Waterville Regional Airport

INTERIM REPORT 1

McFARLAND JOHNSON

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Waterville Regional Airport

INVENTORY
CHAPTER 1

McFARLAND JOHNSON

1. INVENTORY

1.1. Introduction

This inventory chapter provides an overview of the Waterville Regional Airport (WVL or the Airport), including its location and ownership, history, service areas, socioeconomic data, meteorological conditions, recent development, operational characteristics, physical facilities, airspace, land use, zoning, and recycling and waste reduction. Please see the technical supplement in **Appendix A** for detailed definitions of FAA standards and a glossary of abbreviations used throughout this document.

This information was obtained through on-site investigations of the Airport, interviews with airport personnel, and a review of published information as of the fall of 2022. Information was also obtained from available planning documents and studies concerning the Airport and surrounding areas. The information presented in this chapter serves as the basis for the development of aviation forecasts as well as the baseline data to be used in Chapter 4, *Facility Requirements*.

This chapter is organized into the following sections:

- Airport Background
- Socioeconomic Data
- Meteorological Conditions and Climate
- Recent Airport Development
- Existing Airport Facilities
- Aviation Activity
- Airspace and Air Traffic Control
- Land Use and Zoning
- Airport Recycling, Reuse, and Waste Reduction

1.2. Airport Background

1.2.1. Airport Location and Details

The Airport is in the Kennebec Valley region of Maine, in the northern portion of Kennebec County. It is two nautical miles southwest of the central business district of the City of Waterville.

The Airport is operated by the City of Waterville. Employees at the Airport include a full-time airport manager, a full-time maintenance worker, as well as two employees who each work 24 hours per week, and a third who works eight hours per week.

1.2.2. Airport History

According to a 2011 report on the Airport website, the Airport officially opened in June of 1931. The original configuration consisted of four runways, two at 2,000 feet long, and two at 1,800 feet long. During World War II, the Airport was operated under military control and one of the runways was eliminated. By the end of the war, the three runways were all 150 feet wide. The longest of the runways (currently Runway 5-23) was 3,994 feet long, a second runway which has since been decommissioned was 3,860 feet long, and Runway 14-32 was 2,305 feet long (it is currently 2,301 feet long).

In 1947, the Airport was dedicated to Captain Robert A. LaFleur, a U.S. Army Air Corps officer who was declared Missing in Action over Germany on July 2, 1943. In the early 1960's Runway 5-23 was extended to 5,000 feet. Subsequently, Runway 5-23 was extended to 5,500 feet long, which is the current length.

1.2.3. Roadway Access

Access from the north and south is provided by Intestate 95 via Exit 127. From there, the Airport can be accessed via Kennedy Memorial Drive to Airport Road. Kennedy Drive (State Route 137) also provides access from the east and the west.

1.2.4. Public Transit Access

The Kennebec Valley Community Action Program (KVCAP) provides public bus transportation in and around Waterville. The KVCAP Kennebec Explorer bus route runs weekdays to downtown Waterville, with the closest stop being at the Shaw's Supermarket Plaza which is located just off the approach end of Runway 23 on Kennedy Memorial Drive.

1.2.5. Airport Service Area

The Airport service area is comprised of areas within a 30- and 60-minute drive of the Airport. As identified in **Figure 1-1**, Augusta State Airport (AUG) is the only airport within a 30-minute drive of WVL. There are two general aviation (GA) airports that are within a 60-minute drive of the Airport. Pittsfield Municipal Airport is approximately 22 miles northeast of the Airport, and Central Maine Regional (in Norridgewock) is approximately 16 miles northwest of the Airport. As shown in **Table 1-1**, WVL has the longest runway of airports within a 60-minute drive time.

Table 1-1: WVL and Surrounding Paved Runway Airports

Airport	Runway(s)	Runway Length	Based Aircraft	Instrument Approaches	Associated City	Distance from WVL (Statute Miles (SM))
WVL	5-23 14-32	5,500 2,301	20	Precision RNAV (GPS)	Waterville	---
AUG	17-35 8-26	5,001 2,703	47	Precision RNAV (GPS)	Augusta	16 S
OWK	15-33 3-21	4,000 3,998	27	RNAV (GPS) RNAV (GPS)	Norridgewock	16 NW
2B7	18-36	4,000	33	RNAV (GPS)	Pittsfield	22 NE
BST	15-33	4,000	28	RNAV (GPS)	Belfast	34 E

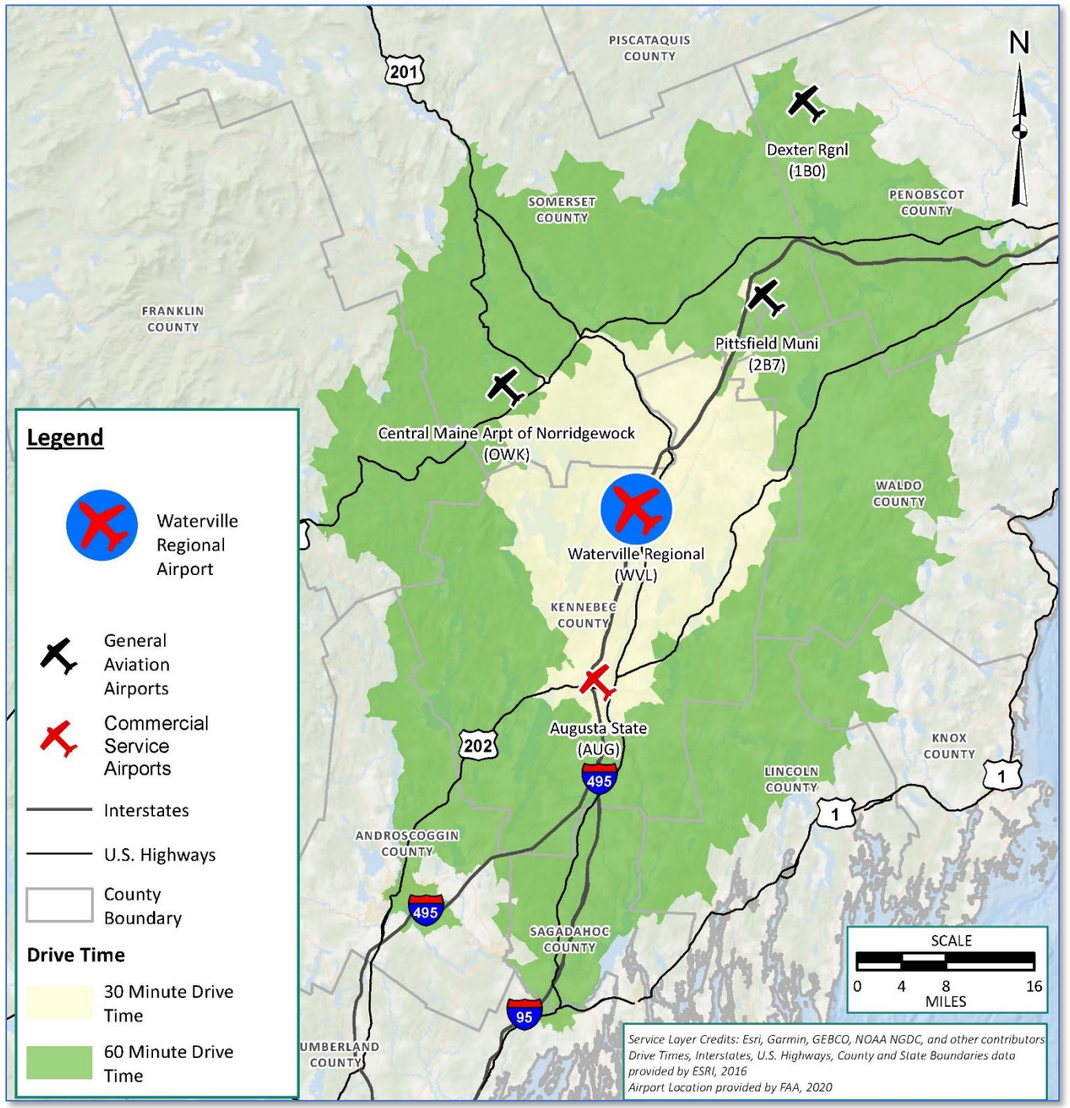
Source: FAA Airport Data and Information Portal (ADIP), 2022.

1.2.6. Airport Classification and Level of Service

The Airport is classified by the FAA in the NPIAS as a public-use, GA airport. The Airport is further

categorized as a "Local" GA airport, or one that serves local and regional markets with moderate levels of activity, including some multi-engine propeller aircraft, and at least 15 based aircraft with no based jets.

Figure 1-1: WVL Airport Service Area



Source: McFarland Johnson, 2022.

1.2.7. Airport Property and Existing Avigation Easements

The Airport consists of approximately 375 acres. There are seven easements totaling approximately 65 acres. Two parcels have recently been released from aeronautical obligations for the development of solar farms, which have both been constructed.

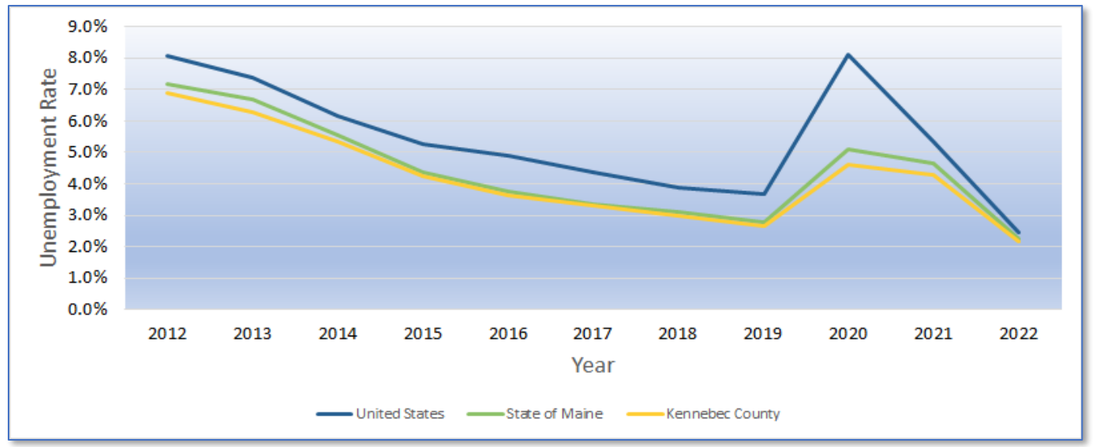
1.3. Socioeconomic Data

The socioeconomics of Kennebec County are important to understanding the Airport service area and local and regional trends. The socioeconomic health of the surrounding community provides insight into the health and direction of the Airport. To adequately understand the community's profile, this study will review unemployment, population, and income data within the context of local, state, and national averages.

1.3.1. Unemployment

Historically, Kennebec County has had a lower unemployment rate than the U.S. and the state of Maine. Unemployment rates from 2012 through 2022 can be seen in **Figure 1-2**. As of December 2022, unemployment in Kennebec County is 3.0 percent, whereas the unemployment rates of the U.S. and the state of Maine are at 3.7 and 3.1 percent, respectively. The unemployment rate of Kennebec County has generally remained lower than the U.S. and the State of Maine. The spike in unemployment rate in 2020-2021 was due to the worldwide Covid-19 pandemic.

Figure 1-2: Historical Unemployment Rates



Source: U.S. Bureau of Labor Statistics, 2022.

1.3.2. Population

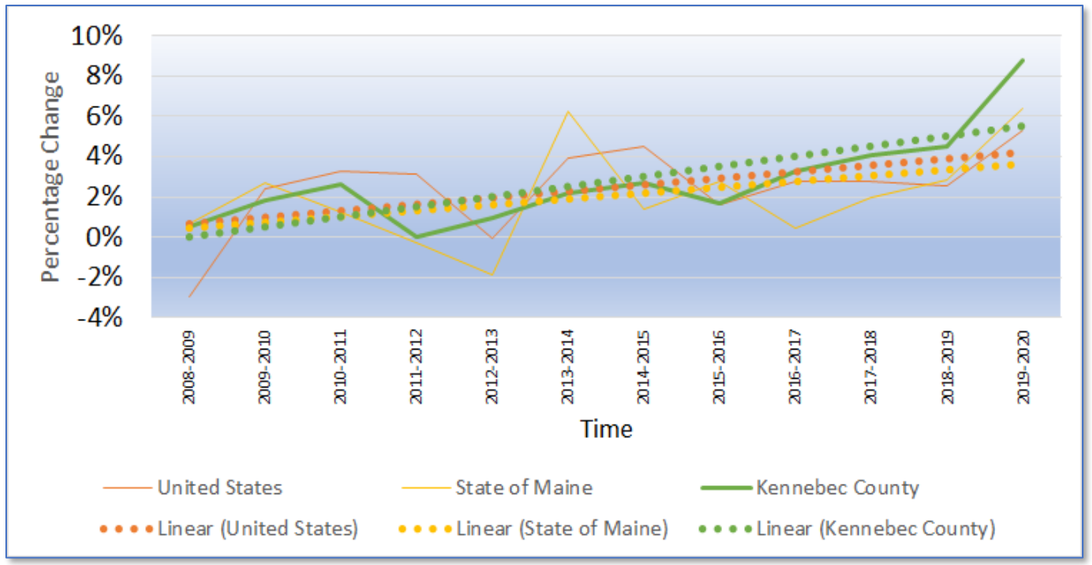
According to the 2022 update of the *Comprehensive Economic Development Strategy* published by the Kennebec Valley Council of Governments, the state of Maine between 1990 and 2020 saw a population growth of +9.7 percent, whereas the U.S. saw a population growth of +32.8 percent over

the same time period. Between 2016 and 2020, Kennebec County saw a population increase of 2,104 people (or an average of +0.43 percent per year). The population dynamics of the region bode well for the Airport as the population is growing.

1.3.3. Income

Regarding year-over-year increases in personal income, Kennebec County has performed better than the state of Maine, and the U.S. Particularly in recent years (2015-2020), Kennebec County saw an increase in personal income of 24.2 percent, compared with increases of 15.24 percent and 15.92 percent over the same time period for the state of Maine and the U.S., respectively as shown in **Figure 1-3**.

Figure 1-3: Historical Changes in Personal Income



Source: Bureau of Economic Analysis, U.S, Department of Commerce, 2022.

1.4. Recent Airport Development

In 2022, the Airport reconstructed Taxiway A, which was listed on the 2018 *Pavement Condition Report* as published by the Maine DOT as "Poor" with a PCI of 44 out of 100 points. A list of AIP-funded projects can be seen in **Figure 1-6**.

Table 1-2: WVL AIP Funded Projects

Fiscal Year	Project	AIP Federal Funds
2005	Acquire Land for Development	$204,250
2005	Rehabilitate Apron	$754,300
2006	Rehabilitate Taxiway	$1,676,750
2007	Update Airport Master Plan Study	$146,300
2008	Update Airport Master Plan Study	$150,100
2010	Rehabilitate Runway 14-32	$119,700
2010	Acquire Snow Removal Equipment	$161,310
2012	Rehabilitate Runway 14-32, Remove Obstructions	$818,100
2013	Rehabilitate Runway 5-23	$234,900
2014	Rehabilitate Runway 5-23	$4,326,300
2016	Acquire Easement for Approaches	$119,700
2018	Wildlife Hazard Assessment	$46,800
2018	Remove Obstructions [APP or DEP]	$344,850
2020	Seal Taxiway Pavement Surface/Pavement Joints	$28,318
2020	Seal Runway Pavement Surface/Pavement Joints	$270,597
2021	Reconstruct, Mark, Light and Sign Parallel Taxiway A	$4,171,770
2022	Airport Master Plan Update	$299,520

Source: FAA, 2023.

1.5. Meteorological Conditions and Climate

1.5.1. Climate

Weather plays an important role in adequately planning for an airport. Temperature and wind are essential factors in determining runway length and orientation. The need for navigational aids and lighting is determined by the percentage of time that visibility is impaired due to cloud cover or other conditions. Summers in Waterville are mild, with an average high temperature in July of 78 degrees Fahrenheit (F)[1]. The climate in the Northeastern part of the U.S. is classified as a fairly diverse climate, with bitterly cold winters and semi-humid summers. Due to its location and elevation, Waterville experiences slightly more snowfall in the winter months than the national average of 64 inches[2]. The area receives an average of approximately 43 inches of rain per year, with the largest monthly share being in October with approximately 4.5 inches.

1.5.2. Ceiling and Visibility

FAA AC 150/5060-5, *Airport Capacity and Delay* identifies three categories of ceiling and visibility

[1] https://weatherspark.com/y/27269/Average-Weather-in-Waterville-Maine-United-States-Year-Round#Sections-Humidity, accessed October 19, 2022.

[2] https://www.usclimatedata.com/climate/waterville/maine/united-states/usme0852, accessed October 19, 2022

minimums. These categories include VFR, IFR, and PVC. Meteorological data were obtained through the NCDC consisting of 10 years of hourly observations and environmental conditions reported by the AWOS on the airfield. This data was analyzed to explore ceiling, visibility, and wind conditions at the Airport. Over the last 10 years, the Airport was in VFR conditions approximately 75 percent of the time, in IFR conditions approximately 21 percent of the time, and closed approximately 4 percent of the time.

1.5.3. Wind Coverage

The orientation of runways for takeoff and landing operations is primarily a function of wind velocity and direction taken together with the ability of aircraft to operate under adverse conditions. Generally, the primary runway at an airport is aligned as closely as possible with the direction of the prevailing winds. The crosswind component is the vector of wind velocity and direction, which acts at an angle to the runway. Runway wind coverage refers to the percentage of time in which operations can safely occur given crosswind components. The FAA has established that all the runways combined should provide acceptable crosswind conditions 95 percent of the time, based on different allowable crosswind components that are derived from the RDC for each runway.

Per the approved ALP, Runway 5-23 has an RDC of C-II-4000, and Runway 14-32 has an RDC of B-I-VIS (note: for a description of RDC, please consult **Appendix A**). However, reviewing the flight information from the FAA TFMSC which provides data on the type and frequency of aircraft operations, Runway 5-23 has an RDC of B-II-4000. The all-weather and IFR wind roses can be seen in **Figure 1-4** and **Figure 1-5**, respectively. A detailed analysis of runway orientation as it relates to wind will be covered in Chapter 4, *Facility Requirements*.

1.6. Existing Airport Facilities

This section is divided into two subsections: airside and landside. The airside facilities include runways and taxiways, while the landside facilities are associated with the transition from air to land transportation. Existing conditions at the Airport can be seen in **Figure 1-6**.

1.6.1. Airport Airside Facilities

1.6.1.1. Runways

The Airport has two bidirectional runways. Runway 5-23 measures 5,500 feet long and 100 feet wide and serves as the Airport's primary runway. The runway is composed of grooved asphalt and is in excellent condition as of the last airport inspection. Runway 5-23 is marked with precision instrument approach markings and equipped with HIRL and a MALSF supporting the Category I (CAT I) precision instrument approach to Runway 5. Both Runways 5 and 23 also have GPS-enabled approaches. Per the 2018 *Pavement Condition Report*, Runway 5-23 was listed in "Good" condition with a PCI of 95.

Runway 14-32 measures 2,301 feet long, and 60 feet wide. It is constructed of asphalt and is also listed in excellent condition as of the last airport inspection. With no instrument approaches, the runway is equipped with basic markings and has no edge lighting. There are no visual landing aids to either end of Runway 14-32. The 2018 *Pavement Condition Report* listed Runway 14-32 in "Good" condition with a PCI of 97.

1.6.1.2. Taxiways

Taxiway A is a full-length parallel taxiway to Runway 5-23 and has MITL. There are four entrance/exit taxiways. Taxiways A1 and A4 are at the approach ends of Runway 5-23. Entrance/exit Taxiway A2 is approximately 1,600 feet from the approach end of Runway 5, and entrance/exit Taxiway A3 is approximately 1,500 feet from the approach end of Runway 23. Taxiway D provides direct access from the aprons and hangars/Terminal Building to Runway 14-32. It has been converted from a portion of a former closed third runway. Non-standard geometry conditions are shown in **Table 1-3**. These issues will be discussed further in Chapter 4, *Facility Requirements*.

Table 1-3: Non-Standard Geometry Conditions

FAA Standard	Non-Standard Condition
ROFA	Airport Road and LaFleur Road transition through the Runway 14 ROFA
Converging Taxiways	Taxiway A and Taxiway D converge at Runway 14-32 which can cause pilot confusion
Taxiway Intersection at Other Than Right Angle	Taxiway D intersects Runway 14-32 at an oblique angle
Direct Access	The itinerant apron provides direct access to Runway 14-32 via Taxiway D

Source: McFarland Johnson, 2022.

1.6.1.3. Visual and Navigation Aids

Runway 5 is supported by a 1400-foot MALSF and a VASI. Runway 23 has a PAPI and REILs. Runway 14-32 has no approach lights or visual approach aids.

1.6.2. Landside Facilities and Services

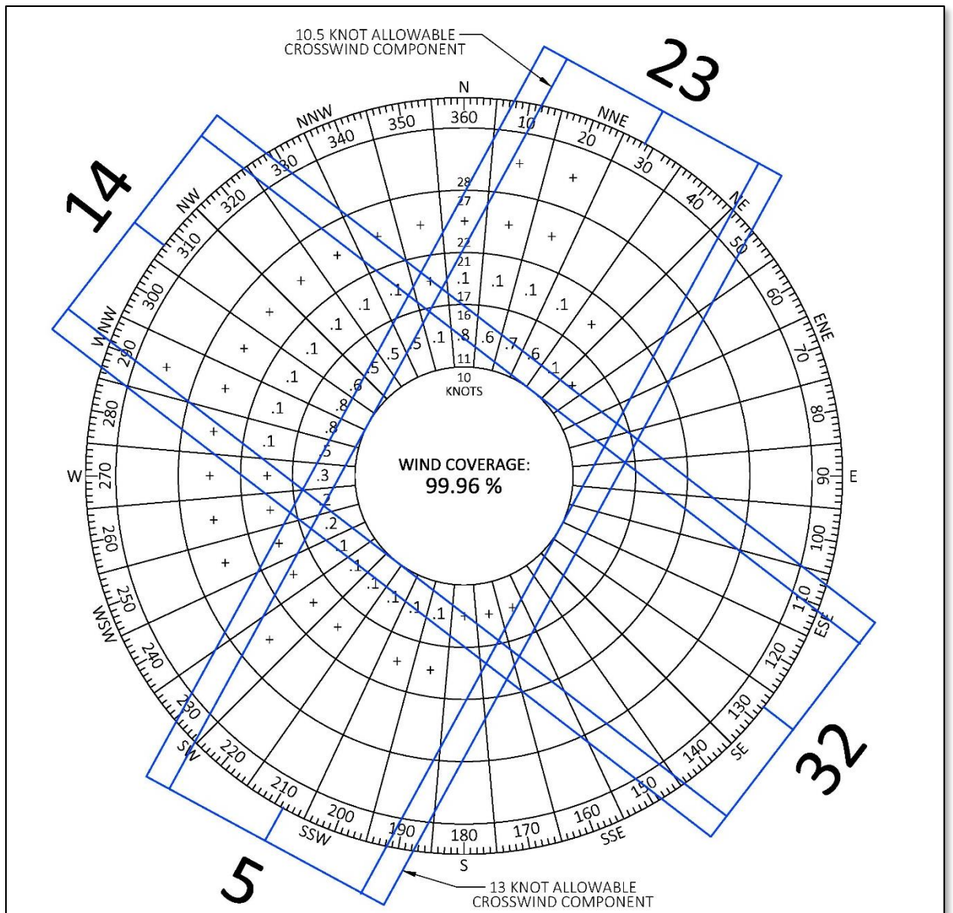
1.6.2.1. Terminal Building/Hangar

The Terminal Building and attached hangar can be seen as #5 in **Figure 1-6** and in **Figure 1-7**. The Terminal Building spans approximately 13,500 square feet (SF). It includes leased office space for tenants, a pilots' lounge, a conference room, and the airport manager's office. The attached hangar is approximately 9,000 SF and is used to store airfield equipment, as well as deice aircraft using infrared heaters. According to the 2011 airport master plan Update, the terminal building was constructed sometime between 1972 and 1976.

1.6.2.2. Aircraft Hangars

There are two larger conventional hangars at WVL. One on the south end of Taxiway D is approximately 8,500 SF, and the other toward the north end of the Airport is approximately 4,500 SF. Both appear to be structurally sound, but the exterior finishes are showing their apparent ages. Additionally, 11 smaller individual hangars (conventional hangars approximately 2,000 SF up to 2,500 SF.) As of December 2022, the 12th conventional hangar of approximately 5,600 SF is being constructed on a concrete pad adjacent to Taxiway D across from the Terminal Building.

