance - Vehicles	34,173	65,805	55,000	55,000	56,650	58,350	60,100	61,903	292,002	338,511	847,357
Travel and Training	26,462	47,484	28,000	35,500	36,565	37,662	38,792	39,956	188,474	218,493	546,931
Miscellaneous	2,183	5,252	5,000	5,000	5,150	5,305	5,464	5,628	26,546	30,774	77,032
Insurance	63,039	68,694	69,078	69,078	71,150	73,285	75,483	77,748	366,744	425,157	1,064,250
Merchant Service (Credit Card Fees)	19,116	24,554	25,000	25,000	25,750	26,523	27,318	28,138	132,728	153,869	385,162
				0	0	0	0	0	0	0	0
Total Operations & Maintenance Expenses	$2,192,649	$2,284,690	$2,490,660	$2,706,748	$2,787,950	$2,871,589	$2,957,737	$3,046,469	$14,370,493	$16,659,340	$41,701,500
Annual Growth Rate	-	4.2%	9.0%	8.7%	3.0%	3.0%	3.0%	3.0%	4.1%	3.0%	3.0%
Operating Expenses Per Enplaned Passenger:											
La Crosse Regional Airport	$23.81	$24.44	$26.24	$28.09	$28.50	$28.92	$29.40	$29.88	$28.97	$31.41	$35.59
Non-Hub Industry Average	$45.57	$46.22	$46.87	$47.53	$48.21	$48.89	$49.58	$50.28	$48.90	$52.83	$58.71

LA CROSSE REGIONAL AIRPORT (LSE)
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Master Plan - Financial Implementation Analysis
Actual, Budgeted and Projected Operating Revenues

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				Short Term							
				Projected							
Revenues	Actual 2017	Actual 2018	Budget 2019	2020	2021	2022	2023	2024	Total	Mid Term 2025-2029	Long Term 2030-2039
					LDW - Landed Weight Growth						
					ENP - Enplanement Growth						
AIRLINE REVENUES											
Landing Fees	$255,528	$235,586	$216,000	$206,000	$212,180	$218,545	$225,102	$231,855	$1,093,682	$1,267,877	$3,173,738
Terminal Rents	474,911	522,570	500,000	515,000	530,450	546,364	562,754	579,637	2,734,205	3,169,693	7,934,345
Total Airline Revenues	$730,439	$758,156	$716,000	$721,000	$742,630	$764,909	$787,856	$811,492	$3,827,887	$4,437,570	$11,108,083
Annual Growth Rate	-	3.8%	-5.6%	0.7%	3.0%	3.0%	3.0%	3.0%	2.5%	3.0%	3.0%
Airline Cost Per Enplaned Passenger:											
La Crosse Regional Airport	$7.93	$8.11	$7.54	$7.48	$7.59	$7.70	$7.83	$7.96	$7.72	$8.37	$9.48
Non-Hub Industry Average	$9.01	$9.14	$9.27	$9.40	$9.53	$9.67	$9.80	$9.94	$9.67	$10.45	$11.61
NON-AIRLINE REVENUES											
Landing Fees	$79,691	$58,886	$70,000	$70,000	$72,646	$75,392	$78,169	$81,049	$377,255	$452,291	$1,191,389
Fuel Flowage Fees	48,164	45,952	40,000	45,000	46,350	47,741	49,173	50,648	238,911	$276,963	$693,292
FBO Rents and Fees	135,954	136,889	125,000	133,000	136,990	141,100	145,333	149,693	706,115	$818,581	$2,049,064
Rental Car Concession Fees	423,790	490,860	420,000	480,000	501,886	524,770	547,691	571,613	2,625,959	$3,255,098	$9,022,203
Rental Car Rents and Fees	210,664	235,000	238,000	236,500	243,595	250,903	258,430	266,183	1,255,611	$1,455,597	$3,643,636
Public Parking Fees	658,729	698,421	678,500	692,250	723,813	756,816	789,872	824,373	3,787,125	$4,694,462	$13,011,708
Restaurant Concession Fees	51,372	51,316	45,000	45,000	47,052	49,197	51,346	53,589	246,184	$305,165	$845,832
Terminal Advertising	29,116	2,075	15,000	15,000	15,450	15,914	16,391	16,883	79,637	$92,321	$231,097
Other Terminal Rents	41,384	54,610	52,000	52,000	53,560	55,167	56,822	58,526	276,075	$320,047	$801,138
Other Aeronautical Rents	182,356	163,601	150,500	151,300	155,839	160,514	165,330	170,289	803,272	$931,213	$2,331,003
Other Non-Aeronautical Rents	45,883	46,973	46,610	47,390	48,812	50,276	51,784	53,338	251,600	$291,673	$730,114
Fuel Sales	908	9,125	0	10,000	10,300	10,609	10,927	11,255	53,091	$61,547	$154,065
Miscellaneous Operating Revenue	38,365	32,684	20,500	20,500	21,115	21,748	22,401	23,073	108,837	$126,172	$315,833
					0	0	0	0	0	$0	$0
Total Non-Airline Revenues	$1,946,376	$2,026,392	$1,901,110	$1,997,940	$2,077,408	$2,160,146	$2,243,668	$2,330,510	$10,809,672	$13,081,131	$35,020,373
Annual Growth Rate	-	4.1%	-6.2%	5.1%	4.0%	4.0%	3.9%	3.9%	4.2%	3.9%	3.9%
NON-OPERATING REVENUES											
Investment Income	$32,584	$63,432	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000	$75,000	$150,000
-	0	0	0	0	0	0	0	0	0	0	0
Total Non-Operating Revenues	$32,584	$63,432	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$75,000	$75,000	$150,000
Annual Growth Rate	-	94.7%	-76.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Revenues	$2,709,399	$2,847,980	$2,632,110	$2,733,940	$2,835,038	$2,940,054	$3,046,524	$3,157,002	$14,712,559	$17,593,701	$46,278,457
Annual Growth Rate	-	5.1%	-7.6%	3.9%	3.7%	3.7%	3.6%	3.6%	3.7%	3.6%	3.7%
Operating Revenues Per Enplaned Passenger:											
La Crosse Regional Airport	$29.06	$29.78	$27.57	$28.22	$28.83	$29.46	$30.13	$30.82	$29.51	$33.03	$39.37
Non-Hub Industry Average	$45.87	$46.52	$47.17	$47.84	$48.52	$49.20	$49.90	$50.60	$49.21	$53.17	$59.09