Figure 1-4: All-Weather Wind Rose



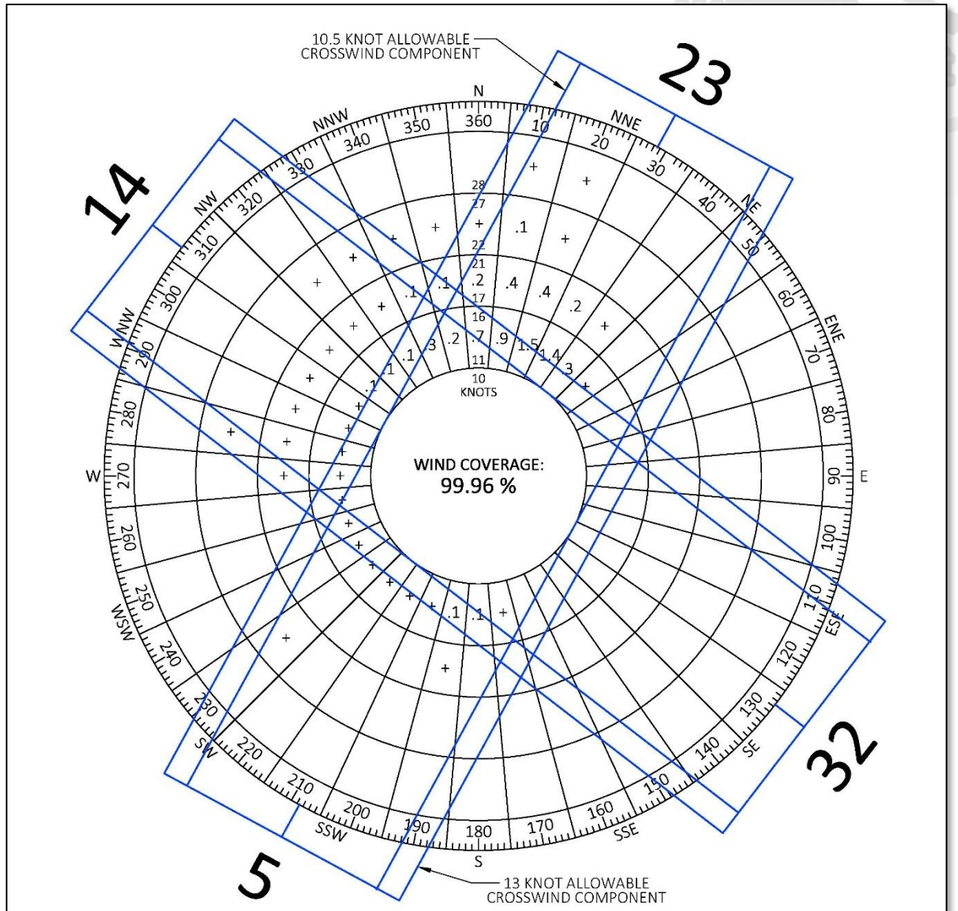
ALL WEATHER WINDROSE

ALL CEILING AND VISIBILITIES

ALL WEATHER		
	10.5kt	13kt
RUNWAY 5	61.25%	62.40%
RUNWAY 23	62.57%	63.45%
RUNWAY 5-23	95.25%	97.28%
RUNWAY 14	50.56%	50.72%
RUNWAY 32	74.11%	75.74%
RUNWAY 14-32	96.10%	97.89%
COMBINED	99.70%	99.96%

SOURCE: WATERVILLE REGIONAL AIRPORT, 2012 - 2021 (726073)

Figure 1-5: IFR Wind Rose



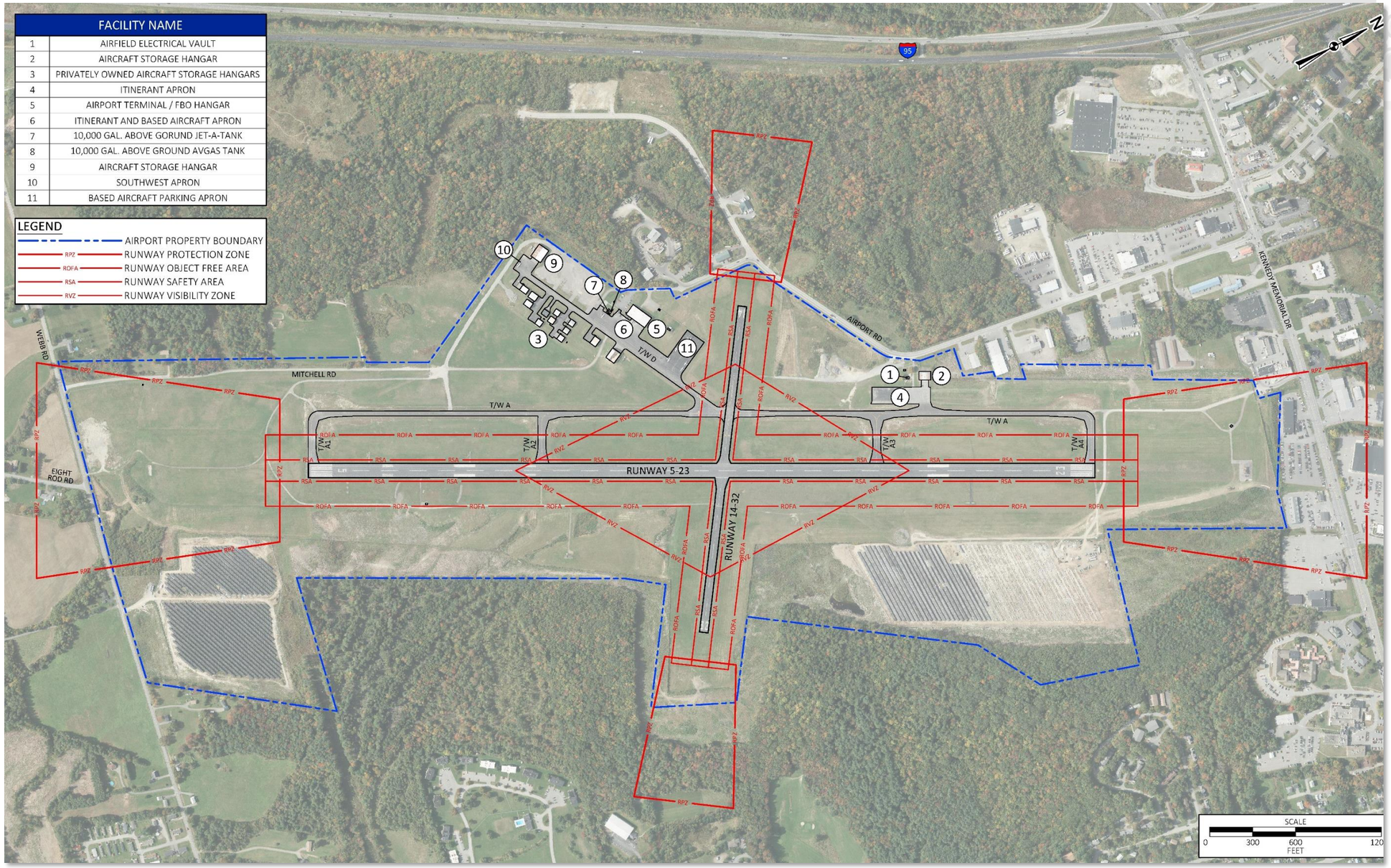
IFR WINDROSE

CEILING < 1000' AND / OR VISIBILITY < 3 MILES BUT CEILING ≥ 200' AND VISIBILITY ≥ ½ MILES

IFR		
	10.5kt	13kt
RUNWAY 5	72.65%	73.06%
RUNWAY 23	64.13%	64.18%
RUNWAY 5-23	99.05%	99.25%
RUNWAY 14	64.23%	64.48%
RUNWAY 32	67.11%	69.20%
RUNWAY 14-32	93.61%	95.95%
COMBINED	99.76%	99.96%

SOURCE: WATERVILLE REGIONAL AIRPORT, 2012 - 2021 (726073)

Figure 1-6: Existing Airport Conditions



Source: McFarland Johnson, 2022.

Figure 1-7: Terminal Building/Hangar

Source: McFarland Johnson, 2022.

1.6.2.3. Aircraft Parking

There are four aircraft parking locations at the Airport. The first is at the southwest end of Taxiway D which has two tie-down spots. It can be seen as #10 in **Figure 1-6**.

The second is an asphalt transient apron in front of the Terminal Building of approximately 3,300 square yards (SY) in two distinct sections. The wider portion directly in front of the Terminal Building and extending slightly toward the southwest can support the parking of one or two ADG II aircraft. This portion of the transient apron is approximately 75 yards wide by 30 yards deep. A second adjoining portion to the northeast is approximately 85 yards wide by 13 yards deep and can accommodate several ADG I aircraft. This apron is identified as #6 in **Figure 1-6**. The third aircraft parking location is northeast of the Terminal Building and has tie-downs for up to eight ADG I, and two ADG II aircraft. It is utilized for based aircraft parking and can be seen in **Figure 1-8**, and labeled #11 in **Figure 1-6**.

The final aircraft parking location, shown as #4 in **Figure 1-6** is adjacent to Taxiway A3 toward the north end of the Airport and is approximately 5,500 SY. Currently, this apron is utilized by the municipal fire department to conduct driver training exercises but can be used for overflow aircraft parking.

1.6.2.4. Vehicle Parking

A single primary paved parking lot exists adjacent to the terminal building providing 16 parking spaces. Additionally, there is a gravel parking lot of approximately 70,000 SF that can be utilized for overflow parking and for parking rental cars to be utilized by arriving passengers.

1.6.2.5. Fencing

The Airport is completely fenced in with 6-foot and 8-foot perimeter fencing. Most of the fencing is topped with three strands of barbed wire. Per the 2020 *Airport Wildlife Hazard Management Plan*, approximately one third of the perimeter fence is relatively new, another third is considered adequate, but needing repair/maintenance, and the final third is in need of replacement. Also, large sections of fence on the east side have no barbed wire and require vegetation removal within the fence corridor.

Figure 1-8: WVL Based Aircraft Parking Apron

Source: McFarland Johnson, 2022.

1.6.2.6. Aircraft Rescue and Firefighting (ARFF)

As a GA airport, there is no requirement for on-site ARFF at WVL. Emergency services are provided by the Waterville Fire Department, as well as surrounding townships for mutual aid if necessary. The nearest fire station to the Airport is at 7 College Ave, which is an approximately 3.5-mile drive. The Airport has recently acquired an Oshkosh P-19 ARFF vehicle from a nearby airport.

1.6.2.7. Aviation Fueling Facilities

Directly south-west of the Terminal Building is the Airport fuel farm. There are two 10,000-gallon tanks: one for 100LL and the other for Jet-A. Additionally, the Airport owns and operates a 3,000-gallon Jet-A mobile fueler. The fuel farm and mobile fueler can be seen as #7 and #8 in **Figure 1-6** and in **Figure 1-9**.

Figure 1-9: Airport Fuel Farm

Source: McFarland Johnson, 2022.

1.7. Aviation Activity

Information on aviation activity was culled from different sources. Based aircraft information on record with the FAA was verified as correct by Airport management. For operations data, the Airport's GARD system provides valuable operations data and coupled with information collected from the FAA on aircraft operations that utilize ADS-B, and FAA's TFMSC, an accurate composite picture of the number and type of aircraft operations can be created.

1.7.1. Based Aircraft and Annual Operations

According to the FAA 5010 data, there are 18 single-engine aircraft based at the Airport, along with two multi-engine aircraft for a total of 20 based aircraft.

In 2021, aircraft utilizing ADS-B accounted for 6,004 operations into and out of WVL. This number will not include aircraft that are not equipped with ADS-B equipment, such as light sport aircraft (LSA), and other aircraft that will not operate within certain airspace. The GARD data for 2021 indicates there were 8,383 aircraft operations; however, the GARD system manufacturer indicated there was a server issue, and some operations after June were not counted, so the actual number of aircraft operations is likely higher. Also, through November 2022, the GARD system reported a total of 8,947 operations.

1.7.2. Current and Potential Airport Users

Discussions with the airport manager revealed that current Airport users include regular flights by Wiggins Airways, utilizing a Beechcraft 99 that is based at the Airport. Also, parents of students at Colby College use the Airport for visits and weekends. A local farm utilizes the Airport regularly, and there are weekly flights from Canada that have precleared U.S. Customs before arriving at the Airport.

Large and small local businesses often find the need for flight departments to move employees at a lower cost than can be provided by commercial service airlines. According to the Mid-Maine Chamber of Commerce website, some of the largest employers in the Greater Waterville area include MaineGeneral Medical Center (1,182 employees), T-Mobile (750 employees), Sheridan Corporation (150 employees), Orion Rope Works (75 employees), and Northeast Laboratories (63 employees), among others. Other potential Airport users could include newly certificated private pilots and transplants from other parts of Maine and beyond.

1.7.2.1. Fixed Base Operator

FBO functions such as fueling, deicing, tie-down, and parking services are handled by Airport personnel.

1.7.2.2. Flight School

Airlink Flight School is an FAA Part 141 certified flight school, or one that provides a structured training program and syllabus. They offer flight training in several types of single-engine aircraft, as well as multi-engine aircraft at WVL.

1.8. Airspace and Air Traffic Control

Airspace in the U.S. is classified as controlled, uncontrolled, or special use. A detailed explanation of different airspace classes can be found in **Appendix A** Section A.2. The airspace surrounding WVL is Class G airspace, however Class E begins 700 feet above the surface of the Airport. To view the airspace surrounding the Airport, refer to **Figure 1-10**.

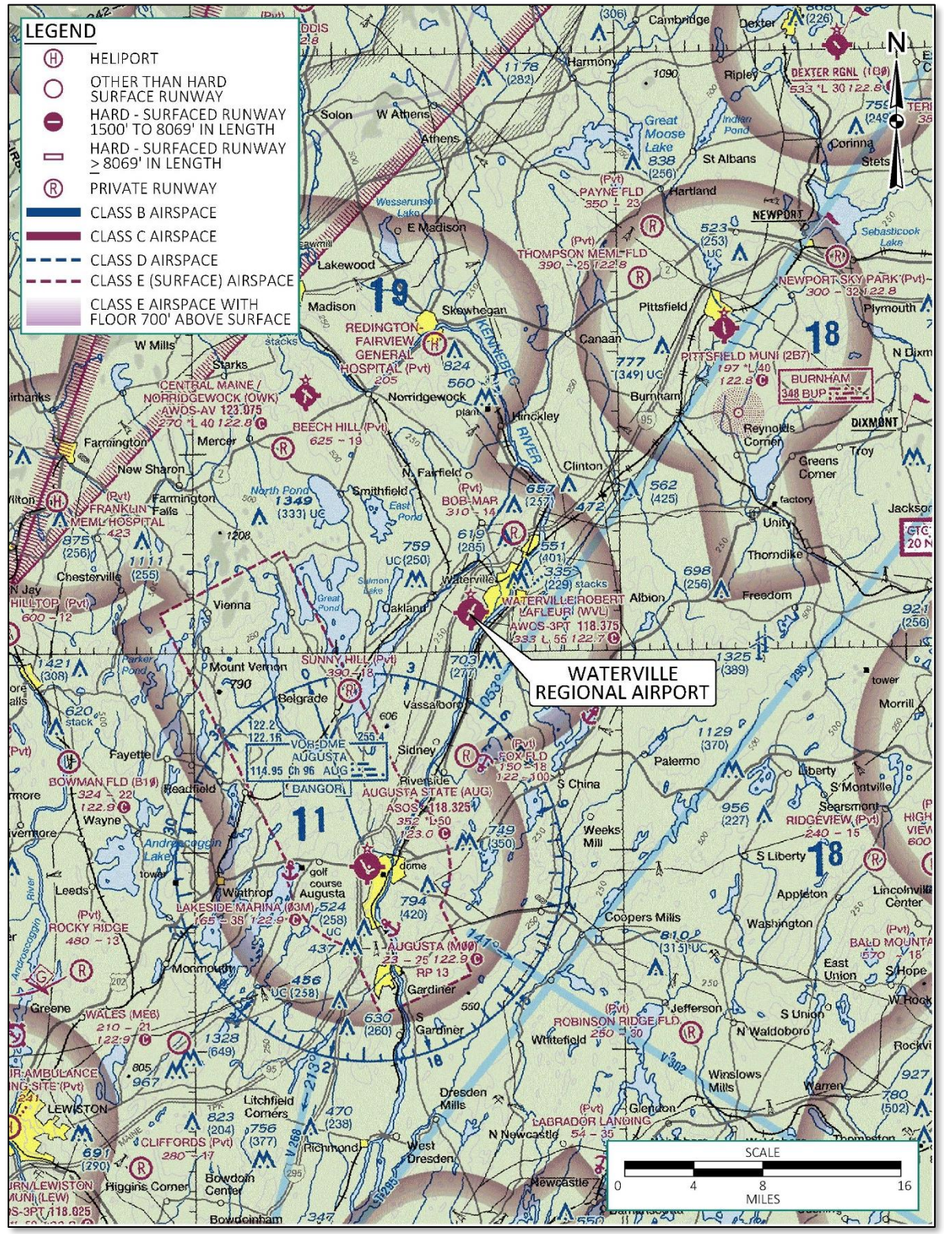
1.8.1. WVL Airspace Control

There are 21 FAA ARTCCs throughout the continental U.S. The Boston ARTCC controls IFR airspace en route to and from WVL.

1.8.1.1. Airport Traffic Control Tower

There is no ATCT at the Airport. Aircraft operating in the local airspace are not required to file any type of flight plan or contact any air traffic control facility. Only when entering airspace where contact is mandatory, will aircraft be required to file a flight plan or contact an ATCT. Local advisories and weather conditions (limited) can be obtained using the airport Unicom.

Figure 1-10: WVL Airspace Map



Source: New York Sectional Chart, FAA, 2022.

1.8.2. Instrument Approach Procedures

A flight procedure is a set of predetermined maneuvers using electronic or visual navigational aids that assist pilots in locating and landing or departing from an airport, particularly in bad weather. WVL has three published instrument approach procedures. One of the approaches utilizes ground-based equipment of the ILS, and two approaches are area navigation (RNAV), or those that utilize GPS. Both GPS approaches are Localizer Approaches with Vertical Guidance (LPV). Instrument approach minima can be seen in **1.8.2**.

Table 1-4: WVL Instrument Approaches

Approach	Ceiling (Feet Above Ground)	Visibility (Statute Miles)
ILS or LOC/DME RWY 05	200	¾
RNAV (GPS) RWY 05	200	¾
RNAV (GPS) RWY 23	200	¾

Source: FAA Terminal Procedures, 2022.

1.8.2.1. Developable Land

There are five parcels of land suitable for aeronautical development as can be seen in **Figure 1-11**. There were no parcels identified for non-aeronautical development; however, some portion of Development Area 5, as well as a small portion of Development Area 5 have Airport Road frontage and could be utilized for non-aeronautical development.

Development areas in **Figure 1-11** are color-coded to show the maximum heights of possible development without encroaching into adjacent airspace, such as the Part 77 transitional surface, for example. Note that Development Area 3 is shown atop the based aircraft apron, which could be relocated if a developer showed interest in developing this area.

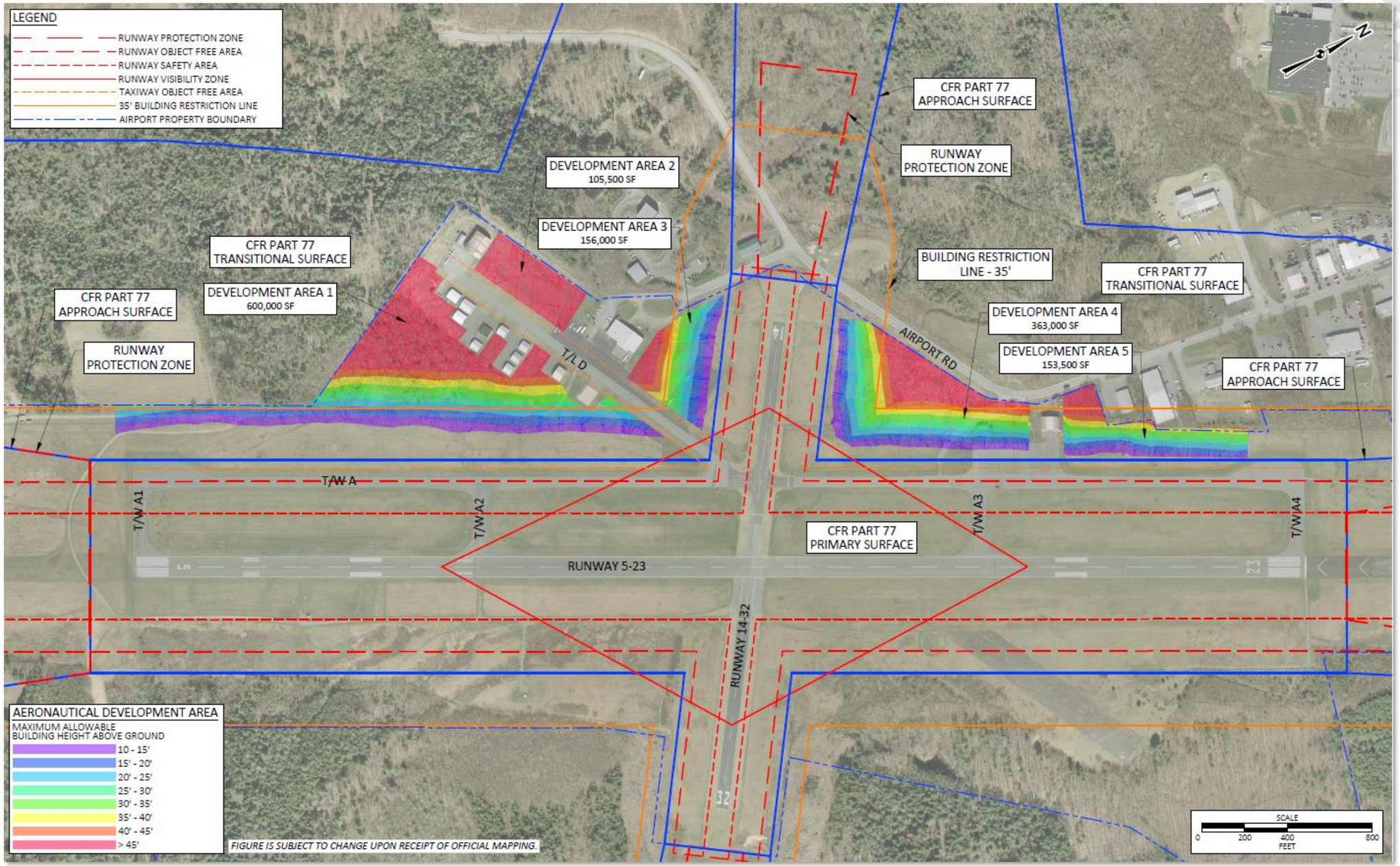
1.9. Land Use and Zoning

When considering improvement projects that meet airport development goals, it is important early in the planning process to identify potential impacts to existing land uses on airport property and in the surrounding area and to determine how potential airport projects will affect future land use and development patterns. This will enable the plan to incorporate measures into the future design and layout of airport developments that will avoid or minimize land use conflicts as well as improve on existing conflicts when practicable.

The City of Waterville classifies land use into several categories. Most of the lands surrounding the Airport are used for commercial and industrial purposes; however, there are some areas of residential and commercial activities interspersed. **Figure 1-12** details land uses surrounding the Airport.

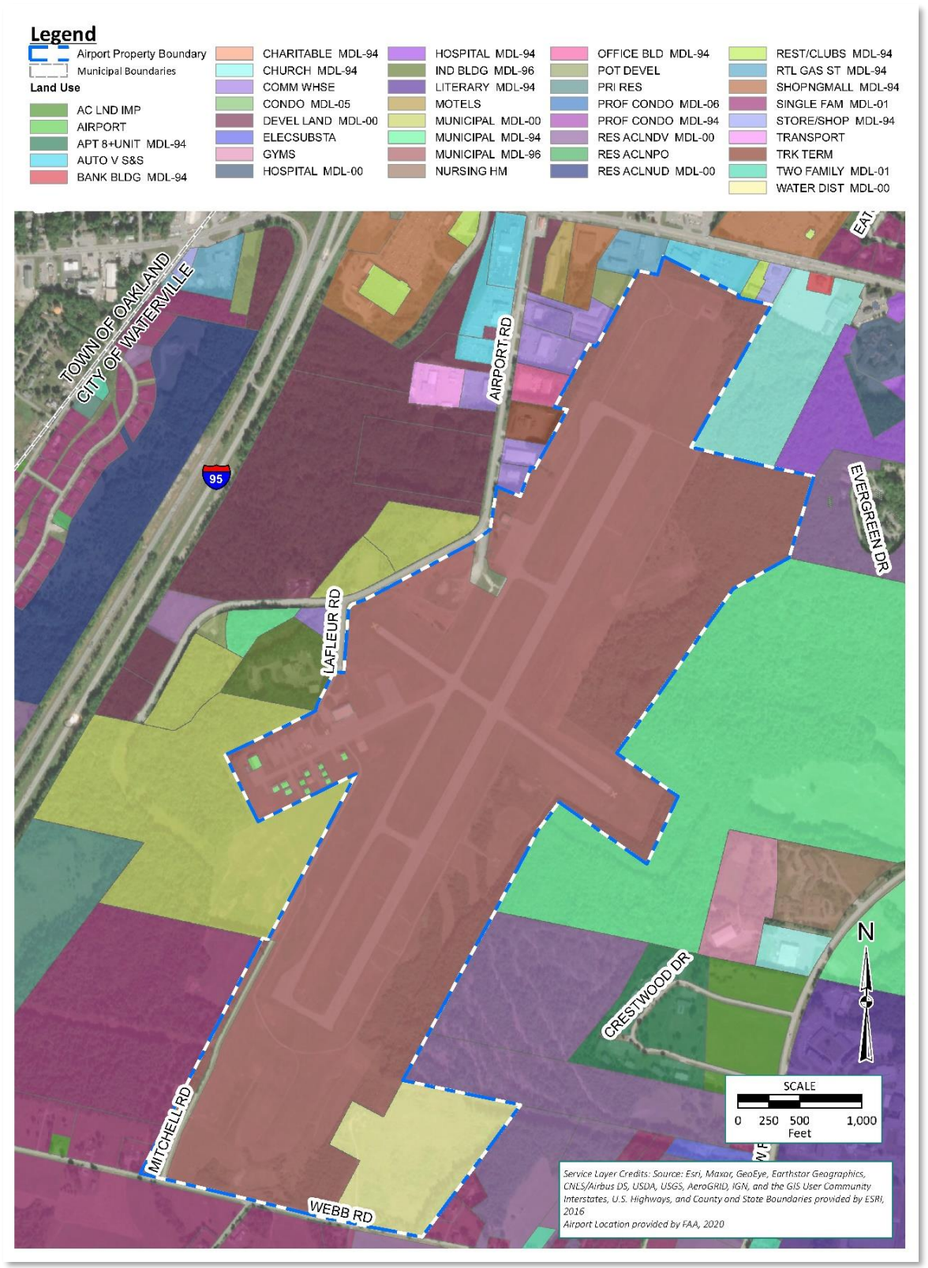
The Airport is located within the Airport district zone along with Airport industrial. Surrounding land use zones includes industrial to the west, rural residential to the southwest and south, medium density residential to the southeast, resource protection to the east where a golf course is located, and commercial and industrial use to the north.

Figure 1-11: Airport Development Areas



Source: McFarland Johnson, 2022.

Figure 1-12: Land Use Map



Source: City of Waterville, 2022.

FAA AC 150/5200-33C, *Hazardous Wildlife Attractants On or Near Airports*, provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. Potential wildlife attractants and congregation areas can include areas such as shopping malls, agricultural fields, livestock operations, golf courses, parks, waste handling facilities, waterbodies, wetlands, and water management facilities. There is a municipal golf course adjacent to the airport, and a private golf course approximately 0.75 mile to the northwest of the airport that may serve as wildlife attractants for a variety of species that can be hazardous to aircraft operations.

FAA 150/5300-13B, *Airport Design*, identifies several land uses that are compatible with an airport's runway protection zone (RPZ). The RPZ functions to enhance the protection of people and property on the ground and the area is maintained clear of incompatible objects and activities. Land uses

incompatible with the RPZ include buildings and structures (including residences, schools, churches, hospitals, and industrial buildings), recreational areas, transportation facilities (including roads), fuel and hazardous materials storage facilities, wastewater treatment facilities, and above-ground utility infrastructure. As future improvements are considered as part of the process, the presence of future structures and transportation facilities within the RPZs, as well as potential impacts should the RPZs be adjusted, will be considered.

The layout of the City of Waterville Zoning map can be found in **Figure 1-12**. The 2022 official zoning map indicates that the Airport is in the ordinance's Airport District (AIR). Directly surrounding the Airport, areas are zoned as Medium Density Residential (RB), Rural Residential (RR), Industrial (IND), Airport Industrial (AI), Commercial-C (CC), and Resource Protection (RP).

The City of Waterville adopted Ordinance 4.1.3A. "Aviation Clearances", which states, "No part of any new structure or planting shall be allowed to protrude into the air sufficiently to interfere with aviation requirements of the Waterville Regional Airport as determined by the FAA criteria applicable to the current airport development plans as submitted and approved by FAA".

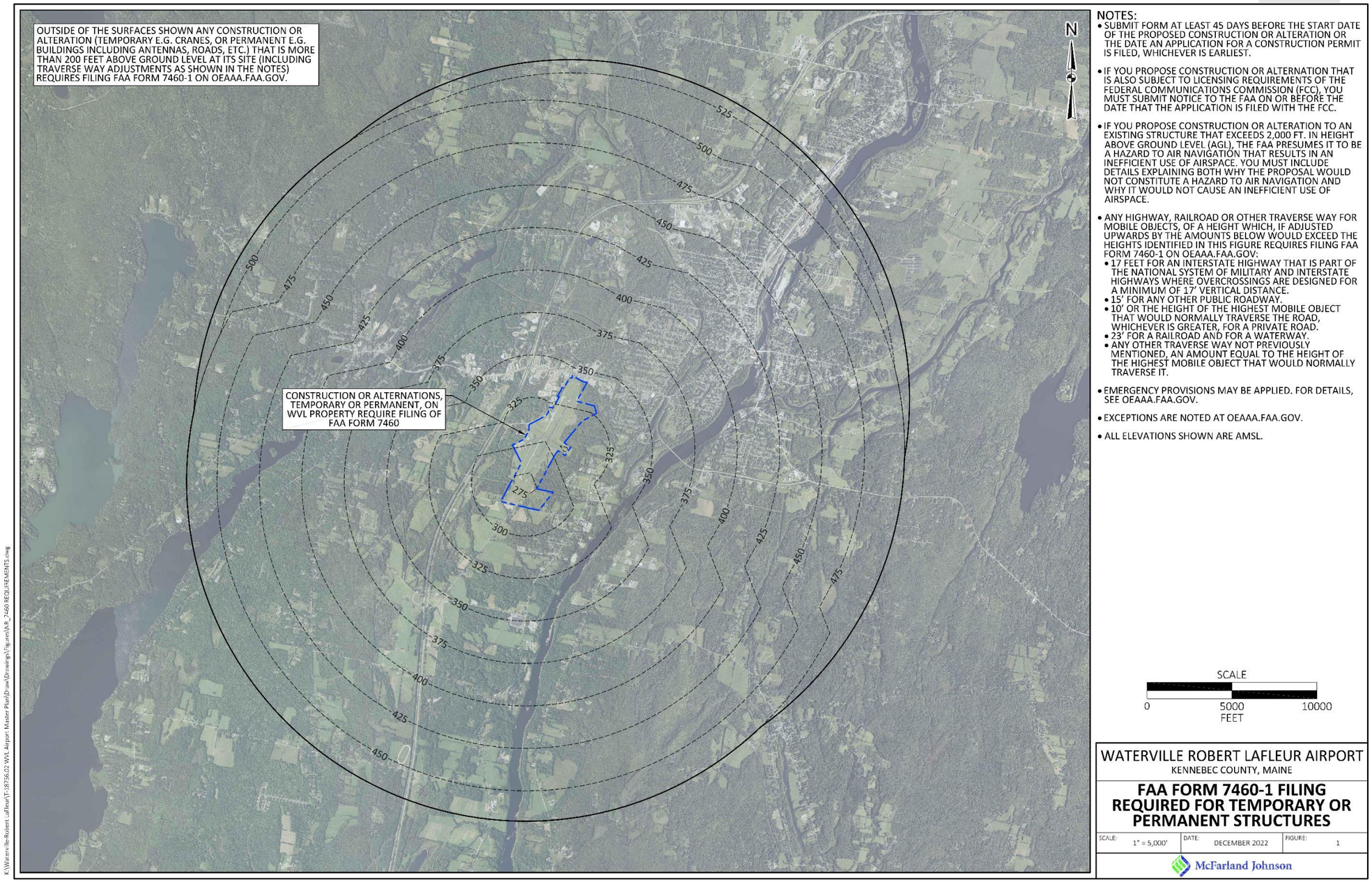
To maintain the safety of aircraft operations at the Airport, the FAA requires any planned new construction or alteration of existing facilities file an FAA Form 7460-1. The FAA runs a submitted Form 7460-1 through all FAA lines of business to see whether the planned construction will interfere with aircraft operations. To aid the airport and developers, **Figure 1-13** has been created showing where the timely filing of FAA Form 7460-1 needs to be completed. This figure is available to developers and others upon request to Airport management.

1.10. Airport Recycling, Reuse, and Waste Reduction

Solid waste management is an issue of importance to both the Airport and the City of Waterville. This Recycling, Reuse, and Waste Reduction Plan (RRWR Plan or the Plan) addresses materials management at WVL by:

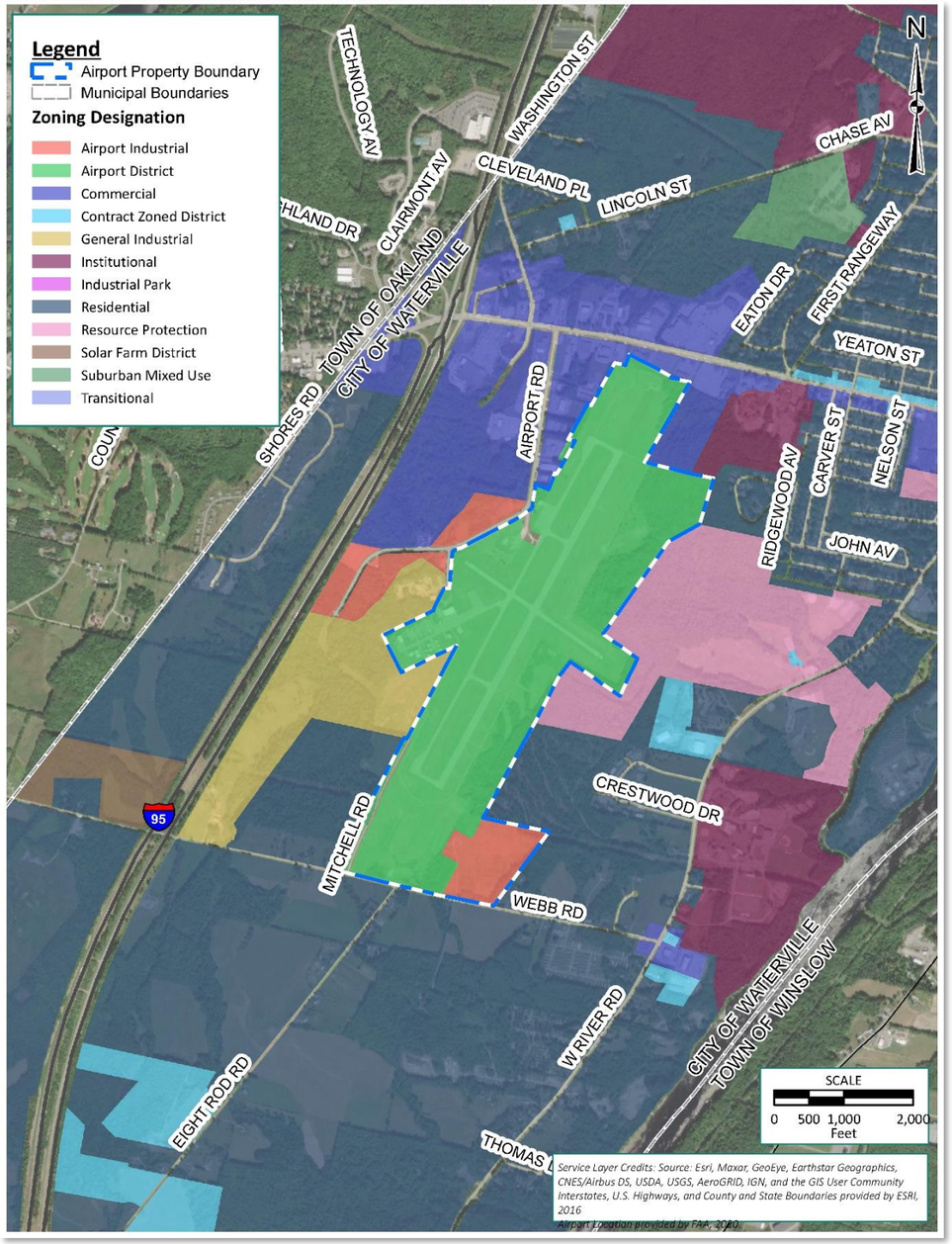
- Reviewing existing recycling, waste reduction, and reuse policies, and facilities at WVL;
- Analyzing the opportunities, costs, and benefits of initiating or expanding these efforts; and
- Recommending goals and/or initiatives to establish, operate, and maintain an airport recycling, reuse, and waste reduction program, in compliance with FAA guidance.

Figure 1-13: FAA Form 7460-1 Filing Requirement Areas



Source.: FAA Form 7460-1 Filing Requirement Areas.

Figure 1-14: Zoning Map



Source: City of Waterville, 2022.

1.10.1. Federal Airport Waste Management Plans and Policies

The U.S. Congress passed the FAA Modernization and Reform Act of 2012 (FMRA or the Act) which amended Title 49 of the U.S. Code (U.S.C.). The Act included several changes to the AIP, two of which related to recycling, reuse, and waste reduction at airports. Section 132(b) of the Act expanded the definition of airport planning to include "developing a plan for recycling and minimizing the generation of airport solid waste, consistent with applicable state and local recycling laws, including the cost of a waste audit."

Section 133 of the Act added a provision that requires airports that are updating their master plan to address issues relating to solid waste recycling at the airport. This includes:

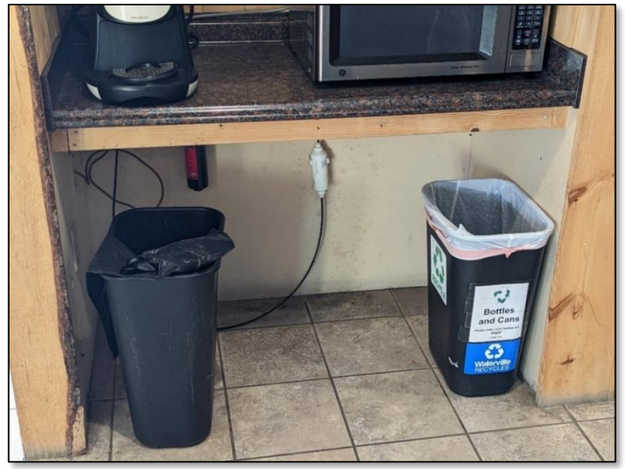
- Assessing the feasibility of municipal solid waste recycling at the airport,
- Minimizing the generation of solid waste at the airport,
- Documenting operation and maintenance requirements,
- Reviewing waste management contracts, and
- Identifying the potential for cost savings or the generation of revenue.

As defined by Congress, "recycling" refers to any program, practice, or opportunity to reduce the amount of waste disposed of in a landfill. This includes reuse and waste reduction as well as the recycling of materials.

The FAA issued a Memorandum dated September 30, 2014, to guide the preparation of airport RRWR plans as an element of a master plan or master plan update, within a sustainability planning document, or as a stand-alone document. The guidance is immediately applicable to all federally obligated airports, which includes WVL.

1.10.2. Existing Waste Sources

Figure 1-15: Terminal Building Trash Receptacles



Source: McFarland Johnson, 2022.

Conversations with representatives of the Airport indicate they do not have a dumpster and solid waste is picked up weekly by a municipal packer-style garbage truck. The Airport typically produces approximately three bags of trash per week. Currently, WVL does not have a reuse or recycle program for municipal solid waste in place; however, inside the Terminal Building, there is one trash area, and trash is separated into recyclable materials as can be seen in **Figure 1-15**.

Areas within the Airport property can be divided into how much control the Airport has over the generation and

disposal of waste. The three levels of control are:

- Areas where the Airport has direct control of waste management;
- Areas where the Airport has no direct control but can influence waste management; and
- Areas where the Airport has no control or influence over waste management.

1.10.2.1. Direct Control Areas

Table 1-5 lists the areas where the Airport has direct control over how waste is generated and collected. The Airport has direct control over the main hangar and offices, the maintenance hangar, and any Airport maintenance vehicles or operations.

Table 1-5: Waste Generation and Control at WVL

Area	Waste generated	Control
Area 1: Terminal Building and offices	Paper, plastic, aluminum cans, trash, used oil, and aircraft parts	Direct Control
Area 2: Field maintenance activities	Paper, plastic, aluminum cans, trash, general waste	Direct Control
Area 3: Hangars/tenants	Paper, plastic, aluminum cans, trash, deplaned waste, possibly used oil, and aircraft parts	Influence, but No Direct Control

Source: Airport management, 2022.

1.10.2.2. Influence / No Direct Control Areas

Additionally, **Table 1-5** also lists areas where the Airport has some influence, but no direct control over how waste is generated and collected. As shown in the table, these include hangars, tenants, aircraft, and Airport construction. Although the Airport does not directly control the many tenants operating on Airport grounds, in most cases the Airport could have influence, as the lessor, over their tenant's waste disposal and recycling practices. Contractual lease agreements could be used

as a tool to begin a waste recycling program among tenants at the Airport. Any waste generated on aircraft is removed and managed by Airport tenants that own their aircraft. Any construction waste and debris removal and subsequent reuse, recycling, or disposal are conducted by the construction contractor.

1.10.2.3. No Direct Control or Influence Areas

These are areas that the Airport neither owns nor leases. There are no areas on WVL property where the Airport has neither control nor influence. Currently, private aircraft owners and tenants conduct their waste collection efforts independently of the Airport; however, all are influenced in some small part by the leases and fees negotiated by the Airport. Furthermore, any consolidated recycling collection and disposal program implemented by the Airport could be made available to all tenants voluntarily.

1.10.3. Overview of Existing Airport Recycling, Reuse, and Waste Management

WVL has no established system for recycling, and a City of Waterville municipal waste hauler collects Airport generated trash once a week. Typically, solid waste consists of paper, plastic, aluminum cans, trash, and general waste.

There is no formalized plan for tenants at WVL and they must arrange for their own waste hauling and management. Typically, the collective amounts of trash generated by private aircraft owners likely would not amount to much more than a trash bag or two per month, if even that. Currently, all the tenants remove their own trash and dispose of it.

According to the City of Waterville, the following recycling options are available:

- Single-stream (no sort) curbside recycling for residents (must be clearly labeled "recycling" or "recycle")
- I Recycle Inc. drop-off recycling for residents and businesses (sorting required)
- Electronic Waste/Disposal Recycling: Give IT get IT at 60 Industrial Street and Pine Tree Waste at 2 LaFleur Road
- Bulky Waste (such as tires, mattresses, electronics, furniture, and appliances): Pine Tree Waste at 2 LaFleur Road
- Car batteries and Freon units: One Steel Recycling at 25 Ayers Street, Oakland
- Christmas tree recycling: Special collections by the City of Waterville in January

1.10.4. Recommendations

Enhancing the Airport's recycling, reuse, and waste reduction programs should be a focal point for the Airport moving forward. In addition to government incentives, an airport recycling and waste minimization program helps reduce the Airport's environmental footprint in the community it serves and provides passengers with an opportunity to recycle away from home.

Different areas within an airport facility can have different collection strategies. The decision about what type of collection system is best for a facility or specific areas requires an understanding of passenger and employee behavior and the value of the recyclables if comingled or separated.

Waterville Regional Airport

ENVIRONMENTAL INVENTORY CHAPTER 2

McFARLAND JOHNSON

2. ENVIRONMENTAL INVENTORY

2.1. Introduction

The operation and development of an airport has the potential to affect neighboring land uses and natural and human environments, which are of fundamental concern in the airport planning process. Therefore, it is imperative to identify the resources and potential impacts on the environment and the surrounding community during the initial stages of the planning process. This allows airport planners and engineers to incorporate measures in accordance with federal, state, and local rules and regulations to avoid, minimize, or mitigate potential impacts on the environment.

The National Environmental Policy Act (NEPA) of 1969 requires that all federal agencies consider the potential impacts their projects and policies have on the environment. To ensure airport development complies with NEPA, the Federal Aviation Administration (FAA), an agency of the United States Department of Transportation (USDOT), developed FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. The Order describes the environmental review process and identifies environmental categories which must be addressed prior to the implementation of a federal action at an airport, including the funding of a development project. The current version of FAA Order 5050.4B, dated April 2006, in conjunction with FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, dated July 16, 2015, provides guidance for reviewing and documenting the effects airport development projects have on the environment. FAA Orders 5050.4B and 1050.1F identify specific environmental categories that must be considered in relation to a proposed action to determine whether a significant impact would result and, if so, determine what reasons would be appropriate to avoid or minimize an impact's effect. FAA Order 1050.1F specifies the threshold of significance for each of the categories addressed. The following is a list of environmental impact categories, identified in Order 1050.1F, that may be relevant to FAA actions:

- Biotic resources (including fish, wildlife, and plants)
- Water Resources (including wetlands, surface waters, wild and scenic rivers, floodplains, and groundwater)
- Coastal Resources
- Department of Transportation Act, Section 4(f) Resources
- Historic Resources (including architectural, archeological, and cultural resources)
- Farmlands
- Land use
- Noise
- Visual effects
- Air Quality
- Hazardous Materials and Solid Waste
- Energy
- Climate
- Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks

This chapter provides a summary of the environmental conditions and constraints at Waterville Robert-Lafleur Airport (WVL or the Airport). The information provided in this chapter will be carefully considered as part of the alternatives analysis that will be completed for this Master Plan Update (MPU). Future airport development proposed in this MPU will be reviewed in further detail in the subsequent environmental documentation to satisfy the requirements of NEPA. The information provided in this chapter is based on information obtained from appropriate federal, state, and local agencies along with publicly available information.

2.2. Biotic Resources

The Maine Natural Areas Program reviewed the Airport property on November 9, 2022, for the presence of rare or unique botanical features. According to their database, there were no documented records of occurrence within the Airport boundary.

The Maine Department of Inland Fisheries and Wildlife reviewed the Airport property on December 14, 2022 for state-listed species that may occur at or near the Airport. According to their review, several state-listed bat species and upland sandpipers may be present at or near the airport. As specific projects are proposed and designed, additional consultation is recommended to ensure projects are compliant with state and federal regulations protecting endangered species.

Northern Long-Eared Bat *(Myotis septentrionalis)*

The Endangered Species Act (ESA) directs all federal agencies to work to conserve federally listed endangered and threatened species and to use their authorities to further the purposes of the ESA. Section 7 of the ESA, titled "Interagency Cooperation," is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any federally listed species.

An Official Species List from the US Fish & Wildlife Service was obtained on December 21, 2022 and is included in **Appendix B**. There are two listed species, the endangered northern long-eared bat (*Myotis septentrionalis*) and the endangered Atlantic salmon (*Salmo* salar), and one candidate species, the monarch butterfly (*Danaus plexippus*) within the vicinity of the Airport. The Airport is located adjacent to fluvial elements that may affect downstream locations where critical habitat for the Atlantic salmon are present. The candidate status of the monarch does not provide protection under the ESA, and no further coordination with the USFWS is required at this time.

Atlantic Salmon *(Salmo salar)*

2.3. Water Resources

2.3.1. Wetlands

The National Wetland Inventory (NWI) online tool was used as an overview resource to identify mapped wetlands at the Airport. This is a preliminary tool, prior to the development of any specific projects, a formal wetland lineation in accordance with the 1987 United States Army Corps of Engineers *Wetlands Delineation Manual* (1987 USACE Manual) and 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (2012 Regional Supplement)* will be required. Based on the NWI wetland mapper, there may be multiple wetland and stream resources west of the Runway 14 end, a wetland north of the Runway 32 end, and multiple streams in the southeastern portion of the Airport. Mapped wetlands are shown in **Figure 2-1**.

Impacts on federally regulated wetlands will necessitate approval from the USACE and may require compensatory mitigation as a permit condition depending on the specific details of the

proposed project(s). Future proposed projects will take measures in design and construction to avoid, minimize, or mitigate any possible adverse impacts to wetland resources to the degree practicable. The use of Best Management Practices (BMPs) during construction projects will minimize indirect impacts on wetland resources. Projects that have no practicable alternatives to avoid direct impacts on state-regulated wetlands will require a Chapter 310 National Recreation and Park Association (NRPA) permit from the Maine Department of Environmental Protection (MEDEP), while impacts to federally regulated surface waters will require a Section 404 permit from USACE and a Chapter 310 NRPA permit from the MEDEP.

2.3.2. Surface Waters

According to the NWI mapper, there are multiple intermittent streams mapped in the southeastern portion of the airport. A formal wetland delineation will be required prior to the development of any projects to delineate any surface waters within Airport property.