LA CROSSE REGIONAL AIRPORT (LSE)
City of La Crosse, Wisconsin

LSE - MP - 2019 - 4b

Schedule 6-5

Master Plan - Financial Implementation Analysis
Financial Plan Summary
Budgeted and Projected Net Revenues, Capital Funding and Capital Expenditures

16-Aug-19

Operating/Capital Cash Flow	Short Term						Mid Term	Long Term
	Projected							
	2020	2021	2022	2023	2024	Total	2025-2029	2030-2039
Passenger Enplanements	96,348	97,807	99,288	100,607	101,943	495,992	530,381	1,171,704
Annual Growth Rates	-	1.51%	1.51%	1.33%	1.33%	1.42%	1.33%	1.33%
Operating Cash Flow								
Revenues:								
Airline Revenues	$721,000	$742,630	$764,909	$787,856	$811,492	$3,827,887	$4,437,570	$11,108,083
Non-Airline Revenues	1,997,940	2,077,408	2,160,146	2,243,668	2,330,510	10,809,672	13,081,131	35,020,373
Non-Operating Revenues	15,000	15,000	15,000	15,000	15,000	75,000	75,000	150,000
Total Revenues	$2,733,940	$2,835,038	$2,940,054	$3,046,524	$3,157,002	$14,712,559	$17,593,701	$46,278,457
Operations & Maintenance Expenses	(2,706,748)	(2,787,950)	(2,871,589)	(2,957,737)	(3,046,469)	(14,370,493)	(16,659,340)	(41,701,500)
Total Net Operating Cash Flow Available For Capital Expenditures	$27,192	$47,087	$68,466	$88,788	$110,533	$342,066	$934,361	$4,576,956
Capital Cash Flow								
Beginning Cash Balance	$2,896,887	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$2,896,887	$1,994,387	$2,608,490
Other Capital Funding Sources:								
AIP Entitlement Grants:	$1,232,353	$1,247,076	$1,262,022	$1,277,194	$1,292,595	$6,311,240	$6,586,171	$13,734,227
AIP Entitlement unspent current year + carryover	(0)	(3,529)	-	-	(0)	(0)	-	(0)
AIP Entitlements carryover from the prior years	-	0	3,529	-	-	-	0	-
AIP Discretionary Grants	-	254,925	5,365,605	2,691,045	3,691,158	12,002,733	7,034,677	20,574,976
Wisconsin BOA Aviation Grants	3,221,097	295,016	665,450	1,968,821	952,180	7,102,563	2,622,933	4,212,010
Passenger Facility Charges:	380,672	386,436	392,287	397,496	405,844	1,962,735	2,092,468	4,629,404
PFC beginning year unliquidated balance	1,148,179	897,501	725,574	525,564	261,307	1,148,179	(0)	142,100
Less PFC Funded Debt Service	(223,800)	(224,900)	(223,900)	(222,750)	(221,450)	(1,116,800)	-	-
PFC unspent current year + carryover	(897,501)	(725,574)	(525,564)	(261,307)	0	0	(142,100)	-
RAC Customer Facility Charges	325,000	334,750	344,793	355,136	365,790	1,725,469	2,216,380	5,532,907
Less CFC Funded Debt Service	(274,905)	(274,280)	(273,505)	(272,580)	(276,430)	(1,371,700)	(1,391,458)	(857,997)
Other Unidentified Funding	-	-	-	-	-	-	15,646,223	4,000,000
Total Other Capital Funding Sources	$4,911,095	$2,187,420	$7,736,290	$6,458,619	$6,470,995	$27,764,419	$34,665,295	$51,967,628
Total Funds Available for Capital Expenditures	$7,835,174	$4,663,681	$10,150,937	$8,704,462	$8,511,083	$31,003,372	$37,594,043	$59,153,075
Capital Improvement Program Expenditures	5,406,000	2,317,500	7,993,882	6,774,907	6,516,696	29,008,985	34,985,553	54,876,755
Ending Cash Balance	$2,429,174	$2,346,181	$2,157,056	$1,929,554	$1,994,387	$1,994,387	$2,608,490	$4,276,319

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