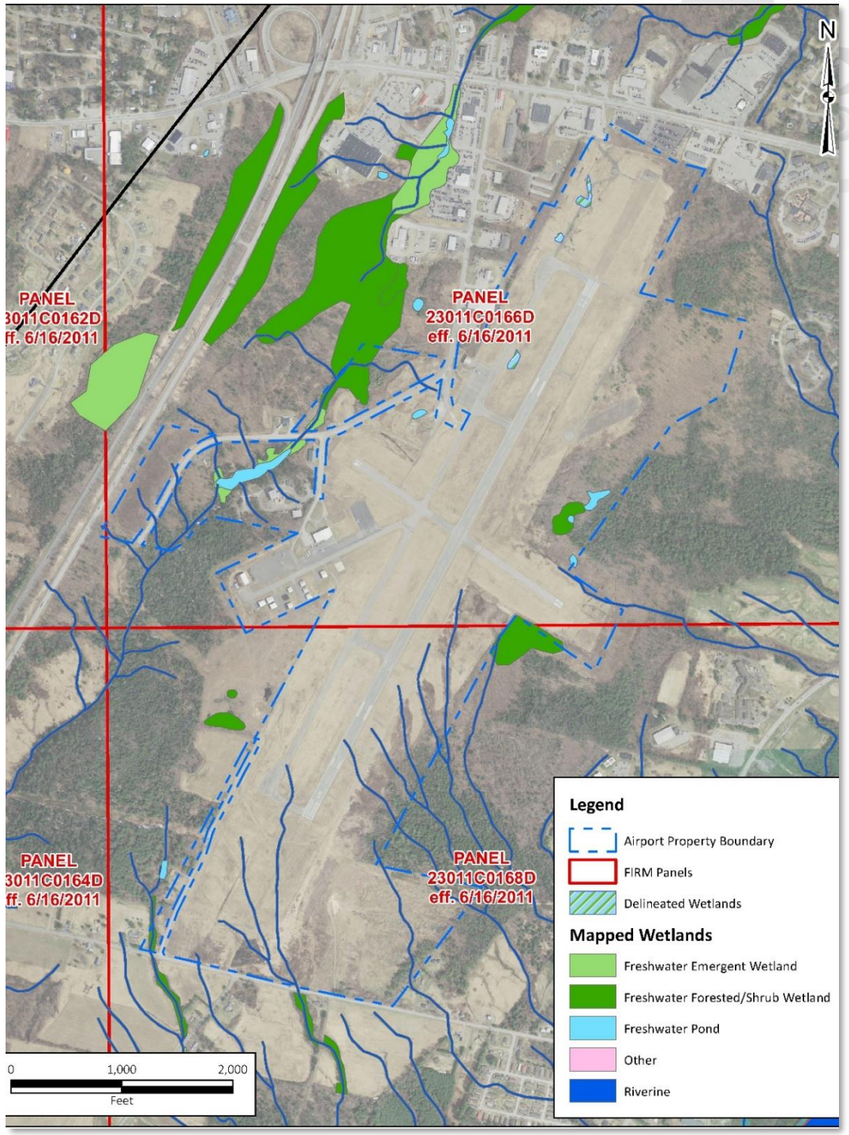
2.3.3. Wild and Scenic Rivers

There are no federal wild and scenic rivers on or adjacent to Airport property. The State of Maine protects outstanding rivers and river segments under Section 480-P of the NRPA[1]. According to NRPA, the Kennebec River from Georgetown to its confluence with the Sebasticook River in Winslow is listed as an outstanding river. The portion of the Kennebec River and its confluence with the Sebasticook River is approximately two miles east of the Airport.

2.3.4. Floodplains

According to the Flood Insurance Rate Map (FIRM) panels depicting the Airport (FIRM 23011C0166D

Figure 2-1: Wetland and Surface Waters



Sources: FEMA National Flood Hazard Layer, National Wetland Inventory, McFarland Johnson 2020 wetland delineation.

[1] http://www.mainelegislature.org/legis/statutes/38/title38sec480-P.html

and FIRM 23011C0168D) the Airport is not located within a regulatory floodway or floodplain.

2.3.5. Groundwater

The Maine Geologic Survey published the Significant Sand and Gravel Aquifers in the Waterville Quadrangle map on January 1, 2000. According to the map, there are no significant sand and gravel aquifers near the Airport.

2.4. Coastal Resources

The Coastal Zone Management Act is a federal program that provides for the management and protection of all the nation's oceans and Great Lakes coasts. The Airport is not located within the state's mapped coastal zone management areas.

2.5. Department of Transportation Act, Section 4(f) Resources

Section 4(f) of the Department of Transportation Act of 1966 protects publicly owned parks, recreation areas, wildlife and waterfowl refuges, and historic sites of national, state, or local significance from development unless there are no feasible alternatives. The closest potential Section 4(f) resource to the limits of the project is the Pine Ridge Municipal Golf Course and Rummels Field, which are adjacent to the eastern boundary of the airport.

2.6. Historic Resources

Consultation with the Maine Historic Preservation Commission (MHPC) indicated that the Airport is eligible for listing in the National Register of Historic Places in 2004, and any future improvements subject to NEPA will require review under Section 106. Additionally, there is potential for the presence of a homestead on the north side of Webb Road and several structures west of Mitchell Road. MHPC recommended additional consultation prior to any ground-disturbing activities in those areas. A copy of MHPC correspondence is included in **Appendix B**.

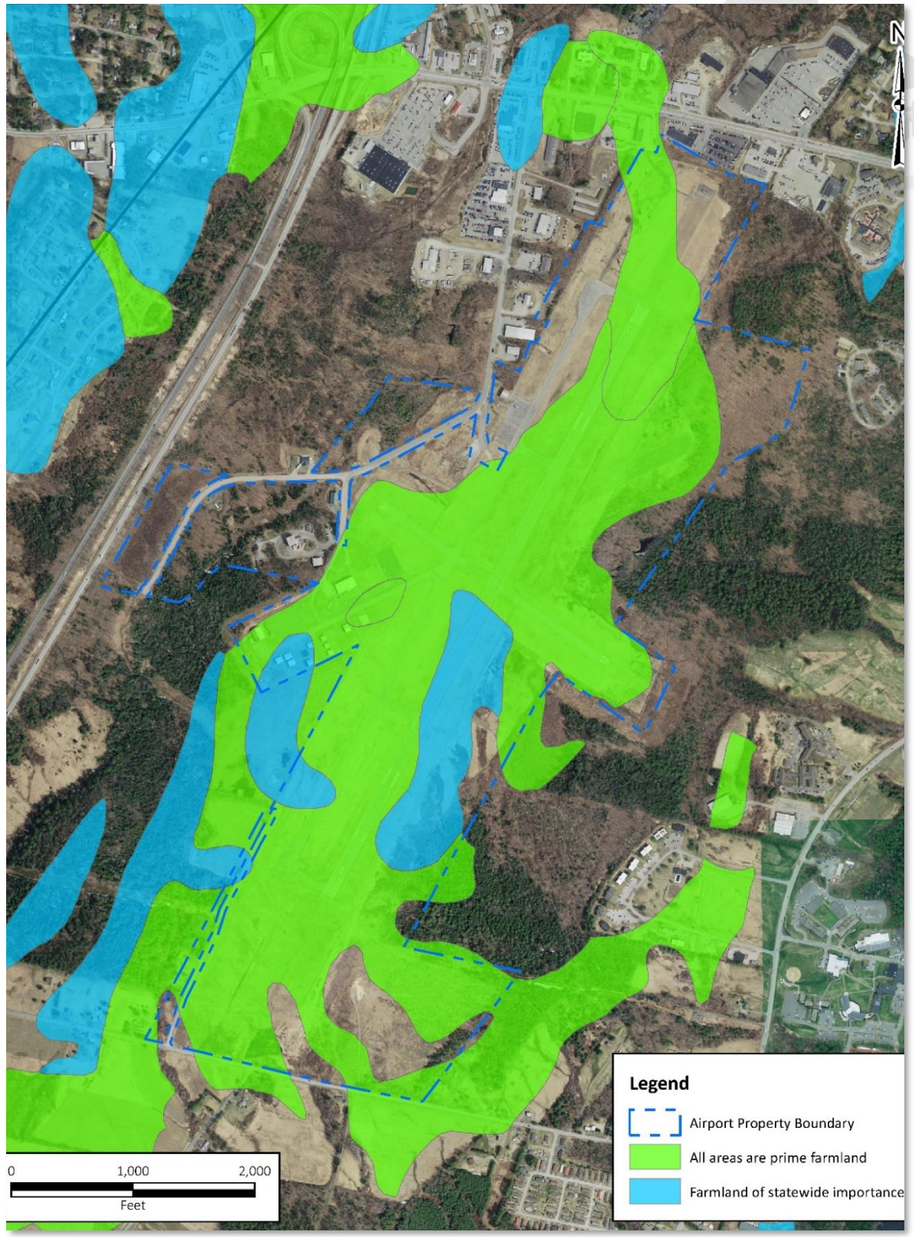
2.7. Farmlands

The Farmland Protection Policy Act (FPPA), 7 CFR Part 658, requires federal agencies to consider project alternatives that will minimize unnecessary and irreversible conversion of farmland to non-agricultural uses. For the purposes of the FPPA, farmland refers to soils classified as prime farmland, unique farmland, and land of statewide or local importance. According to the U.S. Natural Resource Conservation Service (NRCS) Web Soil Survey, accessed on November 21, 2022, approximately 59 percent (241.8 acres) of the Airport is classified as prime farmland soils and eight percent (32.5 acres) is classified as farmland of statewide importance. Farmland soils on airport property are shown in **Figure 2-2**.

FPPA does not apply to land already committed to "urban development or water storage." Airport property that has been previously committed to urban development or current airport utilization and development would not be subject to the FPPA regulations.

The Maine Agriculture Protection Act protects farmers from neighbors' complaints about noise, odor, or other aspects of agricultural operations. There are no zoned agricultural areas in the vicinity of the Airport.

Figure 2-2: Farmlands



Source: Natural Resource Conservation Service, Farmland Classification.

2.8. Noise

Aircraft noise emissions, inherent to the operation of an airport, can adversely impact land use compatibility between an airport and surrounding properties, particularly in the presence of noise-sensitive receptors. Churches, hospitals, schools, amphitheaters, and residential districts are receptors that are sensitive to elevated noise levels. Recreational areas and some commercial uses are moderately sensitive to elevated noise levels. Therefore, it is important to predict any change in noise levels associated with airport development, to determine the significance, if any, of the impact on noise-sensitive land-uses. Then, abatement measures can be incorporated into airport development plans to avoid or minimize the impacts.

2.9. Visual Effects

The airport is a publicly owned, general aviation airport. Light emissions are typically one of the greatest concerns for residents in neighborhoods, as well as users of other incompatible land uses, adjacent to an airport that could be directly impacted by a change in lighting. Given the Airport's size, location, history, and surrounding land use, an increase in light emissions is unlikely to be

significant. However, future projects that may result in any lighting changes or other visual changes to the Airport or surrounding community may require additional analysis.

2.10. Air Quality

The Airport is in Kennebec County, which the EPA does not currently list as an area of nonattainment or maintenance for NAAQS. Most Airport projects will not cause or create a reasonably foreseeable emissions increase, which can be sufficiently documented and disclosed through a qualitative air quality assessment to satisfy the requirements of the Clean Air Act (CAA) and NEPA. If large-scale projects are proposed that may create an increase in emissions, a full emissions inventory will be required.

2.11. Hazardous Materials and Solid Waste

A Hazardous Waste/Contaminated Material (HWCM) desktop screening was conducted to determine the potential for the presence of HWCM on or in the vicinity of Airport property. The screening involved the review of online governmental databases and Environmental Database Reports provided by Nationwide Environmental Title Research Online (NETROnline). An environmental regulatory agency records review of this nature is based on publicly available information from state and federal agencies.

Two MEDEP (Maine Department of Environmental Protection) Resource Conservation and Recovery Act (RCRA) sites were identified within a one-mile radius of the Airport; however, these sites are not actively listed in the Maine list of remediation sites. A copy of the report is included in **Appendix B**.

Given the potential for soil and groundwater contamination to exist on Airport property, as each project is proposed, they will be evaluated for their specific potential to encounter chemical, petroleum, or hazardous materials in direct consultation with MEDEP and EPA. If previously unidentified chemical, hazardous, or petroleum-related wastes are encountered during the construction of any future proposed projects, the MEDEP will be notified and the wastes will be handled and disposed of based on consultation with the MEDEP and in accordance with all applicable federal, state, and local regulations.

As projects are proposed, they will be evaluated for their specific potential to encounter chemical, petroleum, or hazardous materials in direct consultation with DEP and EPA. If previously unidentified chemical, hazardous, or petroleum-related wastes are encountered during the construction of any future proposed projects, the wastes will be handled and disposed of in accordance with all applicable federal, state, and local regulations.

2.11.1. Per- and Polyfluoroalkyl Substances (PFAS)

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two man-made chemicals that were commonly used in household and industrial products, and historically in firefighting foams. PFOA and PFOS are persistent in the environment and have been increasingly tested for, and found in groundwater, often in drinking water wells. While PFAS is not currently regulated, in 2022 the EPA issued a Health Advisory at 0.004 parts per trillion (ppt) in drinking water for PFOA and 0.02 ppt for PFOS.

The MEDEP provides information about sites where PFOA and PFOS may have been detected. The closest sampled site to the Airport was a domestic well approximately 0.5 mile to the southwest, with undetectable amounts of PFAS in the groundwater.

2.12. Energy

The use of energy supplies and natural resources is closely linked to the construction of Airport improvements and operations. Each proposed project will be evaluated for the potential effect upon these resources and methods to reduce potential energy uses will be developed and considered during the review process.

2.13. Climate

EO 13834 was revoked and replaced in large part by Executive Order 13990 *Climate Crisis; Efforts to Protect Public Health and Environment and Restore Science* which is still waiting on implementing instructions from the CEQ. This Executive Order directs all executive departments and agencies to immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last four years that conflict with national climate objectives, and to immediately commence work to confront the climate crisis.

In 2021, the FAA released the Aviation Climate Action Plan, to provide a government approach and policy framework for the aviation sector to help meet climate goals. Actions for airports identified by this plan include seeking grants for authorized emission reduction projects and developing a resilience framework.

The FAA has not identified a significance threshold for Greenhouse Gas (GHG) emissions, as there is no current accepted method of determining the level of significance applicable to airport projects given the small percentage of emissions they contribute. Any increase in emissions of GHGs as the

result of a proposed action at the Airport would be considered negligible in comparison with U.S. annual emissions and therefore would not have a significant impact on global climate change.

NEPA requires the consideration of GHGs and the evaluation of potential incremental changes in emissions that would result from the proposed action and alternatives compared to no-action alternatives. Where proposed projects would increase GHG emissions, the emissions should be assessed either qualitatively or quantitatively as described in the order. However, there are no significant thresholds or federal standards for GHG emissions applicable to aviation as of December 2022.

2.14. Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks

Proposed projects will be evaluated for the potential effects on the community economy, social structure, and necessary community health and safety services as specific alternatives are developed during the design process.

Environmental justice evaluations consider the potential of federal actions, including those involving federally obligated airports, to cause a disproportionate and adverse effect on low-income or minority populations. The Airport is in the City of Waterville, near the border of Winslow, both in Kennebec County. Socioeconomic data for the area is shown in **Table 2-1**.

Table 2-1: Socioeconomic Data for Waterville Area

Census Category	National Average	City of Waterville	Kennebec County
Total Population	329,725,481	15,872	123,293
White Population	74.5%	94.6%	97.7%
Minority Population	25.5%	5.4%	2.3%
Population Under Age 5	5.9%	4.2%	4.8%
Population Aged 65 & Older	16.0%	17.2%	19.9%
Individuals Below Poverty Level	12.6%	23.1%	12.0%
Median Household Income	$69,021	$41,245	$58,097

Source: US Census Bureau – 2021 American Community Survey 5-Year Estimates.

The MEDEP does not have published environmental justice maps; however, based on the information above, Airport development is not likely to result in disproportionately high adverse human health or environmental effects on children, the elderly, minorities, or low-income populations.

Waterville Regional Airport

FORECASTS OF AVIATION DEMAND
CHAPTER 3

McFARLAND JOHNSON

3. FORECASTS OF AVIATION DEMAND

Forecasts of aviation demand are a key element in airport planning. Demand forecasts, based on the service area and airport characteristics, provide a basis for determining the type, size, and timing of aviation facility development and are a platform upon which this Master Plan Update is based. Consequently, these forecasts influence all phases of the planning process.

Forecasting future activity involves both quantitative and qualitative considerations. The forecasting approach in this analysis identifies several methodologies to project future aviation demand, applies those methodologies to each forecast area of interest, and identifies a preferred forecast of activity growth at Waterville Regional Airport (WVL or the Airport).

GA activity is determined by the size of the local population, corresponding business activity, per person income, the cost of flying, services available at a particular airport, the national economy, and, more directly, the number of based aircraft at an airport. This chapter provides forecasts of aviation demand for a 20-year planning period (2023-2042). The projections of aviation activity provide a basis for insight into the type, size, and timing of aviation facility development in the future.

This chapter is organized into the following sections:

- Forecast Methodologies
- Based Aircraft
- Operations
- Air Passengers
- Comparison to FAA Terminal Area Forecast
- Critical Aircraft

3.1. Forecast Methodologies

The following forecast methodologies were considered for the WVL forecast:

- **Regression Analysis:** Since historical data has been mostly flatlined, regression analyses cannot determine a correlation even if one exists. This type of forecasting is not accurate for WVL and was not used.

- **Local Economic Conditions:** Generally, growing populations and incomes tend to result in a growing airport. **Table 3-1** shows local economic compound annual growth rates (CAGR). The County personal income forecast was chosen as the preferred forecast for based aircraft.

Table 3-1: Economic Data CAGR

CAGR	Maine Population	Maine Employment	Maine Personal Income	County Population	County Employment	County Personal Income
2017-22	0.5%	0.5%	2.2%	0.4%	0.4%	2.1%
2022-40	0.2%	0.8%	1.8%	0.2%	0.6%	1.7%

Source: Woods and Poole, 2023.

- **Trend Analysis:** It is common to collect aircraft operations records from airport control towers at airports for the most accurate historical data. However, WVL is a non-towered airport, which have inaccurately recorded operations counts. To address that, the State of Maine implemented a record collection effort through the General Audio Recording Device (GARD) system program. WVL has been recording operations using the GARD system that uses acoustic noise to estimate aircraft operations counts. The Airport collected GARD data but this system does not accurately, nor consistently, record the operation counts, and has resulted in incomplete data sets for 2020-2022. It is likely that the GARD data accounts for 50-60% of total aircraft operations. The Federal Aviation Administration (FAA) requires aircraft flying into specific airspaces to have ADS-B installed. This allows airports, such as WVL, to install a recording device that can track ADS-B aircraft with ADS-B transponders. Though the ADS-B data provides insight into the airport operations, the historical data does not provide more than a year of consistent data and is therefore insufficient to serve as historical data. In this case, the FAA Terminal Area Forecast (TAF) is the only consistent record of aircraft operations at the Airport.

  Table 3-2 presents the CAGR trend analysis results for the short-term, medium-term, and long-term based on historic FAA Traffic Flow Management System Count (TFMSC) and FAA TAF data for WVL. Historical growth informed the range of operations forecasts considered.

Table 3-2: WVL Operations/Fuel Sale CAGR

	5-Year Trend	10-Year Trend	20-Year Trend
FAA TFMSC (historical)	3.1%	2.7%	-1.4%
FAA TAF (historical)	0.0%	1.8%	-4.0%
Jet A (historical)	19.3%*	-	-
Avgas/100LL (historical)	3.0%*	-	-

* Fuel history was only available for four years. Percentages shown are 4-year CAGRs.

Source: FAA TFMSC, FAA TAF, WVL Fuel Sales, FAA Aerospace Forecasts, ME SASP, and McFarland Johnson analysis, 2023.

- **Market Share Analysis:** Market share analysis applies a method for projecting future aeronautical activity that can be compared to any measure for which a reliable higher-level forecast is available. The methodology uses historical market share as a basis for projecting future market share. A "top-down" method of forecasting uses forecasts of larger demand aggregates to derive forecasts for smaller elements of the system – in this case Waterville Regional Airport. According to the FAA's 2022 TAF, WVL has had a consistent market of based aircraft and a slight increase of market share of operations. This forecast was not used as the FAA's TAF is flatlined for most Maine airports and therefore does not provide adequate or accurate information to inform the WVL forecasts.

- **National Growth Rate:** The FAA Aerospace Forecasts provides national growth projections for the aviation industry. The FAA's Aerospace Forecasts FY 2022-2042 identifies projected CAGR for GA aircraft through the end of its forecast period (2042).

  The FAA forecasts GA operations to increase modestly between 2022 and 2042 in the United States. Some factors contributing to the limited growth rates nationally include the decrease

in leisure GA activity with non-corporate aircraft. Driving factors in the reduction of leisure GA activity are unfavorable pilot demographics, overall increasing cost of aircraft ownership (including fuel prices), availability of lower cost alternatives for aviation recreational usage, and new aircraft delivery rates below the retirement rate of the aging fleet.[1] Jet aircraft, on the other hand, are expected to provide the highest increase in hours flown. GA, especially business aviation, became more attractive and added flexibility to flyers. The growth in the U.S. GDP is a compound catalyst for the growth in the turbine and jet fleets. This resulted in jet deliveries increasing by 14.7 percent and turboprop deliveries rising 18.6 percent in 2021.

These growth rates are identified in **Table 3-3**. National growth forecasts informed the range of operations forecasts considered. These growth rates were selected to be the preferred operations forecast.

Table 3-3: FAA Aerospace Forecast 2022-2042 Growth Rates

Operations at FAA and Contract Towers									
FY	Air Carrier	Air Taxi/ Commuter	GA Itn.	GA Local	GA Total	MIL Itn.	MIL Local	MIL Total	Total
2022-32	5.3%	0.0%	0.8%	1.0%	0.9%	0.0%	0.0%	0.0%	2.2%
2022-42	3.4%	0.5%	0.6%	0.7%	0.6%	0.0%	0.0%	0.0%	1.5%

Active General Aviation and Air Taxi Aircraft (Based Aircraft)								
FY	SEP	MEP	Total Piston	Turbo-prop	Turbo Jet	Rotorcraft Total	Other	Total GA Fleet
2022-32	-1.0%	-0.4%	-0.9%	0.2%	2.9%	1.5%	1.2%	0.0%
2022-42	-0.9%	-0.3%	-0.8%	0.6%	2.6%	1.5%	1.0%	0.1%

Source: FAA Aerospace Forecast 2022-2042.

- **Operations per Based Aircraft:** Operations per based aircraft (OPBA) assigns a representative level of aircraft operations for each based aircraft. For non-towered airports, this methodology is recommended by the FAA to project the level of activity using the forecast of based aircraft once established. At WVL, there are approximately 800 total OPBA.

- **Local Factors:** As described further in Section 3.2.2, local factors play an important role in forecasting based aircraft and operations. There are unique nuances to each airport that can impact its growth areas. These local factors, especially private developers planning to build hangars, are a good indicator for forecast considerations. These local factors helped inform the decision for the based aircraft preferred forecast.

3.2. Based Aircraft

Forecasting the number and type of based aircraft is critical to planning future GA facilities, especially for the type and size of hangars and aircraft movement and parking areas. This section takes the different forecasting methodologies into account and incorporates local factors when calculating low, medium, and high growth forecasts for WVL.

3.2.1. Historical Based Aircraft

The FAA defines a based aircraft as an aircraft that is operational and airworthy and is based at the facility in question. Based aircraft are major contributors to the economics of an airport as they generate revenue from tie-down, hangar rentals, and fuel sales. Airport records are consistent with the FAA TAF for the total number of based aircraft. In the past ten years, based aircraft have varied from 18 to 26 and have been consistent at 18-20 aircraft since 2018. Part of what could be hampering growth is a lack of hangar space. Based aircraft owners in Maine tend to want to shelter their aircraft in hangars, especially during the winter months. Aircraft owners approach WVL looking for hangar space on a regular basis. With the lack of available hangar space, there is little to no opportunity for based aircraft growth.

3.2.2. Local Factors

A variety of factors influence the total number of aircraft forecast to be based at WVL. The number of hangars at an airport is a significant factor in determining based aircraft. In New England, with harsh winters and frequent precipitation, aircraft owners prefer to store aircraft inside hangars. The number and availability of hangar space will typically increase the number of based aircraft.

A hangar developer has expressed interest in constructing one 8-unit t-hangar building and a 7-unit building off Taxiway D in summer 2023. The developer is working on a proposal at the time of the writing (spring 2023). The airport manager also indicated that there has been sufficient interest in hangar storage, which would fill these hangars shortly after construction. This would mean short-term based aircraft numbers could see a boost.

Based on conversations with the flight school Airlink, they anticipate moving two current single engine aircraft from Brunswick to WVL if there were hangar space. Additionally, the partnership between the Airport, Airlink, and Colby College has increased demand and Airlink anticipates a growth of 4-5 based aircraft (including one multi-engine aircraft) by 2027.

Additionally, Jump and Raft, an airport tenant that offers skydiving and white-water rafting services, was consulted for their plans. They operate two Cessna 182s for the skydiving portion of their business, typically from May through late September/early October. Some years, depending on weather, they can operate into November. Their busiest months are July and August wherein they operate four to five days a week. They disclosed plans, which include upgrading one of the 182s for a Cessna 210, with the advantage being more efficient and increased operations.

Jump and Raft currently leases space in the terminal building and hangars their aircraft at WVL year-round. Plans (three to five years) include acquiring their own hangar if one on the airfield becomes available. A challenge they face is their hangar needs to have accessibility from the public side, which limits potential existing hangars since not all hangars have landside access. They indicated a "standard" 32-foot by 32-foot hangar would satisfy all their aircraft and gear storage needs. Ideally,

[1] FAA Aerospace Forecast FY 2022–2042.

they would like to site a hangar on a parcel in the north end of the Airport with plumbing and electrical infrastructure they could build-to-suit a hangar for their needs. They would like to incorporate the availability to provide food and beverage service to their clients.

3.2.3. Based Aircraft Forecast

The FAA TAF provides a forecast of based aircraft that remains the same throughout the 20-year planning period, which is consistent with historical trends. The following forecast methodologies were used to allow for a range of options for forecast based aircraft at WVL.

Low – The FAA TAF is a basic forecast generated by the FAA that features national and regional growth attributes in its composition. The FAA requires a master plan forecast to be within 10 percent of the TAF as a benchmark in the development of new forecasts. The current TAF published by the FAA shows no growth throughout the 20-year planning period. This methodology represents the low-end forecast operations at WVL.

Medium – The medium forecast scenario represents the middle of forecast at WVL. This scenario takes into consideration the forecast growth of Kennebec County personal income between 2022 and 2040 (1.7 percent CAGR). Incidentally, this encompasses the growth of a proposed 8-unit t-hangar development.

High – The high forecast scenario represents the high end of forecast operations at WVL. This scenario considers the construction of two t-hangar buildings, which would result in 15 additional based aircraft filling those t-hangars. Additionally, this forecast includes five additional Airlink flight school aircraft. While this based aircraft growth is spread evenly throughout the forecast period, this growth to 40 based aircraft could occur faster than forecast based on demand.

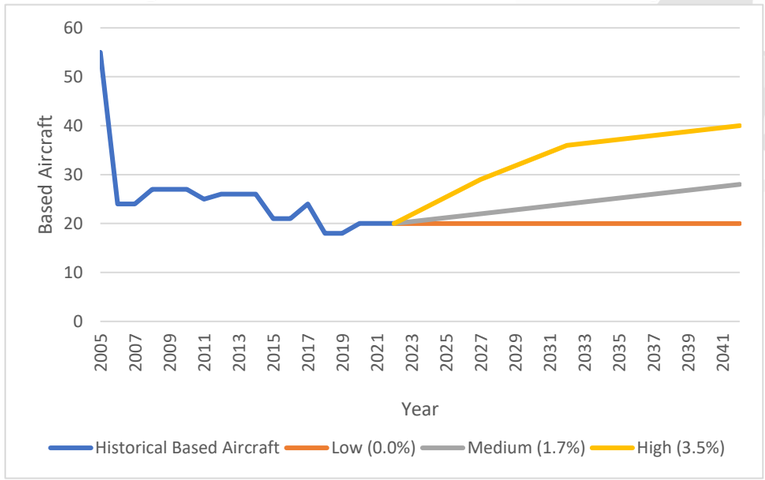
The results are shown in **Table 3-4** and **Figure 3-1**, which present a range of what could reasonably be considered at WVL. The Master Plan recommends the medium growth forecast. Should the developer construct a t-hangar building in 2023, the Master Plan recommends that the high growth forecast should be used for planning purposes.

Table 3-4: Forecast of Based Aircraft

	Low – TAF 0%	Medium – County Personal Income Growth 1.7%	High – Anticipated Hangar Growth 3.5%
2022	20	20	20
2027	20	22	29
2032	20	24	36
2042	20	28	40

Source: McFarland Johnson analysis, 2023.

Figure 3-1: Based Aircraft Forecasts Summary



Sources: FAA TAF and McFarland Johnson analysis, 2023.

3.3. Operations

The FAA defines an aircraft operation as a takeoff or a landing (counted separately) and categorizes the operations by aircraft type and purpose. These categories include commercial (air taxi), GA (both recreational and corporate), and military.

3.3.1. Historical Activity

As noted in Section 3.1.2, the only consistent historical data is the TAF which is shown in **Table 3-5**.

Table 3-5: Historical Aircraft Operations

Year	GA Itinerant	GA Local	Military	Total
2012	5,500	8,000	50	13,550
2013	5,500	8,000	50	13,550
2014	8,000	8,000	200	16,200
2015	8,000	8,000	200	16,200
2016	8,000	8,000	200	16,200
2017	8,000	8,000	200	16,200
2018	8,000	8,000	200	16,200
2019	8,000	8,000	200	16,200
2020	8,000	8,000	200	16,200
2021	8,000	8,000	200	16,200
2022	8,000	8,000	200	16,200

Source: FAA Terminal Area Forecast, 2023

Though the GARD system acts as a baseline to count operations, there has been a lack of reliable GARD data with gaps in data over the past five years. Therefore, the historical operations trend analysis was not a good predictor of forecast operations. This study also analyzed the historical fuel sales data as an indicator of operations at the Airport.

3.3.2. Operations Forecast

The Master Plan used the following forecast methodologies to allow for a range of options for forecasted operations at WVL. None of these forecast scenarios include air taxi operations, since there were none included in the last 10 years of TAF data. The 2022 operations by type are shown in **Table 3-6**.

Table 3-6: 2022 Operations by Type

Category	Percent	Representative Aircraft
Single Engine	78%	Beech Airliner 99, Cessna 172, Cirrus SR-22, Beech Bonanzas
Multi-Engine /Turboprop	11%	Beech Super King Air 350, Pilatus PC-12
Jet	2%	Embraer Phenom 300, Learjet 60, Cessna Excel/XLS

Sources: FAA TFMSC and McFarland Johnson analysis, 2023.

Low – The FAA TAF is a basic forecast generated by the FAA that features national and regional growth attributes in its composition. The current TAF published by the FAA shows no growth throughout the 20-year planning period. This methodology represents the low-end forecast operations at WVL.

Medium – The medium forecast scenario assumes the FAA's Aerospace Forecast growth rates as shown in **Table 3-3**, which averages out to 0.6 percent CAGR for GA total operations.

High – This scenario considers the total OPBA based on the medium growth based aircraft forecast. Incidentally, this CAGR is very similar to the Kennebec County forecast personal income CAGR of 1.7 percent as well as the 1.8 percent CAGR of 10-year historical operations growth.

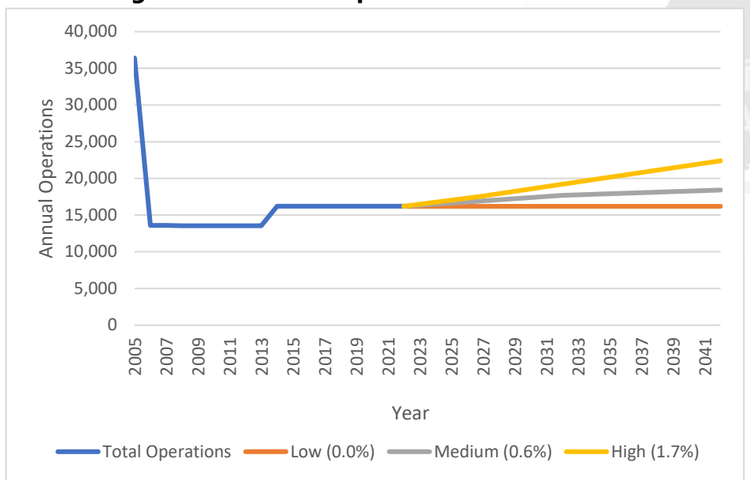
Results of the forecasts are shown in **Table 3-7** and **Figure 3-2**. The medium growth operations forecast was chosen as the preferred since it is in line with the FAA's Aerospace Forecast. Should the developer construct a t-hangar building in 2023, the Master Plan recommends that the 800 OPBA should be applied to the based aircraft high growth forecast and used for planning purposes.

Table 3-7: Operations Forecast Scenarios

	Low – TAF 0.0%	Medium – FAA Aerospace Forecast 0.6%	High – OPBA 1.7%
Base Year	16,200	16,200	16,200
2027	16,200	16,933	17,800
2032	16,200	17,701	19,400
2042	16,200	18,414	22,600

Sources: FAA TAF, FAA Aerospace Forecast, Woods & Poole, and McFarland Johnson analysis, 2023.

Figure 3-2: Annual Operations Forecast Scenarios



Sources: FAA TAF and McFarland Johnson analysis, 2023.

3.3.2.1. Instrument Operations

Annual instrument arrivals are important to an airport when planning for capacity and demand. Most GA pilots are visual flight rules (VFR) pilots, but those who are instrument flight rules (IFR) certified are recommended to file an IFR flight plan. Flight plans are filed for both VFR and IFR flights but are mostly used for IFR or combined IFR and VFR flights. The FAA's TFMSC identified almost 1,500 instrument operations in 2022. In 2022, the TAF reported WVL to have 16,200 total aircraft operations of which 8,000 were itinerant GA operations. The instrument approaches historically account for 12-18 percent of GA itinerant operations comparing the TFMSC to TAF annual operations. The 10-year CAGR of instrument operations has been 2.6 percent and the 5-year CAGR has been 3.0 percent. The Master Plan forecasts instrument operations to maintain the current percentage of total instrument operations to itinerant GA operations resulting in a total of 1,300 to 2,100 instrument operations in 2042.

3.3.3. Peaking Characteristics

Annual projections provide a good overview of activity at an airport but fail to reflect the operational characteristics of the facility. Facility requirements are not driven by annual demand but rather by the capacity shortfalls and delays experienced during times of peak operational activity. Therefore, the Master Plan provides forecasts for the peak month, the average day in the peak month (ADPM), and the peak hour of the ADPM. The values for these metrics were calculated using the methodology in FAA Advisory Circular 150/5360-13A, *Airport Terminal Planning*, with exception of the peak month calculation. Airport peaking characteristics were calculated using the following assumptions:

- **Peak Month Operation:** This level of activity is defined as the calendar month when peak aircraft operations occur. At WVL, the peak month is in the summer (July) with occasional October peaks. In the past five years, the median peak month operations as a total of annual operations according to FAA's TFMSC was at or over 14 percent for multiple years.

- **Average Day/Peak Month (ADPM):** This level of operation is defined as the average day within the peak month determined by dividing peak month operations by number of days within the peak month (in this case 30).
- **Peak Hour Operation:** This level of operation is defined as the peak hour within the design day, assuming 12 percent of daily operations in the design hour.

The peaking characteristics for the preferred operations forecast are detailed in **Table 3-8**.

Table 3-8: Preferred Operations Peaking Characteristics

Year	Peak Month	ADPM	Peak Hour
Base Year	2,268	76	9
2027	2,371	79	9
2032	2,478	83	10
2042	2,578	86	10

Source: McFarland Johnson analysis, 2023.

3.4. Air Passengers

GA passengers consist of passengers traveling to/from the Airport (transient) using GA facilities (excluding pilots). Unlike commercial airline passengers and charters, the FAA does not record the number of GA passengers using the Airport.

To estimate GA passenger enplanements at the Airport, guidance pertaining to the sizing of GA Terminal Buildings contained in *ACRP Report 113, Guidebook on General Aviation Facility Planning* (ACRP 113) is utilized to establish a reasonable point of reference. ACRP 113 assumes a factor of 2.5 people (pilots and passengers) per operation. The analysis includes a planning factor of 2.5 people to baseline GA itinerant operations to determine the projected GA passenger and crew estimate. Additionally, the analysis used a reduced 1.5 people per GA itinerant operation factor to forecast only passengers. The results are presented in **Table 3-9** showing the 2042 GA passengers range for the medium and high growth operations scenarios for facility planning purposes.

Table 3-9: GA Passengers

Item	GA Passengers and Crew	GA Passengers Only
Baseline GA Itinerant Operations	8,000	8,000
Planning Factor (People per Operation)	2.5	1.5
Baseline GA Passengers	20,000	12,000
2042 GA Passengers	22,542 - 27,750	13,525 - 16,650

Source: McFarland Johnson, 2023.

3.5. Comparison to FAA Terminal Area Forecast

To estimate future aviation demand, the analysis used a variety of analytical techniques to explore a range of potential realities, and a preferred forecast is determined after considering pertinent subjective considerations. As such, the forecast prepared herein is developed using several methodologies. Various methods of forecasting aviation demand exist and are widely used throughout the industry. Several standard methods have been reviewed to develop the forecast for WVL and the preferred is shown in **Table 3-10** compared to the FAA's TAF.

Table 3-10: WVL and TAF Forecasts Comparison

	Actual	Forecast		
	Baseline	2027	2032	2042
FAA TAF				
Total Operations	16,200	16,200	16,200	16,200
Based Aircraft	20	20	20	20
Master Plan Forecast				
Total Operations	16,200	16,933	17,701	18,414
Based Aircraft	20	22	24	28
Pct. Difference From TAF				
Total Operations	0.0%	4.5%	9.3%	13.7%
Based Aircraft	0.0%	10.0%	20.0%	40.0%

Sources: FAA TAF, 2023 and McFarland Johnson analysis, 2023.

The FAA TAF is a flat line (no growth) for general aviation airports and represents a top-down market share analysis. The forecast this Master Plan presents is a bottoms-up forecast that takes into consideration the national growth, interest in building hangars, and the airport manager getting calls about aircraft space frequently. Private developers are not willing to put their money into hangars they are not certain they will fill. The Master Plan forecast is realistic and consistent with local conditions.

Considering WVL's existing 20 based aircraft, only four additional based aircraft would exceed the 10-year 15 percent TAF growth comparison. The planned t-hangar development will exceed the TAF growth comparison guidelines even if the first building is less than half full in five years.

3.6. Critical Aircraft

The Master Plan used FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination* to determine the current and future critical aircraft for the Airport that represents the aircraft or group of aircraft with similar characteristics with 500 or more annual operations. The critical aircraft forecast used the five-year historical operations data from the FAA TFMSC. While this source does not capture 100 percent of airport activity, particularly local operations not filing formal flight plans, the database does provide an understanding of airport activity and should be relatively accurate with respect to the more complex aircraft as they are more likely to fly under IFR with a filed flight plan.

Table 3-11 reveals the level of airport activity by aircraft approach category (AAC) and airplane design group (ADG) for calendar year 2022. During this period, an analysis identified a substantial number of AAC B aircraft and combined ADG II and III aircraft operations.

By the end of the planning period in 2042, the critical aircraft is expected to remain a B-II aircraft. **Table 3-12** below highlights the important features of the existing and future critical aircraft.

Table 3-11: WVL TFMSC 2022

ADG	Aircraft Approach Category				Total
	A	B	C	D	
I	106	759	53	0	918
II	69	350	56	0	479[1]
III	0	2	8	10	20
Total	175	1,111	117	10	

[1] Includes four operations of a Cessna Longitude, which is an ADG II aircraft with an undefined AAC.
Sources: WVL TFMSC 2022 and McFarland Johnson, 2023.

Table 3-12: Existing and Future Critical Aircraft (Airport and Runway 5-23)

Characteristics	Beech Super King Air 350
Length	46.67’
Wingspan	57.92’
Tail Height	14.33
MTOW	14,000 lbs.
Approach Speed	107 knots
AAC	B
ADG	II
TDG	2A

Sources: FAA AC 150/5300-13B, 2023; https://www.aircharterservice.com/aircraft-guide/private/hawkerbeechcraftcorp-usa/beechcraftkingair350350i, accessed Jan. 5, 2023.

3.6.1. Runway 14-32

Chapter 4, *Facility Requirements*, of this Master Plan will determine if Runway 14-32 is a crosswind, secondary, or additional runway. The critical aircraft for Runway 14-32 was determined to be A-I based on 2022 ADS-B data. Student pilots use the runway for training operations of A-I aircraft, which may not show up on ADS-B or TFMSC data.

3.6.2. Taxiway Design Group (TDG)

Like critical aircraft, the design TDG for the airport is an aircraft or group of aircraft with similar characteristics that have 500 or more annual operations at the airport. At WVL, 2022 TFMSC operations show over 450 operations of aircraft that have a TDG-1B or larger (2A, 2B, and 3). It is reasonable to assume the FAA TFMSC database may not capture 5-10 percent of TDG-1B or larger aircraft operations. Therefore, the existing and future taxiway design standard at the Airport is TDG-1B.

Waterville Regional Airport

FACILITY REQUIREMENTS CHAPTER 4

McFARLAND JOHNSON

4. FACILITY REQUIREMENTS

This chapter presents the airside and landside facility requirements necessary to accommodate existing and forecasted demand at Waterville Regional Airport (WVL or the Airport) in accordance with Federal Aviation Administration (FAA) design criteria and safety standards. The facility requirements are based upon several sources, including the aviation demand forecasts presented in Chapter 3, *Forecasts of Aviation Demand*; FAA Advisory Circular (AC) 150/5300-13B, *Airport Design;* and 14 Code of Federal Regulations (CFR) Part 77, *Objects Affecting Navigable Airspace*. The findings of this chapter serve as the basis for the formulation of Airport alternatives and development recommendations. The major components of this chapter are listed below:

- Airfield Capacity Analysis
- Airside Facility Requirements
- Landside Facility Requirements

4.1. Airfield Capacity Analysis

Current activity is substantially below 90,000 operations that merit an analysis of runway capacity.

Recommendation: Conduct a capacity analysis if the Airport reaches 90,000 or more annual operations during the planning period.

4.2. Airside Facility Requirements

Airfield facility requirements address the items that are directly related to the arrival and departure of aircraft, primarily runways and taxiways and their associated safety areas. To assure that all runway and taxiway systems are correctly designed, the FAA has established criteria for use in planning and design of airfield facilities. The selection of appropriate FAA design standards for the development of airfield facilities is based on the characteristics of the most demanding aircraft expected to use an airport or that facility at an airport on a regular basis (500 operations or more per year). Correctly identifying the future aircraft types that will regularly use an airport is particularly important because the design standards that are selected for those aircraft will impact airport development for years to come. Using the appropriate standards will ensure that the facilities can safely accommodate aircraft using the Airport today as well as aircraft that are projected to use the Airport in the future.

The FAA approved forecasts indicate that the existing and future design aircraft for WVL is the Beechcraft Super King Air 350 (B350), which is a B-II aircraft. While the Airport has its own airport reference code (ARC), each runway has its own runway design code (RDC) based on the critical aircraft of each runway. Runway 5-23 is a B-II-4000 runway meaning Runway 5-23 has a runway visual range (RVR) of 4,000 feet and visibility minimums of ¾ SM (statute mile). Runway 14-32 is an RDC of A/B-I-VIS runway, meaning the runway only has visual approaches. Both runways are anticipated to maintain their current critical aircraft throughout the planning period. The following aircraft facilities requirements are covered in this section as they relate to the classification of the Airport:

- Runway Length
- Runway Width
- Runway Strength
- Runway Orientation
- Runway Designation
- Runway Safety Areas
- Runway Object Free Areas
- Runway Obstacle Free Zones
- Runway Protection Zones
- Runway Visibility Zone
- Taxiways
- Airport Markings and Lighting
- Instrument Approaches, NAVAIDs, and Visual Aids
- Deicing Area
- Airfield Facility Requirements Summary

4.2.1. Runway Length

A wide variety of aircraft use the Airport daily. These aircraft, both large and small, have different runway requirements. For example, in some cases, smaller or older aircraft may require more runway length than larger or newer and more efficient aircraft. Several factors go into determining aircraft performance and runway requirements that must be met for an aircraft to use a particular runway. These include (but are not limited to):

- **Airport elevation**: The higher the airport elevation, the lower the air density, which translates to less air circulating through the engine resulting in less power and less lift on aircraft wings. The higher the airport elevation, the longer a runway needs to be.

- **Aircraft weight**: The heavier an aircraft, the longer it takes to takeoff or slow down. This means the heavier an aircraft (with more passengers, luggage, cargo, and/or fuel – also known as payload), the longer a runway needs to be. Aircraft flying longer distances (stage lengths) require more fuel, which results in heavier aircraft weight and longer runway needs.

- **Temperature**: The higher the temperature, the lower the air density, which means lower combustion and power for engines and lower lift on the wings. This means that the higher the temperature, the more runway length is needed.

- **Longitudinal slope of the runway**: If the runway slopes up, it takes longer for aircraft to achieve take off speed. Similarly, if a runway slopes down, it takes longer for an aircraft to break on landing.

- **Runway condition (dry/wet/icy/contaminated)**: A dry, clean runway is the best for takeoff and landing. During rain, snow, ice, sand, dust, or other contamination, there is less traction between the wheels and the runway pavement, which results in longer runway length needed for takeoff and landing.

The FAA has two methods of determining runway length at this time: 1) published FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design,* and 2) the small aircraft runway length analysis tool (SARLAT).

The following inputs are used for WVL:

- Airport elevation: 333 feet mean sea level (MSL)
- Mean maximum temperature of the hottest month: 86 Fahrenheit
- Difference between high and low points of runway elevations:
  - Runway 5-23: 65 feet
  - Runway 14-32: 9 feet

4.2.1.1. Runway 5-23

The critical design aircraft for Runway 5-23 is a B-II aircraft, representative of the B350.

Method 1 – FAA AC: Since the B350 has a maximum takeoff weight (MTOW) of more than 12,500 pounds, Figure 3-1 from FAA AC 150/5325-4B, was used at 60 percent useful load[1]. This resulted in:

- Takeoff dry and landing runway length: 5,350 feet
- Takeoff wet runway length: 5,500 feet

Method 2 - SARLAT: The SARLAT showed that at WVL the critical aircraft resulted in:

- Aircraft taking off in dry conditions could operate at 85 percent useful load
- Aircraft taking off in wet conditions could operate at 54 percent useful load
- Aircraft can land at maximum landing weight (MLW)
- A 5,700-foot-long runway would get the critical aircraft up to 62 percent load factor in wet takeoff conditions and it allows for greater use/less weight impact of existing jets using WVL (including Part 135 operations).

Critical aircraft operations may be weight restricted with the existing runway length.

Recommendation: No runway length change for Runway 5-23 is anticipated.

4.2.1.2. Runway 14-32

The critical aircraft for Runway 14-32 is an A-I with an approach speed greater than 50 knots and a MTOW of 12,500 pounds or less.

Method 1 – FAA AC: Since the critical aircraft has a MTOW of 12,500 pounds or less, Figure 2-1 from FAA AC 150/5325-4B was used at 95 percent of fleet. This resulted in 3,200 feet of required runway length, which is more than the existing 2,301 feet of Runway 14-32 length.

Method 2 – SARLAT: The SARLAT showed that of the four representative A-I aircraft that use WVL, three have no weight limitations. Only the Piper 24 Comanche had weight limitations as shown in **Figure 4-1**.

Critical aircraft operations may be weight restricted with the existing runway length, especially during wet/contaminated conditions.

Figure 4-1: Runway 14-32 WVL SARLAT

Pressure Altitude: 333 ft | Air Temperature: 86 F | Wind Speed: 0 kts | Runway Length: 2301 ft | Gradient: 0.4 % | Surface Type: Paved

Aircraft Name	Takeoff Weight (Useful Load)		Landing at Maximum Landing Weight	
			No Correction	
	Dry	Wet	Dry	Wet
Piston				
Cessna 172 Skyhawk	2300 lbs 100 %	2300 lbs 100 %	✓	✓
Cessna 182 Skylane	2950 lbs 100 %	2950 lbs 100 %	✓	✓
Piper 24 Comanche	2251 lbs 73 %	2088 lbs 58 %	✓	✓
Piper 28B Dakota	3000 lbs 100 %	3000 lbs 100 %	✓	✓

Sources: FAA SARLAT 2023 and ADS-B 2022 operations.

Recommendation: No runway length change for Runway 14-32 is anticipated.

4.2.2. Runway Width

Runway 5-23 is 100 feet wide. B-II standards are 75 feet of runway width. Runway 14-32 is 60 feet wide. A/B-I standards are 60 feet of runway width.

Recommendation: The next runway reconstruction should include a review of the cost/benefit of keeping Runway 5-23 at 100 feet compared to a 75-foot-wide runway.

4.2.3. Runway Strength

Pavement strength requirements are related to three primary factors: 1) the weight of aircraft anticipated to use the Airport, 2) the landing gear type and geometry, and 3) the volume of aircraft operations. Airport pavement design, however, is not predicated on a particular weight that is not to be exceeded.

Current pavement strengths for both Runways 5-23 and 14-32 are shown in **Table 4-1**. Both runways support the weight of their respective critical aircraft.

[1] Median range was 335 NM for the Beech King Air, which results in a 61.5% useful load.

Table 4-1: Current Runway Strengths

Runway	Weight Bearing Capacity	Critical Aircraft
5-23	Single Wheel: 40,000 lbs. Double Wheel: 60,000 lbs. Double Tandem: 105,000 lbs.	Beechcraft Super King Air 350 Double Wheel: 15,000 lbs.[1]
14-32	Single Wheel: 25,000 lbs.	Cessna 172/182 Single Wheel: 2,550/3,100 lbs.

[1] The MTOW of the B350, listed as 14,000 lbs in Chapter 3, *Forecasts of Aviation Demand*, has been adjusted to 15,000 lbs to match the most current FAA Aircraft Characteristics Database which was updated after Chapter 3 was approved.
Sources: FAA, ADIP, 2023 and FAA AC 150/5300-13B, Aircraft Characteristics Database, Sep. 7, 2023.

Recommendation: No change.

4.2.4. Runway Orientation

A significant factor in evaluating runway orientation is the direction and speed of the prevailing winds. Ideally, all aircraft takeoff and land in the direction of the wind. A runway alignment that does not allow an aircraft to go directly in the wind creates a crosswind component (i.e., winds at an angle to the runway in use), which makes it more difficult for a pilot to guide the airplane down the intended path. The commonly used measure of degree to which a runway is aligned with the prevailing wind conditions is the wind coverage percentage, which is the percentage of time crosswind components are below an acceptable velocity. This measure indicates the percentage of time aircraft with a particular airplane design group (ADG) will be able to safely use the runway. The ADG is based on the wingspan and tail height of an aircraft. Based on a review completed in 2023, the Airport is closed approximately four percent of the time due to inclement weather.

FAA standards recommend that airfields provide a 95 percent wind coverage factor. WVL wind coverage is shown in **Table 4-2**.

Table 4-2: Wind Coverage

Runway	VFR		IFR		All-Weather	
	10.5	13	10.5	13	10.5	13
5-23	94.50%	**96.87%**	**99.05%**	**99.25%**	**95.25%**	**97.28%**
14-32	**96.81%**	**98.43%**	93.61%	**95.95%**	**96.10%**	**97.89%**
Combined	**99.70%**	**99.96%**	**99.76%**	**99.96%**	**99.70%**	**99.96%**

Source: FAA WVL (72607314615), Wind Data, 2013-2022.

Runway 5-23 meets both 10.5 knot and 13 knot coverage in instrument flight rules (IFR) and all-weather conditions but does not meet the 95 percent coverage at 10.5 knots in visual flight rules (VFR). As mentioned in Chapter 3, *Forecasts of Aviation Demand,* Runway 14-32 is an A-I runway used for training in VFR conditions. Therefore, Runway 14-32 is an eligible and justified crosswind runway during VFR conditions.

Recommendation: Runway 14-32 is an eligible and justified crosswind runway.

4.2.5. Runway Designation

Runway designations on Runway 5-23 and Runway 14-32 are based on the magnetic heading of the runway. A shifting magnetic field requires a prudent examination of the runway designations to ensure that they are within ten degrees of the current and future magnetic heading. As shown in **Table 4-3**, it is recommended that the runway numbering should change to match the projected 20-year magnetic bearing.

Table 4-3: Magnetic Bearing Calculations

	Runway 5-23	Runway 14-32
Current True Bearing	28.6°/208.6°	125.2°/305.3°
Existing Magnetic Declination	15.1° W	15.1° W
Existing Magnetic Bearing	43.7°	140.3°
Change Per Year	0.1° E	0.1° E
20-Year Magnetic Declination	2.0° E	2.0° E
20-Year Magnetic Bearing	41.6°	138.3°

Sources: WVL AVN Datasheet, 2023, National Centers for Environmental Information (NCEI), and McFarland Johnson analysis, 2024.

Recommendation: During the next runway rehabilitation, Runway 5-23 should be changed to Runway 4-22 to match the 20-year magnetic declination.

4.2.6. Runway Safety Areas

Runway safety areas (RSAs) are defined by the FAA as surfaces surrounding a runway that are prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. RSAs consist of a relatively flat graded area free of objects and vegetation that could damage aircraft. According to FAA guidance, the RSA should be capable, under dry conditions, of supporting aircraft rescue and firefighting (ARFF) equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

RSA dimensions for current and future standards for both Runways 5-23 and 14-32 are listed in **Table 4-4** and shown in **Figure 4-2**.

Table 4-4: RSA Dimensions

Runway	Standards	Dimensions	Non-Standard Conditions
5-23	B-II	300' Length beyond runway end 300' Length prior to threshold 150' Width	250' perimeter road from Runway 5 end[1] 76' perimeter road from Runway 23 end[2]
14-32	A/B-I	240' Length beyond runway end 240' Length prior to threshold 120' Width	Non-standard grade 200' from Runway 14

[1] This portion of the perimeter road is only used by Airport staff.
[2] This portion of the perimeter road is also used for accessing the solar farm for maintenance purposes in addition to staff use.
Sources: FAA AC 150/5300-13B and McFarland Johnson, 2023.

Recommendation: Non-standard RSA conditions for both runways should be addressed, if possible.

4.2.7. Runway Object Free Areas

In addition to the RSA, a runway object free area (ROFA) is also defined around runways to enhance the safety of aircraft operations. The FAA defines ROFAs as an area cleared of all objects except some that are related to navigational aids and aircraft ground maneuvering. However, unlike the RSA, there is no grading component to the ROFA. The ROFA is strictly related to the location of above-ground objects and making sure those that are in the ROFA out of necessity, are frangible. ROFA dimensions and non-standard conditions are listed in **Table 4-5**.

Table 4-5: ROFA Dimensions

Runway	Standards	Dimensions	Non-Standard Conditions
5-23	B-II	300' Length beyond runway end 300' Length prior to threshold 500' Width	230' Perimeter Road from Runway 5 end
14-32	A/B-I	240' Length beyond runway end 240' Length prior to threshold 400' Width	167' Airport Road from Runway 14 end 169' LaFleur Road from Runway 14 end

Sources: FAA AC 150/5300-13B and McFarland Johnson analysis, 2023.

Recommendation: Resolve non-standard ROFA conditions for both runways, where possible or acquire a modification of standards (MOS).

4.2.8. Runway Obstacle Free Zones

The runway obstacle free zone (ROFZ) is a defined volume of airspace centered on the runway centerline, whose base elevation is that of the perpendicular runway elevation point. The ROFZ extends 200 feet beyond each end of the runway. ROFZ dimensions are shown in **Table 4-6**. The standards correlate to the type of aircraft that use that runway. Standards are different for large (>12,500 pound MTOW) and small (≤12,500 pound MTOW) aircraft.

Table 4-6: ROFZ Dimensions

Runway	Standards	Dimensions	Non-Standard Conditions
5-23	Large	400' wide	None
14-32	Small	250' wide for operations with approach speeds of 50 knots or more.	None

Sources: FAA AC 150/5300-13B and McFarland Johnson analysis, 2023.

Recommendation: None.

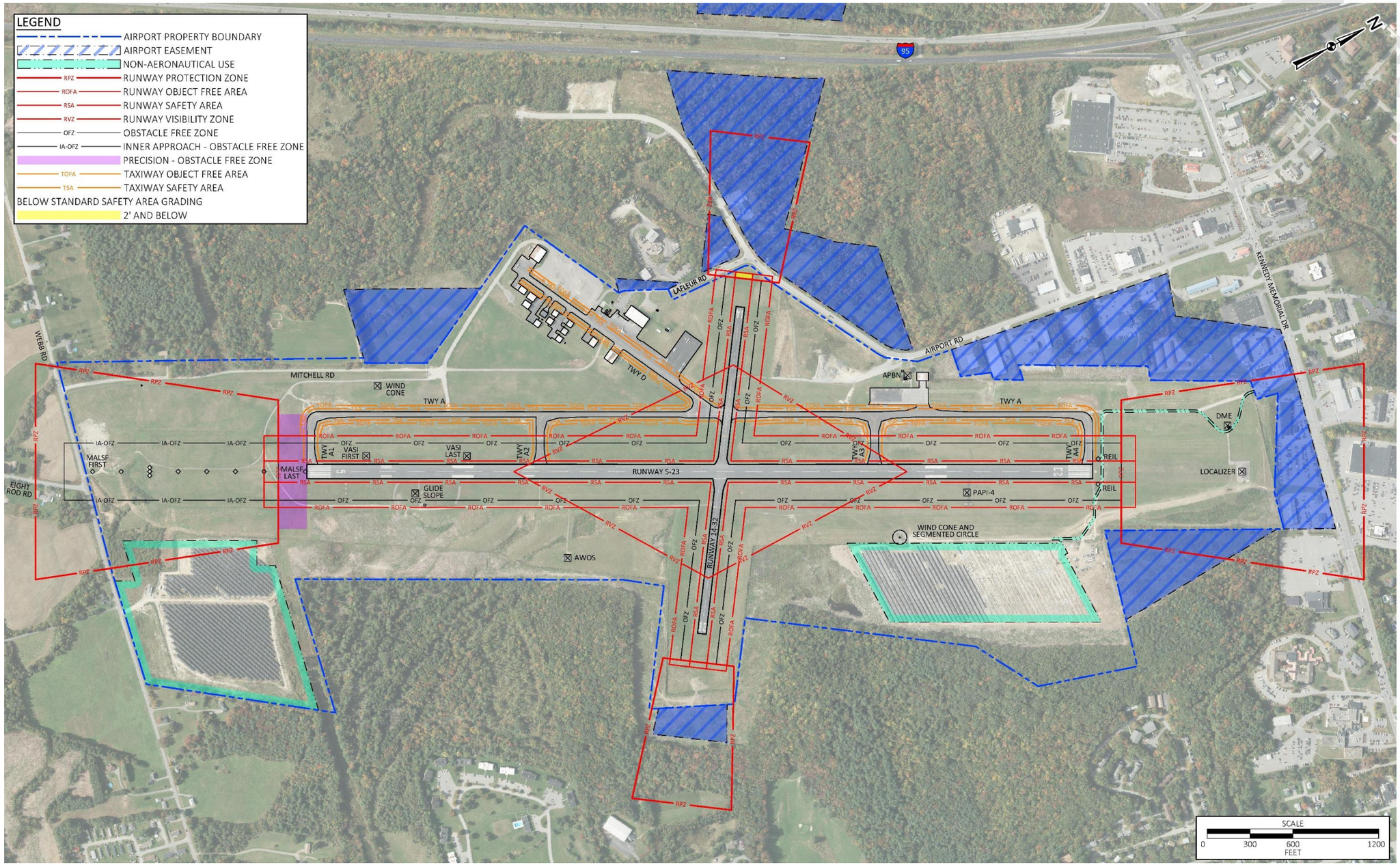
4.2.8.1. Inner-Approach OFZ

The inner-approach obstacle free zone (IA-OFZ) is a defined volume of airspace centered on the approach area. It only applies to runways with an approach lighting system (ALS). Runway 5 has an IA-OFZ which begins 200 feet from the runway threshold at the runway threshold elevation and extends 200 feet beyond the last light unit in the ALS. The IA-OFZ width is the same as the ROFZ (400 feet) and rises at a slope of 50:1 from its beginning for the length of the approach. There are no known IA-OFZ obstructions.

4.2.8.2. Precision Object Free Zone

The precision object free zone (POFZ) is a volume of airspace beginning at the threshold at the threshold elevation. The POFZ extends along the extended runway centerline beyond the runway end for 200 feet at a width of 800 feet. The POFZ only applies to Runway 5 since the landing minimums are less than 250 feet.

Figure 4-2: Existing and Future Conditions



Sources: Airport mapping and McFarland Johnson, 2023.

4.2.9. Runway Protection Zones

Runway protection zones (RPZs) are large trapezoidal areas on the ground off each runway end that are within aircraft approach and departure paths. The RPZ begins 200 feet beyond the end of the runway. The dimensions of the RPZ for each runway end are dependent on the type of aircraft and the approach visibility minimums associated with operations on that runway. As shown in **Figure 4-2**, RPZs for all runway ends extend beyond airport property and include areas that do not have easements in place. **Table 4-7** lists the RPZ conditions for each runway.

Table 4-7: RPZ Dimensions

Runway	Standards	Dimensions	Non-Standard Conditions
5-23	B-II-4000 (Not Lower Than ¾ Mile)	Length: 1,700' Inner Width: 1,000' Outer Width: 1,510'	Runway 5: 995' Mitchell Road 1,172' Webb Road 1,345' Eight Rod Road 1,535' house Runway 23: 915' parking lot (and multiple parking lots beyond) 1,150' building (and multiple buildings beyond) 1,228' Route 137/ Kennedy Memorial Drive
14-32	A/B-I-VIS	Length: 1,000 Inner Width: 500' Outer Width: 700'	Runway 14: 0' Airport Road 0' LaFleur Road 83' building next to LaFleur Road 456' building on Airport Road Runway 32: None

Sources: FAA AC 150/5300-13B and McFarland Johnson analysis, 2023.

Recommendation: As the opportunity arises, the Airport should seek to establish necessary zoning controls to help meet standard dimensions where needed and purchase property in fee or easement.

4.2.10. Runway Visibility Zone

The runway visibility zone (RVZ) applies to intersecting runways and is an area formed by imaginary lines connecting two physically intersecting runways' line of sight (LOS) points. A clear LOS helps pilots visually spot other aircraft and vehicles. Buildings, structures, parked aircraft, and other related items should not be in the RVZ.

The standards state that any two points five feet above the runway centerline within the RVZ must be mutually visible to each other. There are no known obstructions to the RVZ.

Recommendation: Continue to conduct vegetative maintenance within the RVZ.

4.2.11. Taxiways

There are six taxiways at the Airport all lit with light-emitting diode (LED) lights. Runway 5-23 is served by a full-length parallel taxiway, Taxiway A. Runway 14-32 does not qualify for a parallel taxiway, as it does not have approach procedures with minimums below one mile. Planning standards for taxiways include taxiway width, taxiway safety areas (TSAs), taxiway object free areas (TOFAs), taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines. The dimensions of each standard vary based on the identified ADG and taxiway design group (TDG) for each taxiway. The TDG is based on the distance between an aircraft's cockpit to main gear, as well as the width of the main gear. There are six ADG groups, and six TDG groups.

As taxiways are constructed or rehabilitated, design should carefully consider the updated guidance for taxiway design as published in FAA AC 150/5300-13B. The requirements include the design of taxiways for cockpit over centerline taxiing as opposed to judgmental oversteering. This change particularly impacts curves and intersections, which will require changes to accommodate the cockpit over centerline taxiing. The dimensions of intersection fillets (where the edge of pavement should be based on FAA design standards) and taxiway curves are based on the associated TDG for each taxiway.

The representative existing and future design TDG is TDG-1B. Taxiway details and non-standard conditions are shown in **Table 4-8**. **Appendix A** provides details on FAA AC 150/5300-13B taxiway standards and definitions.

Table 4-8: Taxiway Descriptions

Taxiway	TDG	Standard Width	Actual Width	Type of Taxiway	Runway Separation	Non-Standard Conditions
A	1B	25'	35'	Parallel	400'	Exceeds 3-path concept with Taxiway D and Runway 14-32
A1	1B	25'	55'	Entrance	N/A	None
A2	1B	25'	55'	Entrance	N/A	None
A3	1B	25'	55'	Entrance	N/A	Direct access to Runway 5-23
A4	1B	25'	55'	Entrance	N/A	None
D	1B	25'	40'	Apron/Entrance	N/A	Direct access to Runway 14-32 Exceeds 3-path concept with Taxiway A and Runway 14-32

Sources: FAA AC 150/5300-13B, Airport mapping, and McFarland Johnson, 2023.

Recommendation: Resolve non-standard conditions as practicable.

4.2.11.1. Taxiway Safety Areas

The TSA is a defined surface prepared to support the occasional passage of aircraft and ARFF equipment. TSA standards for each ADG are listed in **Table 4-9**. The TSA is currently 79 feet and meets ADG II standards.

Table 4-9: TSA/TOFA/TLOFA Requirements by Airplane Design Group

Design Standard	ADG I	ADG II	ADG III	ADG IV	ADG V	ADG VI
Taxiway Safety Area (feet)	49	79	118	171	214	262
Taxiway Object Free Area (feet)	89	124	171	243	285	35

Source: FAA AC 150/5300-13B.

Recommendation: None.

4.2.11.2. Taxiway/Taxilane Object Free Areas

The TOFA/TLOFA is an area adjacent to the TSA that is clear of objects not fixed by function to provide vertical and horizontal wingtip clearance. The ADG II TOFA/TLOFA spans 124 feet and meets standards. Dimensions for the TOFA/TLOFA are shown in **Table 4-9**. Aircraft parking in front of the terminal should park outside of the Taxiway D TOFA.

Recommendation: Ensure aircraft are parked outside of the Taxiway D TOFA in front of the fueling area and terminal building.

4.2.12. Airport Markings and Lighting

Runway 5-23 has precision instrument markings and is equipped with high intensity runway edge lights (HIRLs). Runway 23 is equipped with runway end identifier lights (REILs).

Runway 14-32 has basic markings and no runway edge lighting. Both runway ends have marked touchdown points.

Recommendation: None.

4.2.13. Instrument Approaches, NAVAIDS, and Visual Aids

Runways 5 and 23 are equipped with instrument approaches. Approach type and visibility minimums, which is the lowest allowed ceiling required to land, are shown in **Table 4-10**. Reference **Appendix A,** Section A.5 for standard IFR and VFR minimums. Runway 5 is also equipped with a 1,400-foot medium intensity approach lighting system with sequenced flashers (MALSF) as well as an instrument landing system (ILS), which is comprised of a localizer and a glideslope. Runway 5 is equipped with a 4-box visual slope approach indicator (VASI) on the left with a standard 3-degree glide path. Runway 23 is equipped with a 4-light precision approach path indicator (PAPI) on the left with a standard 3-degree glide path. The FAA owns and maintains the Runway 5 localizer, glideslope, VASI, distance measuring equipment (DME), and automated weather observation system (AWOS). The Airport owns and maintains the Runway 23 PAPI and Runway 5 REILs and MALSF. It is recommended that the VASI be replaced with a PAPI.

There are no navigational aids for Runway 14-32. There is a wind cone located on the northeast portion of the field near the Runway 23 end next to the solar farm.

Table 4-10: WVL Instrument Approaches

Approach	Ceiling (Feet Above Ground)	Visibility (Statute Miles)
ILS or LOC/DME Runway 5	200	¾
RNAV (GPS) Runway 5	200	¾
RNAV (GPS) Runway 23	250	¾

Source: FAA Terminal Procedures, 2024.

Recommendation: Replace the Runway 5 VASI with a PAPI.

4.2.14. Deicing Area

Aircraft are deiced in front of the main terminal. As of February 2024, the Airport stores two 275-gallon totes of glycol in the terminal building hangar and has a 600-gallon Type 1 distribution machine. In addition to active deicing, the Airport also allows aircraft to use the terminal hangar building for passive deicing. The Airport opens itself up to additional winter operations by providing these active and passive deicing services.

Recommendation: The Airport should monitor deicing frequency and consider adjusting deicing practices as needed.

4.2.15. Airside Facility Requirements Summary

Table 4-11 summarizes the airside facility requirements.

Table 4-11: Airside Facility Requirements Summary

Existing Area	Existing Provision	Future Requirements	Recommendation
Runway Length (Section 4.2.1)	Runway 5-23: 5,500′ Runway 14-32: 2,301′	Runway 5-23: 5,500′ - 5,700′ Runway 14-32: 2,301′ - 3,200′	None
Runway Width (Section 4.2.2)	Runway 5-23: 100′ Runway 14-32: 60′	Runway 5-23: 75′ Runway 14-32: 60′	Review keeping Runway 5-23 at 100′ during the next reconstruction
Runway Strength (Section 4.2.3)	Runway 5-23: SW: 40,000 lbs. DW: 60,000 lbs. DT: 105,000 lbs. Runway 14-32: SW: 25,000 lbs.	Runway 5-23: SW: 40,000 lbs. DW: 60,000 lbs. DT: 105,000 lbs. Runway 14-32: SW: 25,000 lbs.	None
Runway Orientation (Section 4.2.4)	Runway 5-23: primary Runway 14-32: crosswind	Runway 5-23: primary Runway 14-32: crosswind	Runway 14-32 is a justified crosswind runway

Existing Area	Existing Provision	Future Requirements	Recommendation
Runway Designation (Section 4.2.5)	Runway 5-23: 43.7° Runway 14-32: 140.3°	Runway 5-23: 41.6° Runway 14-32: 138.3°	Re-number Runway 5-23 as Runway 4-22 during next rehabilitation/reconstruction
Runway Safety Areas (Section 4.2.6)	Non-standard conditions on Runways 5-23 and 14-32	Provide standard RSAs on all runways	Provide standard RSAs on all runways or coordinate an RSA determination
Runway Object Free Areas (Section 4.2.7)	Non-standard conditions Runways 5-23 and 14-32	Provide standard ROFA on all runways	Resolve non-standard conditions where possible or acquire an MOS
Runway Object Free Zones (Section 4.2.8)	Standard ROFZs for Runways 5-23 and 14-32	Provide standard ROFZ on all runways	None
Runway Protection Zones (Section 4.2.9)	Non-standard for Runways 5, 14, and 23	Provide standard RPZs	Establish necessary zoning controls to help meet standard dimensions and purchase property in fee or easement, when possible
Runway Visibility Zone (Section 4.2.10)	No obstructions	No obstructions	Continue vegetative maintenance
Taxiways (Section 4.2.11)	Runway 5-23: Full parallel Runway 14-32: Access from Taxiway A Non-standard conditions	Runway 5-23: Full parallel Runway 14-32: Access from Taxiway A Meet standards	Resolve non-standard conditions, where possible
Airport Marking and Lighting (Section 4.2.12)	Runway 5-23: Precision markings, HIRL Runway 23: REILs Runway 14-32: Basic markings, unlit	Runway 5-23: Precision markings, HIRL Runway 23: REILs Runway 14-32: Basic markings, unlit	None
Instrument Approaches and NAVAIDS (Section 4.2.13)	Runway 5: ILS, RNAV, VASI Runway 23: RNAV, PAPI Runway 14-32: none	Runway 5: ILS, RNAV, PAPI Runway 23: RNAV, PAPI Runway 14-32: none	Replace Runway 5 VASI with PAPI
Deicing Area (Section 4.2.14)	600-gallon deicing machine Two 275-gallon totes of Type I glycol	600-gallon deicing machine Two 275-gallon totes of Type I glycol	Monitor deicing frequency, adjust practices, if needed

Sources: Airport management and McFarland Johnson analysis, 2023.

4.3. Landside Facility Requirements

Landside facilities must be able to support a wide range of aircraft from small privately-owned propeller aircraft used for recreation to medium-sized corporate jet aircraft used for business travel. Landside facilities for general aviation (GA) include hangars and ramp space. The following aircraft facilities requirements are covered in this section as they relate to the classification of the Airport.

- General Aviation Terminal Facilities
- Aircraft Parking Aprons
- Aircraft Hangar Facilities
- Airfield Maintenance and Snow Removal Facilities and Equipment
- Aviation Fuel Facilities
- Access, Circulation, and Parking Facilities
- Airport Utilities
- Land/Easement Acquisition
- Non-Aviation Use Areas
- Landside Facility Requirements Summary

4.3.1. General Aviation Terminal Facilities

The GA terminal spans 13,500 square feet (SF), which includes an attached hangar of approximately 9,000 SF. The terminal houses office space for tenants, a conference room, airport manager's office, and a pilot lounge. Approximately 2,700 SF are used for public/pilot access whereas the remainder is used for tenants/airport management. The terminal was constructed in the 1970s. In 2024, the Airport began upgrading flooring, a new fireplace, along with installing new security cameras and fire alarm system. The terminal is on well water and septic, which should be upgraded to the City water line within the planning period.

There are nine peak hour operations at the Airport. During the planning period, peak hour operations are anticipated to increase to ten in 2042. As peak hour operations grow, the passengers per peak hour grow along with operations. As noted in the Airport Cooperative Research Program (ACRP) Report 113, it is recommended to assume 2.5 pilots and passengers per peak-hour operation. An average square footage per person of 100 to 150 SF per peak hour passenger is recommended in the Guidebook. The existing total public space in the terminal spans approximately 2,700 SF. GA terminal requirements for the baseline year 2022 and the future are shown in **Table 4-12.**

Table 4-12: GA Terminal Requirements

Year	Peak Hour Operations	Passengers Per Peak Operation	Square Footage Per Person	Requirement	Need
2022	9	23	100-150	2,300-3,450 SF	0-750 SF
2042	10	25	100-150	2,500-3,750 SF	0-1,050 SF

Source: McFarland Johnson analysis, 2023.

Recommendation: The Airport should upgrade to the City water line and expand the terminal as needed throughout the planning period.

4.3.2. Aircraft Parking Aprons

There are five aircraft apron areas at the Airport: southwest apron, terminal apron, Taxiway D apron, based aircraft parking apron, and the itinerant apron, encompassing approximately 119,500 SF, as shown in **Figure 4-3**.

The itinerant apron, which spans approximately 5,500 square yards (SYs), shows an area of approximately 38,900 SF of available aircraft parking space due to aircraft being unable to park on the taxilane to allow access to the hangar. Aircraft utilizing the itinerant apron are restricted to a tail height of approximately 11 feet or less due to CFR Part 77 limitations. This accounts for 59.5 percent of ADG I aircraft. This limits even the use of these smaller aircraft to only half of the apron as the other half has tail height limitations smaller than the shortest ADG I aircraft.

Additionally, per the 2019 Maine Airport Pavement Management System – Pavement Summary Report for the Airport, the itinerant apron has a pavement condition index (PCI) between 25-40. Per the Airport Improvement Program (AIP) handbook, a reconstruction of the itinerant apron is eligible for PCI values below 55.

Based and itinerant aircraft apron details are shown in **Table 4-13**. Due to the condition of the itinerant apron, it is currently unusable and therefore not shown in the table.

The itinerant apron by Taxiway A is used by the municipal fire department for driver training, but this apron can be used for overflow parking as needed.

Table 4-13: Based and Itinerant Aircraft Aprons

Apron	Size (SF)
Based Aircraft Aprons	
Based Aircraft Apron	39,709 SF
Southwest Apron	7,726 SF
Sub-Total Based Aircraft Aprons	47,435 SF
Itinerant Aircraft Aprons	
Terminal Apron	23,967 SF
Taxiway D Apron	9,159 SF
Itinerant Apron (not included due to pavement conditions)	-
Sub-Total Useable Itinerant Aircraft Aprons	33,126 SF

Source: McFarland Johnson Analysis, 2024.

4.3.2.1. Itinerant Aircraft Parking

Itinerant aircraft parking demand calculation is shown in **Table 4-14**. The following assumptions were used to calculate itinerant aircraft demand.

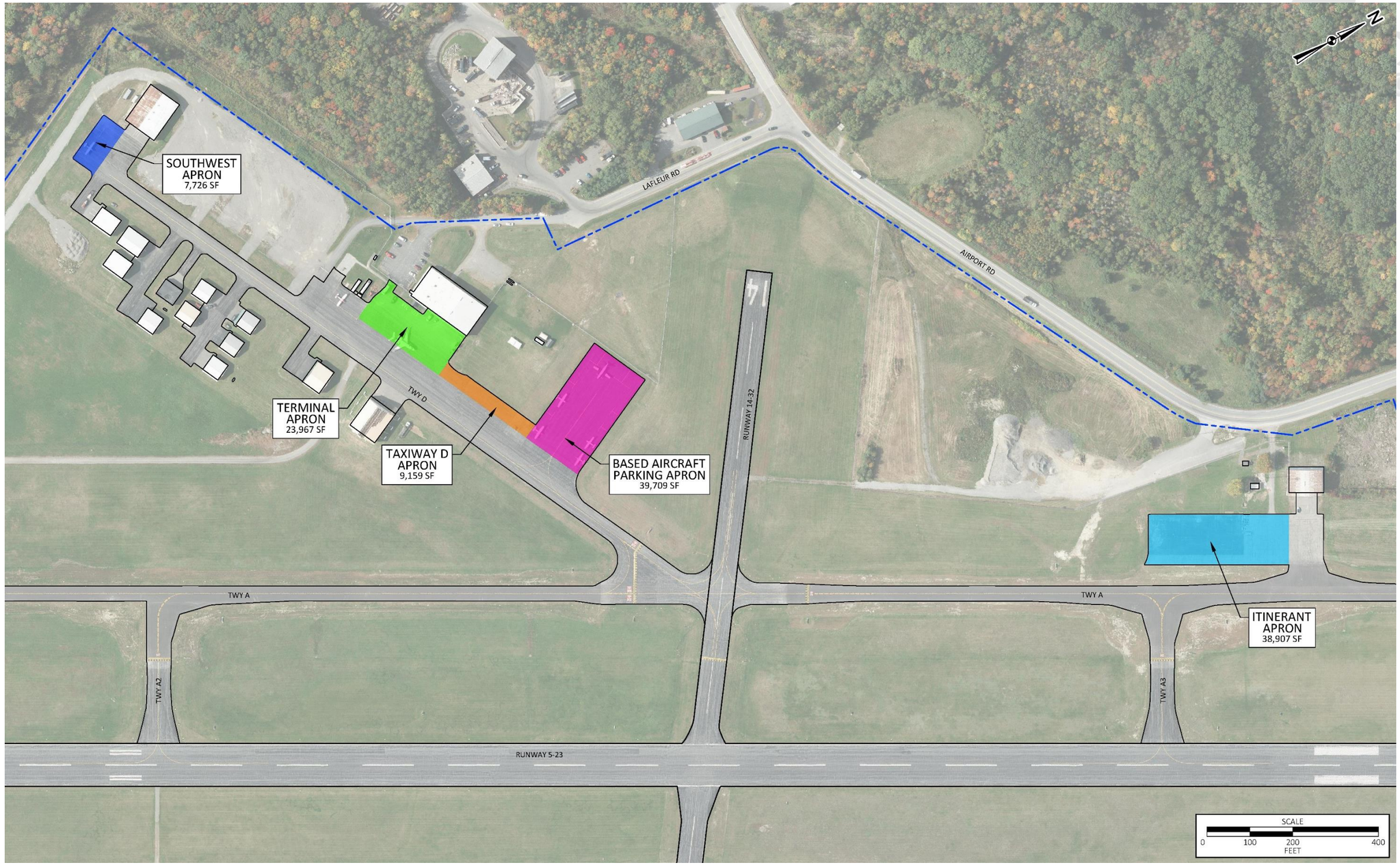
- 3,200 SF for single engine aircraft
- 3,200 SF for multi-engine aircraft
- 21,500 SF for one Global Express jet aircraft on the average day of the peak month
- 25 percent of itinerant aircraft stay at least one night
- When aircraft larger than 69-foot wingspans (large ADG II and ADG III) aircraft arrive, they cannot park on the terminal apron without impacting the Taxiway D TOFA and closing the taxiway. There are no locations that larger than large ADG II+ aircraft can park at the Airport.

Table 4-14: Itinerant Aircraft Apron Demand

Year	Peak Month Operations	Peak Hour Operations (including 25% overnight)	Required Ramp Space (SF)	Available Ramp Space (SF)	Additional Need (SF)
Baseline (ADG I-II)	2,268	11	32,000	33,126	-
Baseline (>ADG II)		1	21,500	-	21,500
2042 (ADG I-II)	2,578	12	35,200	33,126	2,074
2042 (>ADG II)		1	21,500	-	21,500

Source: McFarland Johnson analysis, 2024.

Figure 4-3: Aircraft Parking Aprons



Source: McFarland Johnson, 2024.

Airport management has indicated that at times varying throughout the year, multiple jets (including the Global Express) use the itinerant apron at the same time as shown in **Figure 4-4**.

Figure 4-4: Itinerant Aircraft Parking

Source: Waterville Regional Airport, June 2023.

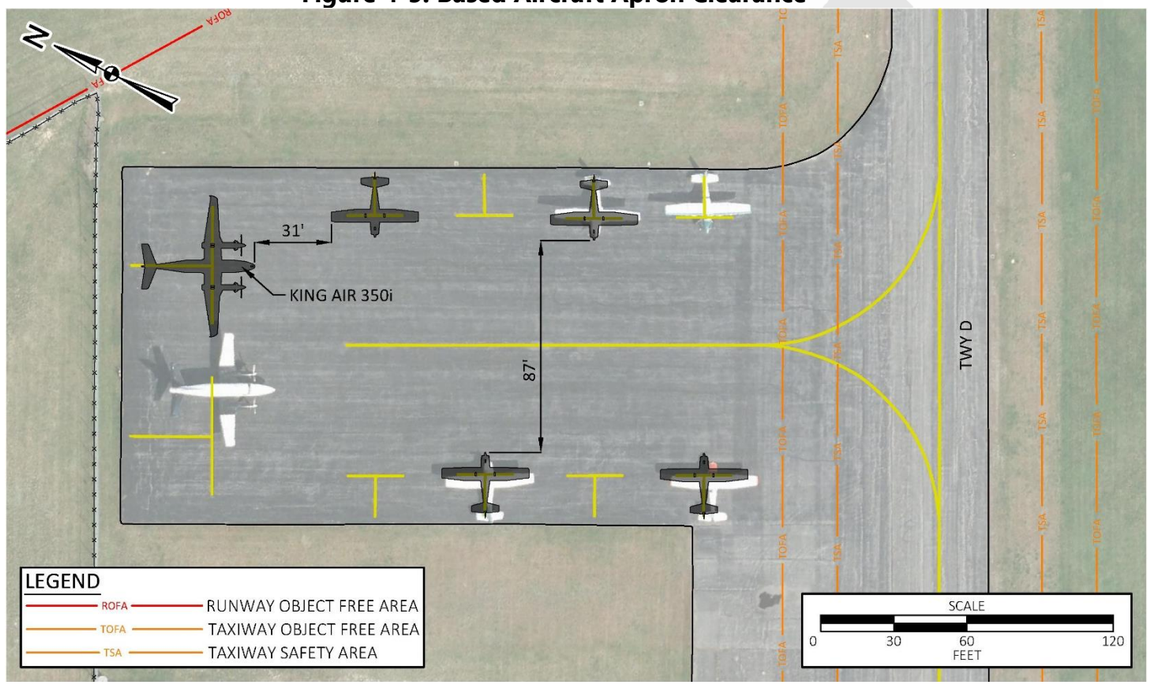
Recommendation: The Airport needs additional itinerant apron space including accommodating large ADG II or ADG III jets (such as the Global Express aircraft that frequents the Airport) during the planning period. There is a short-term need for large ADG II+ aircraft parking.

4.3.2.2. Based Aircraft Parking

As of 2022, 28 percent of single engine based aircraft are parked on the tie-downs. This percentage encompasses the need for six total tie-downs for 2022 and eight total tie-downs in 2042. The Airport has ten ADG I based aircraft and two ADG II tie-downs. Two ADG I tie-downs are located on the southwest apron, and the remaining eight are located on the based aircraft apron, along with the two remaining ADG II tie-downs.

ADG II aircraft taxiing on the based aircraft apron are limited to a wingspan of 55 feet to meet FAA standard ADG II taxilane wingtip clearance. Larger aircraft may operate on the ramp at their own risk. Ramp clearances are shown in **Figure 4-5.**

Figure 4-5: Based Aircraft Apron Clearance



Source: McFarland Johnson, 2024.

Recommendation: None.

4.3.3. Aircraft Hangar Facilities

GA hangars at an airport are planned for both based and itinerant aircraft. Requirements are calculated based on the size and quantity of aircraft based at the Airport. While each aircraft will vary in size, the following planning factors were used to calculate the approximate hangar space requirements for aircraft based at the Airport:

- 1,200 SF for single engine and rotor aircraft
- 1,600 SF for multi-engine aircraft
- 3,200 SF for jet aircraft

When calculating hangar demand, it is assumed that 70 percent of single engine will be stored in individual hangars. It is also assumed that 30 percent of single engine aircraft, 100 percent of multi-engine aircraft, and 100 percent of jet aircraft will be stored in conventional hangars. These assumptions were calculated after discussions with airport management that all based aircraft would like to be hangered in the future. While there are typically based aircraft on the apron areas in the summer months, during the winter months, based aircraft owners prefer to store their aircraft indoors to protect them from the harsh Maine winters. Overall hangar requirements are shown in

Table 4-15. Additional hangars may be needed to accommodate the existing waitlist and if demand occurs faster than forecast. Additionally, private hangar development may occur above and beyond this forecast.

Table 4-15: Aircraft Hangar Demand

Year	Facility Demand	Current Provision	Additional Need
Baseline			
Individual Hangars	13	12	1
Conventional Hangars	9,680 SF	18,600 SF	-
2027			
Individual Hangars	14	12	2
Conventional Hangars	10,400 SF	18,600 SF	-
2032			
Individual Hangars	15	12	3
Conventional Hangars	12,360 SF	18,600 SF	-
2042			
Individual Hangars	16	12	4
Conventional Hangars	14,680 SF	18,600 SF	-

Source: McFarland Johnson, 2023.

Recommendation: As based aircraft increase, the Airport should add four individual hangars throughout the planning period to meet demand.

4.3.4. Airfield Maintenance and Snow Removal Facilities and Equipment

The Airport has snow removal equipment (SRE), as shown in **Table 4-16**, which is stored in the terminal building hangar encompassing approximately 9,000 SF.

Per AC 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials,* the Airport is classified as a medium sized airport having approximately 688,060 SF of paved runway. Medium sized airports account for 1,000 SF per SRE vehicle, which would be approximately 4,000 SF of space needed for the Airport's four pieces of SRE.

Table 4-16: Snow Removal Equipment List

Year	Make/Model	Type
2018	Ram-2500	Pickup W/ 9' Fisher XV2 Plow & Sander
2020	John Deer 544L	Wheeler Loader With Attachments
2011	Freightliner M2106V	Dump Truck
2003	Kodiac CR2.5D	Snowblower

Source: WVL airport management, 2022.

Per FAA AC 150/5220-20A, *Airport Snow and Ice Control Equipment*, since the Airport has greater than 10,000 operations per year and more than 15 inches of annual snow snowfall, it is eligible for one high-speed rotary plow supported by two snowplows.

Per the *AIP Handbook Order 5100-38D, Table 3-7* identifies replacement for equipment that reached the end of its useful life or ten years.

Recommendation: The Airport has the proper snow removal equipment along with space required and should explore replacing the 2011 Freightliner Dump Truck and 2003 Kodiac Snowblower as equipment are past their useful life.

4.3.5. Aviation Fuel Facilities

WVL offers both 100LL Avgas and Jet-A fuel. There are two 10,000-gallon tanks: one for 100LL and one for Jet-A. The 100LL tank was installed in the early 1990s and the Jet-A tank was installed in the late 1980's. Both fuel tanks were relocated to their present location in 2007. Airport management has expressed a need for new tanks, as current tanks had rust removed in the last few years. Additionally, the Airport owns and operates a 3,000-gallon Jet-A mobile fueler. Fuel calculations for 2022 demand are shown in **Table 4-17**. Fuel sales for 2042 were calculated using compound annual growth rate (CAGR) of 0.6 percent for both Jet-A and 100LL and results are shown in **Table 4-17**.

Table 4-17: 2022 Fuel Calculations

	Jet A (Gallons)	100LL AvGas (Gallons)
Existing Storage Supply	10,000	10,000
2022 Peak 7-day demand	2,769	595
2022 Peak 14-day demand	5,538	1,190
2042 Peak 7-day demand	3,121	671
2042 Peak 14-day demand	6,241	1,341

Sources: WVL airport management and McFarland Johnson analysis, 2023.

As the fueling landscape in aviation changes, there may be consideration for sustainable aviation fuel (SAF), electric charging in lieu of fueling, and unleaded Avgas. It is unknown if SAF Jet-A could be mixed with standard Jet-A. An additional dedicated SAF fuel tank may need to be installed or a current Jet-A tank repurposed for SAF. The future of electric aircraft presents potential opportunities for the Airport.

The FAA launched an initiative to eliminate leaded aviation fuels in piston-engine aircraft safely by 2030 in its project EAGLE (eliminate aviation gasoline lead emissions). In the short term, this may result in the need for an additional fuel tanks to provide storage for unleaded Avgas. It is unknown if this can be mixed with or use older storage containers of current 100LL Avgas.

Recommendation: The Airport should explore replacing the existing fuel tanks at their current size. Accommodations for SAF, unleaded Avgas storage, and electric aircraft charging stations should be considered within the planning period.

4.3.6. Access, Circulation, and Parking Facilities

The GA terminal can be accessed from I-95 via Kennedy Memorial Drive which connects to Airport Road to LaFleur Road, where the main parking lot is located. There are 15 parking spaces in the main lot. There is additional unmarked, gravel parking spanning approximately 70,000 SF behind the terminal building.

The methodology used below is based on a previously completed Aircraft Owners and Pilots Associated (AOPA) survey:

- Determine the number of peak hour operations from Chapter 3, *Forecasts of Aviation Demand*.
- Determine the number of peak hour pilots and passengers by multiplying the number of peak hour operations by 2.5.
- Estimate the number of parking spaces in use by assuming that parking demand will be half the number of pilots and passengers, since parking spaces will be utilized only by departing pilots and passengers.
- Multiply by a contingency factor of 1.10.

Automobile parking requirements for GA operations are displayed in **Table 4-18.**

Table 4-18: GA Terminal Parking Space Requirements

Year	Peak Hour Operations	Pilot and Passenger Parking Demand	Contingency	Total Parking Demand
2022	9	23	1.10	25
2042	10	25	1.10	28

Source: McFarland Johnson analysis, 2023.

Recommendation: Additional paved parking spaces may be needed if a portion of the unmarked, gravel parking area is alternated or removed. Parking needs are met if this unmarked, gravel parking area is not altered.

4.3.7. Airport Utilities

The following utilities provide service for the Airport:

- Electric: Central Maine Power Company
- Water and sewer: Well water and septic (terminal); City of Waterville (limited buildings)
- Telephone and internet: Spectrum
- Trash and recycling: Waterville Public Works
- Natural gas: None

Recommendation: If needed, natural gas may be considered in the future.

4.3.8. Land/Easement Acquisition

Per AC 150/5190-4B, *Airport Land Use Compatibility Planning,* an avigation easement is a conveyance of airspace over another property for use by the Airport. The owner of an easement-encumbered property (servient property) has restricted use of their property subject to the airport sponsor's easement (dominant property) for overflight and other applicable restrictions on the use and development of the servient parcel.

Currently, the Airport has parcels of land within the RPZs that are not under Airport control. Any use that includes people or places within the RPZ is not a compatible land use.

Recommendation: The Airport should continue to purchase land easements to allow proper clearances for full RPZ control on all airport runways.

4.3.9. Non-Aviation Use Areas

Two solar farms were constructed on Airport property covering 17 acres for a total 4.6-megawatt facility. The Airport has a land lease with the operator of the solar farm as well as an access road that has been designated non-aviation use (as shown in **Figure 4-2**). In addition to providing clean energy, the solar farms will also help offset Airport operating costs, address some tree growth issues, and provide a buffer zone, reducing wildlife venturing onto the airfield. There are no other areas available on Airport property that are suitable for non-aviation use.

Recommendation: None.

4.3.10. Landside Facility Requirements Summary

Table 4-19 lists the landside facility requirements summary.

Table 4-19: Landside Facility Requirements Summary

Existing Area	Existing Provision	Future Requirements	Recommendation
General Aviation Terminal (Section 4.3.1)	2,700 SF Built in 1970s	2,500 SF - 3,750 SF	Expand terminal 0 - 1,050 SF as needed Provide building and utility updates
Aircraft Parking Aprons (Section 4.3.2)	Itinerant parking: 33,126 SF Based parking: 47,435 SF (10 ADG I tie-downs, two ADG II tie-downs)	Itinerant parking: 56,700 SF (35,200 SF ADG I-II parking and 21,500 SF >ADG II parking) Based parking: 47,435 SF (10 ADG I tie-downs, two ADG II tie-downs)	Itinerant parking: Add 2,074 SF ADG I-II and 21,500 SF >ADG II parking Based parking: none

Existing Area	Existing Provision	Future Requirements	Recommendation
Aircraft Hangar Facilities (Section 4.3.3)	12 individual hangars 18,600 SF conventional hangars	16 individual hangars 14,680 SF conventional hangars	Construct four new individual hangars
Airfield Maintenance and Snow Removal Equipment (Section 4.3.4)	9,000 SF building Four pieces of equipment	9,000 SF building Four pieces of equipment, Replace two pieces of equipment	Consider purchase of two new SRE vehicles
Aviation Fuel Facilities (Section 4.3.5)	Jet-A: 10,000 gallons 110LL: 10,000 gallons	Replace tanks as needed Consider adding SAF and unleaded fuel storage Consider electric aircraft charging station(s)	Replace tanks as needed Consider adding SAF and unleaded fuel storage Consider electric aircraft charging station(s)
Access, Circulation, and Parking Facilities (Section 4.3.6)	15 paved spaces, 70,000 SF unmarked, gravel overflow parking	15 paved spaces, 70,000 SF unmarked, gravel overflow parking	Add paved parking if portion of unmarked, gravel lot is altered
Airport Utilities (Section 4.3.7)	Electric, water, sewer, telephone, internet, trash	Need may change	Consider adding a natural gas line, if needed Upgrade to City water for the terminal and hangars
Land/Easement Acquisition (Section 4.3.8)	Uncontrolled portions of the RPZs on Runways 5, 23, and 32	Control RPZs either on airport property, through easements, or through land use/zoning controls	Purchase RPZ land in easement or fee; work with the City of Waterville to establish zoning controls
Non-Aviation Use Areas (Section 4.3.9)	Two solar farms	Two solar farms	None

Source: McFarland Johnson analysis, 2024.

Waterville Regional Airport

TECHNICAL SUPPLEMENT
APPENDIX A

McFARLAND JOHNSON

A. TECHNICAL SUPPLEMENT

A.1. Purpose and Introduction

In addition to the chapters of the Master Plan, the objective of the Technical Supplement is to define more complex elements of airport design, steps of the master plan process, and planning considerations that affect the Waterville Regional Airport.

Airport Planning looks at the fundamentals of how airports are planned and constructed, with a focus on runway design, terminal design, environmental requirements of airport projects, and the basic understanding of many features and functions of the airport. The last objective of airport planning is where this supplement aims to provide additional technical detail. The supplement is organized into the following subsections:

The technical supplement is informed by various forms of guidance including the project team's experience, Advisory Circulars (ACs) issued by the Federal Aviation Administration, including AC 150/5300-13B, Airport Design, and various other state and federal laws that pertain to the design of airport facilities.

This supplement includes numerous subjects organized into the following sections:

Section	Title
A.1	Purpose and Introduction
A.2	FAA Airspace Classifications
A.3	CFR Part 77 Airspace
A.4	Runway/Taxiway Design Group Classification
A.5	Glossary of Terminology

A.2. FAA Airspace Classifications

Airspace in the United States is classified as controlled, uncontrolled, or special use. Controlled airspace is a generic term that covers the different classifications of airspace (Class A, Class B, Class C, Class D, and Class E) and defined dimensions within which air traffic control (ATC) service is provided to IFR and VFR flights in accordance the with the airspace classification. Uncontrolled airspace includes areas where ATC has neither authority nor responsibility to control aircraft. According to the Aeronautical Information Manual (AIM), special use airspace consists of airspace where activities must be confined because of their nature, or where limitations are imposed upon aircraft operations that are not part of the confined activities. Special use or restricted airspace is depicted on aeronautical charts unless it is the result of a controlled-firing area. Special use areas are typically due to military training facilities. Descriptions of the airspace classifications can be seen in **Table A-1**.

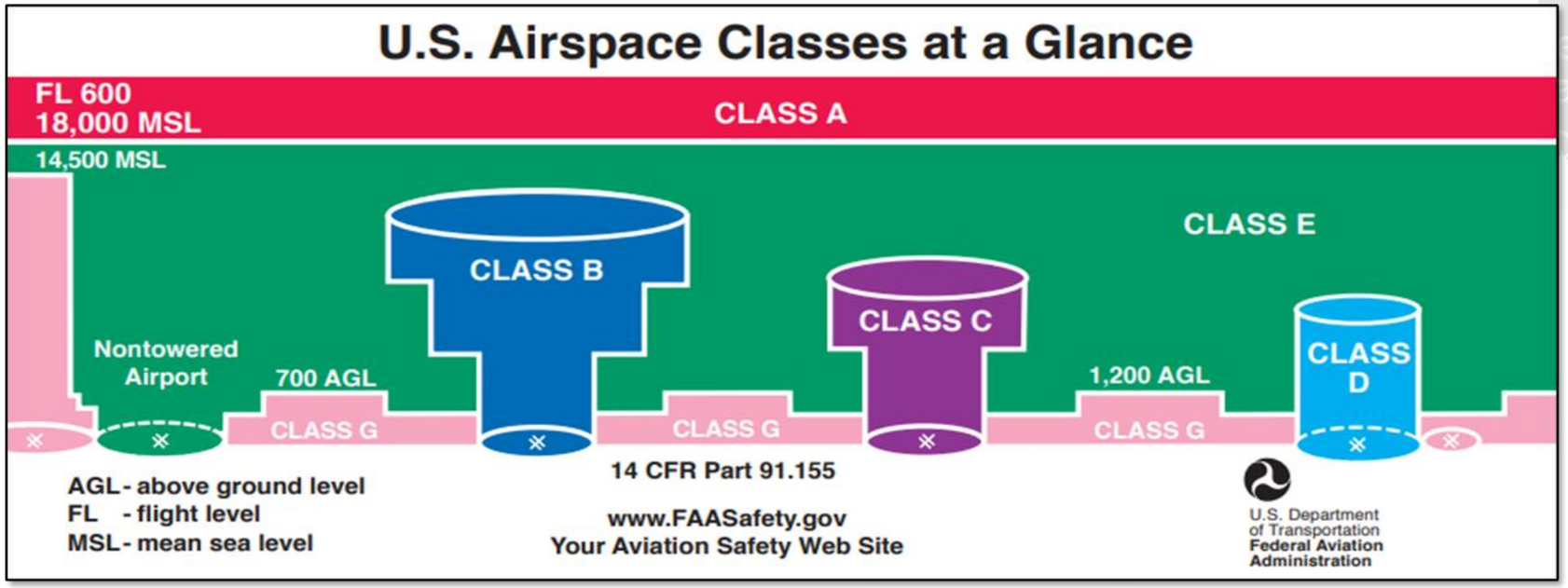
Figure A-1 provides a graphical and tabular explanation of FAA airspace classes.

Table A-1: Airspace Classifications

Airspace Class	Description
Controlled	
A	Class A airspace covers the entire United States and encompasses all airspace from 18,000 feet to 60,000 feet above mean sea level (AMSL). Aircraft flying in Class A airspace must operate under IFR, including filing flight plans.
B	Requires ATC clearance before operating an aircraft within this airspace. All aircraft are subject to IFR or Controlled Visual Flight Rules (CVFR). Class B airspace surrounds the nation's busiest airports and has the appearance of an upside-down multi-tier cake that funnels aircraft traffic toward the airport. Generally, the airspace is within a 20 nautical mile (NM) radius and up to 10,000 feet MSL. The Boston Logan International Airport is the closest airport to WVL surrounded by Class B airspace (approximately 144 NM SSW).
C	The FAA has established Class C airspace at approximately 120 airports around the country that have significant levels of IFR traffic. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. To fly inside Class C airspace, an aircraft must have a two-way radio, an encoding transponder, and established communication with the ATC facility. Aircraft may fly below the floor of the Class C airspace or above the Class C airspace ceiling without establishing communication with ATC. The Bangor International Airport is the closest airport to WVL surrounded by Class C airspace (approximately 40 NM northeast).
D	Class D airspace extends upward to an altitude of 2,500 feet above the airport elevation (charted in MSL) and is within a five-statute mile radius. Aircraft must maintain two-way radio communication with the control facility while operating in this airspace. There is no Class D airspace in Maine, and the closest is Portsmouth International Airport at Pease (100 NM WSW).
E	Class E airspace includes all the controlled airspace that is not classified as A, B, C, or D. Class E airspace has no special restrictions with regard to pilot qualifications or aircraft equipment rules. Nevertheless, it is still controlled airspace, implying that aircraft can be provided with ATC services.
Uncontrolled	
G	Covers all uncontrolled airspace. VFR minimums apply in this airspace. This includes all low-level airspace below 700 feet or 1,200 feet AGL and it extends up to 14,500 feet MSL in remote areas without airport traffic.

Source: FAA, Pilots Handbook of Aeronautical Knowledge, Chapter 15.

Figure A-1: FAA Airspace Classifications



Airspace Class	Entry Requirement	Pilot Certificate or Rating	Two-Way Communication	Altitude Decoding Transponder	VFR Min. Visibility Below 10,000 MSL	VFR Min. Visibility 10,000 MSL and Above	VFR Cloud Clearance Below 10,000 MSL	VFR Cloud Clearance 10,000 MSL and Above
A	ATC Clearance	Instrument	Yes	Yes	N/A	N/A	N/A	N/A
B	ATC Clearance	Private Certificate or student with endorsement	Yes	Yes within 30 nm of the class B primary airport[1]	3 miles	3 miles	Clear of Clouds	Clear of Clouds
C	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	Yes within C space and above lateral limits of C space[1]	3 miles	3 miles	500 below 1,000 above 2,000 horizontal	500 below 1,000 above 2,000 horizontal
D	VFR: Radio Contact IFR: Clearance	Student Certificate	Yes	No unless required by other airspace	3 miles	3 miles	500 below 1,000 above 2,000 horizontal	500 below 1,000 above 2,000 horizontal
E	VFR: None IFR: Clearance	Student Certificate	IFR only	No unless required by other airspace	3 miles	5 miles	500 below 1,000 above 2,000 horizontal	1,000 below 1,000 above 1 mile horizontal
G	None	Student Certificate	No	No unless required by other airspace	Day: 1 mile Night: 3 miles	5 miles[2]	500 below 1,000 above 2,000 horizontal [2]	1,000 below 1,000 above 1 mile horizontal [2]

[1] An altitude decoding transponder is required above 10,000 MSL.
[2] When flying 1,200 AGL or below: DAY: 1 mile visibility clear of clouds; NIGHT: 3 miles visibility, 500 below, 1,000 above, 2,000 horizontal.

02/11

Source: FAA Safety Website, www.FAASafety.gov.

A.3. CFR Part 77 Airspace

The Code of Federal Regulations (CFR) Part 77 imaginary surfaces are established in relation to the airport and each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available for that runway.

A.3.1. CFR Part 77 Primary Surface

The primary surface is longitudinally centered on the runway. When the runway has a paved surface, the primary surface extends 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface depends upon the type of approach provided to the runway, the aircraft using the approach, and the associated visibility minimums. If these variables differ by runway end, the width of the primary surface will be that of the widest primary surface standard per runway.

A.3.2. CFR Part 77 Approach Surface

The approach surface is an inclined, trapezoidal plane longitudinally centered on the extended runway centerline, extending outward and upward from the primary surface. Therefore, for paved runways, this surface begins 200 feet off the edge of pavement. The surface does not consider the presence of displaced thresholds and is based on the physical end of the runway. The dimensions and slope of this surface are based on the category of approach (visual, non-precision, or precision), the visibility minimums of the published approach, and the type of aircraft that will use the approach.

A.3.3. CFR Part 77 Transitional Surface

This surface extends outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

A.3.4. CFR Part 77 Horizontal Surface

The horizontal surface is a horizontal plane 150 feet above the established airport elevation. The edges of this surface are defined by swinging radial arcs from the from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs.

A.3.5. CFR Part 77 Conical Surface

The conical surface extends outward and upward from the perimeter of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

A.4. Runway/Taxiway Design Group Classification

A.4.1. Runway Design Code (RDC)

The RDC signifies the design standards to which a runway will be built. Airport design first requires selecting the Runway Design Code and then applying the airport design criteria associated with the RDC, which is predicated on the design aircraft (typically the largest aircraft to utilize a runway). This code then enables airport designers to design a runway that will satisfy the operational requirements of the selected critical aircraft and ensure that all separation and safety requirements are satisfied.

This document provides criteria for grouping of aircraft into runway design codes. The RDC consists of a letter representing an AAC which is based on approach speed, a number representing an ADG which is based on tail height and/or wingspan, and a number representing the visibility minimums associated with the runway (based on corresponding runway visual range (RVR) values in feet). RDC components are classified as seen in **Table A-2**.

Table A-2: RDC Components

Aircraft Approach Category (AAC)	
Category	**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
Airplane Design Group (ADG)	
Group	**Tail Height (and/or) Wingspan**
I	< 20′ // < 49′
II	20′ - < 30′ // 49′ - < 79′
III	30′ - < 45′ // 79′ - < 118′
IV	45′ - < 60′ // 118′ - < 171′
V	60′ - < 66′ // 171′ - < 214′
VI	66′ - < 80′ // 214′ - < 262′
Visibility Minimums (VIS)	
RVR (FT)	**Flight Visibility Category (statute mile)**
VIS	Visual Approaches
4000	Lower than 1 mile but not lower than ¾ mile (APV ≥ 3/4 but < 1 mile)
2400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)
1600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)
1200	Lower than 1/4 mile (CAT-III PA)

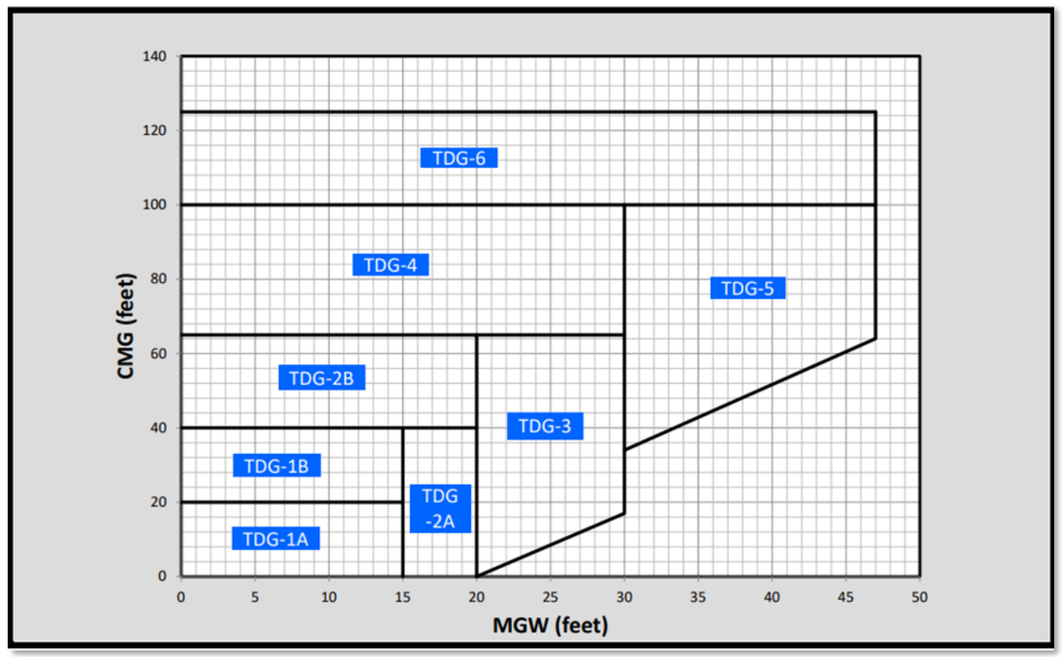
Source: FAA AC 150/5300-13B.

A.4.2. Taxiway Design Group (TDG)

A taxiway is a defined path located in the Movement Area[1] and is used for aircraft to move from one point on the airport to another. Unlike the RDC, which is based on an airport's critical aircraft's approach speed, wingspan, and tail height, taxiway design is dictated based on another code that dictates taxiway design, known as the TDG. TDG guidance is based on several factors including aircraft width, the dimensions of the aircraft undercarriage (which includes the aircraft's overall Main Gear Width, MGW, and the Cockpit to Main Gear Distance, CMG), and runway to taxiway and taxiway/taxilane separation requirements. TDGs can be seen graphically in **Figure A-2**.

Planning standards for taxiways include taxiway width, taxiway safety areas, taxiway object free areas, taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines. The dimensions of each standard vary based on the identified ADG and taxiway design group for each taxiway. The ADG is based on the wingspan and tail height of an aircraft, while the TDG is based on the distance between an aircraft's cockpit to main gear, as well as the width of the main gear. There are six ADG groups and seven TDG groups.

Figure A-2: Taxiway Design Groups



Note: Values in the graph are rounded to the nearest foot. One foot = 0.305 meters.
Source: FAA AC 150/5300-13B.

[1] Movement Area: Areas used for air carrier operations and regulated under Title 14 CFR Part 139. Includes runways, taxiways, and the other areas of the airport used for taxiing, takeoff, and landing of aircraft.

Table A-3 and **Table A-4** depict FAA taxiway standards.

Table A-3: Taxiway Standards – Airplane Design Group

Design Standard	ADG I	ADG II	ADG III	ADG IV	ADG V	ADG VI
Taxiway Safety Area (ft)	49	79	118	171	214	262
Taxiway Object Free Area (ft)	89	124	171	243	285	335
Runway/Taxiway Separation (ft)	150–400*	240–400*	300-400*	400	400-500*	500

Source: FAA AC 150/5300-13B.
* Runway/taxiway separations vary based on approach visibility minimums and/or airport elevation.

Table A-4: Taxiway Standards – Taxiway Design Group

Design Standard	TDG 1A/1B	TDG 2A/2B	TDG 3	TDG 4	TDG 5	TDG 6
Taxiway Width (ft)	25	35	50	50	75	75
Taxiway Shoulder Width (ft)	10	15	20	20	30	30

Source: FAA AC 150/5300-13B.

A.5. Glossary of Terminology

100LL Specialized fuel used to power piston engine aircraft

AAC Aircraft Approach Category

A grouping of aircraft based on landing speed (see **Table A-2**).

AAGR Average Annual Growth Rate

AC Advisory Circular

An AC is an FAA publication that provides guidance for compliance with any rules within Title 14 of the CFR, *Aeronautics and Space*, including, airworthiness regulations, pilot certification, operations standards, and training standards.

ACN Aircraft Classification Number

The ACN is a number that expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard subgrade strength.

ACRP Airport Cooperative Research Program

ACRP is an applied research program authorized by Congress, sponsored by the FAA, and managed by the Transportation Research Board (TRB). This industry-driven program develops practical solutions to near-term challenges facing airports.

ADG Airplane Design Group

A classification of aircraft based on wingspan and tail height. When the aircraft wingspan and tail height fall into different groups, the higher group is used (see **Table A-2**).

ADO Airports District Office

The FAA ADO for Waterville is in Burlington, MA.

ADS-B Automatic Dependent Surveillance-Broadcast

ADS-B is part of FAA's Next Generation Air Transportation System (NextGen) designed to enhance the situational awareness of pilots and aircraft controllers.

AGL Above Ground Level

AIP Airport Improvement Program

The AIP provides grants for the planning and development of public-use airports that are part of the NPIAS.

Air Quality

Under Section 176(c) of the Clean Air Act (CAA) Amendments of 1977, the FAA is responsible for ensuring that federal airport actions conform to the State Implementation Plan (SIP), which protects against regional air pollution impacts. The criteria and procedures for implementing this conformity are detailed in Title 40 CFR Part 93, Determining Conformity of Federal Actions to State or Federal Implementation Plans. Many federal actions on an airport are considered to be general conformity actions. Presently, the general conformity rules only apply in areas that have been determined by the EPA to be in nonattainment or maintenance for the CAA's National Ambient Air Quality Standards (NAAQS) of the six priority pollutants (ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead). Under NEPA, the FAA may be required to prepare detailed air quality analysis for proposed projects whose air quality emissions have the potential to cause violations of the NAAQS for the six criteria pollutants.

ALP Airport Layout Plan

A set of drawings of current and future airport facilities that provides a graphic representation of the existing and long-term development plans for the airport.

ALS Approach Lighting System

Approach lighting systems are designed to facilitate the pilot's transition from instrument flying to visual identification of the landing runway. Depending on the system installed, the ALS generally consists of sequence flashing lights, approach lights, crossbar lights.

AMPU Airport Master Plan Update

AOA Air Operations Area

The AOA is not an FAA defined term, but rather is a term specified in the airport security program that includes portions of the airport designed and used for landing, taking off, or surface maneuvering of aircraft. In this sense, the AOA encompasses both movement and non-movement areas.

AOPA Aircraft Owners and Pilots Association

ARFF Aircraft Rescue and Fire Fighting

According to 14 CFR Paragraph 139.315, Aircraft Rescue and Firefighting: Index Determination, the Index of an airport is determined by a combination of the length of air carrier aircraft and average daily departures of air carrier operations (generally five or more average daily departures of air carrier aircraft in a single Index group).

ARTCC Air Route Traffic Control Centers

ARTCCs help to control aircraft operating under IFR rules within controlled airspace and while en route. The ARTCCs designate specific routes/altitudes for aircraft to maintain separation along federal airways.

ASV Annual Service Volume

The ASV is a reasonable estimate of the annual capacity, or the maximum annual level of aircraft operations that can be accommodated, at an airfield. It should be noted that airports could, and often do, exceed their stated ASV. However, delays begin to increase rapidly once the ASV is exceeded.

The VFR and IFR hourly capacities are the maximum number of aircraft operations that can take place on the runway system in one hour under VFR or IFR conditions, respectively. When hourly demand approaches or exceeds the hourly capacity, delays may force traffic into the succeeding hours or cause aircraft to divert to other airports.

AWOS Automated Weather Observing System

An AWOS is a 24-hour real-time weather data collection and display system that transmits computer-generated voice reports about conditions at the location of the installation. The reports can also be accessed by telephone. A basic AWOS system measures cloud cover and ceiling, visibility, wind speed and direction, temperature, dew point, precipitation accumulation, icing (freezing rain), sea level pressure for altimeter setting, and detects lightning.

Biotic Resources

Biotic resources refer to the various types of flora (plants) and fauna (fish, birds, reptiles, amphibians, mammals, etc.), including state and federally-listed threatened and endangered species, in a particular area. It also encompasses the habitats supporting the various flora and fauna including rivers, lakes, wetlands, forests, and other ecological communities. Airport projects can affect these ecological communities and thereby affect vegetation and wildlife populations.

BRL Building Restriction Line

A line identifying where buildings can and cannot be built on an airport.

CFR Code of Federal Regulations

CFR is the codification of the general and permanent rules and regulations published in the Federal Register by the executive departments and agencies of the federal government of the United States.

CIP Capital Improvement Program

CWA Clean Water Act

Declared Distances

ASDA Accelerate-Stop Distance Available

The runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft that must abort its takeoff. A stopway is an area beyond the takeoff runway able to support the airplane during an aborted takeoff, without causing structural damage to the airplane.

LDA Landing Distance Available

The runway length that is declared available and suitable for satisfying aircraft landing distance requirements.

TODA Takeoff Distance Available

This distance comprises the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA.

TORA Takeoff Run Available

The runway length declared available and suitable for satisfying takeoff run requirements. The TORA is measured from the start of takeoff to a point 200 feet from the beginning of the departure Runway Protection Zone.

DEP Department of Environmental Protection

DME Distance Measuring Equipment

EO Executive Order

EPA Environmental Protection Agency

ESA Endangered Species Act

FAA Federal Aviation Administration

FAR Federal Aviation Regulation

The FAR falls under CFR Title 14: *Aeronautics and Space*.

FEMA Federal Emergency Management Agency

FIRM Flood Insurance Rate Map

FBO Fixed Base Operator

An FBO is an organization that provides aviation services, with permission from the airport, such as fueling, hangars, tie-downs, aircraft rental, aircraft maintenance, flight instruction, and other aeronautical services. In the case of Waterville, the City of Waterville acts as the FBO.

Floodplains

Floodplains are land areas associated with bodies of water (lakes, rivers, and wetlands) that are likely to become inundated during a flooding event. The area or magnitude of a flood will vary according to the magnitude of the storm event as determined by the storm interval occurrences. For example, a five-year storm has a magnitude that can be expected once every five years. Typically, FEMA utilizes a 100-year storm interval for flood preparation. Flooding related to a 100-year storm statistically has a one percent chance of occurring during any given year. The 100-year period has been selected as having special significance for floodplain management because it is the maximum level of flooding that can reasonably be expected and planned for during a project's expected life span.

EO 11988, *Floodplain Management*, directs all federal agencies to avoid the direct and indirect support of floodplain development wherever there is a practicable alternative.

FPPA Farmland Protection Policy Act

GA General Aviation

All flights conducted by non-commercial aircraft, that are not scheduled, except for military operations.

GARD General Audio Recording Device

The GARD system is utilized to record and calculate the numbers of aircraft operations utilizing a system of microphones.

GHG Greenhouse Gas

GPS Global Positioning System

Groundwater

The EPA Sole Source Aquifer (SSA) program was established under the Safe Drinking Water Act (SDWA). According to the EPA, an SSA is defined as one that supplies at least 50 percent of the drinking water for its service area, and wherein there are no reasonably available alternative drinking water sources should the aquifer become contaminated. The SSA program allows for EPA review of federally funded projects that have the potential to affect designated SSAs and their source areas. According to the EPA, Airport property is not located over an SSA and therefore potential projects are not subject to EPA Section 1424(e) of the SDWA.

The United States Geologic Survey (USGS) tracks Principal Aquifers, defined as "a regionally extensive aquifer or aquifer system that has the potential to be used as a source of potable water." According to the Ground Water Atlas of the United States: Segment 12, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont report published in 1995, the Airport is located over the New England crystalline-rock aquifers. Future proposed projects will take measures in design and construction to avoid, minimize, or mitigate any possible adverse impacts on groundwater.

Historic Resources

According to 36 CFR Part 800, historic property is "any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the NHRP." NHPA Section 106 requires that federal agencies, such as the FAA, consider the effects of their actions on historic properties via consultation with SHPO.

HIRL High Intensity Runway Lights

HITL High Intensity Taxiway Lights

HITL is not an FAA-defined term but often refers to the taxiway variant of high-intensity airfield lighting. HITLs are differentiated from HIRLs by the color of their lens. Taxiway edge lights have solid blue lenses, or in the case when lights are not utilized, taxiways are sometimes marked with blue rod-shaped reflectors. Taxiway centerline lights are green in color.

HWCM Hazardous Waste/Contaminated Material

IFR Instrument Flight Rules

IFR conditions occur when the reported cloud ceiling is at least 500 feet but less than 1,000 feet AGL and/or visibility is at least one statute mile but less than three statute miles.

ILS Instrument Landing System

IMC Instrument Meteorological Conditions (see also IFR)

ISA International Standard Atmosphere

The standard atmospheric conditions by which to compare the actual atmospheric conditions at a certain time and location. ISA is based on a standard temperature (59° F, 15° C), pressure (29.92 in. Hg), and density at mean sea level (MSL).

Jet-A Specialized fuel used to power turbine engine aircraft

LSA Light Sport Aircraft

MALSF Medium Intensity Approach Lighting System with Sequenced Flashing Lights

A MALSF is a 1,400-foot medium-intensity ALS with light stations positioned every 200 feet (61 m). This system includes three sequenced flashers adjacent to the outermost three light stations.

MALSR Medium Intensity Approach Lighting System with Runway Alignment Indicator

A MALSR is a 2,400-foot medium-intensity ALS with light stations positioned every 200 feet (61 m). This system includes sequenced flashing Runway Alignment Indicator Lights (RAILs).

MaineDOT Maine Department of Transportation

MITL Medium Intensity Taxiway edge Lights

MLW Maximum Landing Weight

MSL Mean Sea Level

MTOW Maximum Takeoff Weight

NAAQS National Ambient Air Quality Standards

NAVAID Navigational Aids

NAVAIDS are all equipment, lights, signs, and charts associated with the navigation of an aircraft both in the air and on the ground. NAVAIDs are depicted on various aeronautical charts. VFR Sectional Charts are referenced by pilots of slow to medium speed aircraft for cross-country navigation under VMC. NAVAIDs also include land-based navigational aids like the NDB, VOR, Satellite-based systems, and landing guidance systems.

NCDC National Climactic Data Center

NDB Non-Directional Beacon

A non-directional beacon is a radio beacon that aids the pilot of an aircraft equipped with direction-finding equipment. Non-directional refers to the type of radio signal transmitted. The signal sent out from an NDB is omnidirectional and can be received by an aircraft instrument detection finder. An NDB located along a final approach to an airport is also commonly referred to as a compass locator. NDBs are being rapidly replaced by GPS systems that offer more accuracy but are still in wide use in areas of hazardous terrain, such as Alaska and in mountainous geographies.

NEPA National Environmental Protection Act

NHPA National Historic Preservation Act

NHRP National Register of Historic Places

NOAA National Oceanic and Atmospheric Administration

NPDES National Pollutant Discharge Elimination System

NRCS U.S. Natural Resource Conservation Service

NPIAS National Plan of Integrated Airport Systems

NRHP National Register of Historic Places

NRI Nationwide Rivers Inventory

NRPA National Recreation and Park Association

NWI National Wetlands Inventory

OFA Object Free Area

An area centered on a runway, taxiway, or taxilane centerline to increase the safety of aircraft operations. This area is to remain clear of all non-air navigation and non-ground maneuvering related objects.

PAPI Precision Approach Path Indicator

A PAPI is a set of equally spaced lights positioned beside the runway. These color-coded lights can be in sets of two or four and provide visual information about an aircraft's position relative to a runway.

PCI Pavement Condition Index

The PCI is a rating of the pavement condition based on the distresses observed on the pavement surface by type and severity. The PCI values range from 0 (worst) to 100 (best).

PCN Pavement Classification Number

The PCN is a numerical value that expresses the load-carrying capacity of a pavement for unrestricted operations.

PFAS Per- and Polyfluoroalkyl Substances

PFOA Perfluorooctanoic Acid

PFOS Perfluorooctane Sulfonate

PVC Poor Visibility and Ceiling

PVC conditions exist when the cloud ceiling is less than 500 feet and/or the visibility is less than one statute mile.

RCRA Resource Conservation and Recovery Act

RDC Runway Design Code

The RDC dictates the standards to which a runway must be designed and built. It is made up of the AAC, the ADG, and visibility (see **Table A-2**).

REILs Runway End Identifier Lights

A REIL system allows pilots to quickly and certainly identify the end of the runway. Specifications for REIL systems vary but are typically a set of sequence flashers that exist at the end of the runway to help pilots identify the runway beginning or landing threshold.

RHA Rivers and Harbors Appropriation Act

ROFA Runway Object Free Area

An area centered on a runway centerline to increase the safety of aircraft operations. This area is to remain clear of all non-air navigation and non-ground maneuvering related objects.

RPZ Runway Protection Zone

The RPZ is the area located beyond or prior to the runway threshold, at ground level, to increase the safety of people and property around the airport.

RVR Runway Visual Range

RVR measures the atmospheric transmissivity along runways and translates this visibility value to the air traffic user.

RVZ Runway Visibility Zone

The RVZ is the area of visibility that connects two runway lines of sight by imaginary lines.

RSA Runway Safety Area

A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

SHPO State Historic Preservation Office

SPCC Spill Prevention, Control, and Countermeasure

SRE Snow Removal Equipment

Surface Waters

The USACE regulates surface waters under Section 10 of the Rivers and Harbors Appropriation Act (RHA) that are considered to be a TNW as defined in the Act. The USACE also regulates surface water bodies through Section 404 of the CWA that have a significant nexus to a TNW as defined in either Section 10 of the RHA or Section 404 of the CWA. A significant nexus is generally defined as having more than an insubstantial or speculative effect on the chemical, physical, or biological integrity of a downstream TNW. Surficial open waterbodies, including streams, ponds, and lakes, are delineated by their Ordinary High Water Mark as defined in Title 33, Code of Federal Regulations, Part 328 (33 CFR Part 328).

The USACE also regulates wetlands and waterbodies within the state under chapter 310 of the NRPA. Coastal wetlands and great ponds are included as wetlands of special significance.

SWPPP Storm Water Pollution Prevention Plan

TAF FAA's Terminal Area Forecast

The official FAA forecast of aviation activity for U.S. airports.

TDG Taxiway Design Group

A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear distance (CMG) (see **Table A-4**).

TFMSC Traffic Flow Management System Counts

TNW Traditional Navigable Waters of the United States

TOFA/TLOFA Taxiway Object Free Area/Taxilane Object Free Area

An area centered on a taxiway centerline to increase the safety of aircraft operations. This area is to remain clear of all non-air navigation and non-ground maneuvering related objects.

TSA Taxiway Safety Area

The TSA is a defined surface centered on the taxiway centerline and prepared or suitable for reducing the risk of damage to an aircraft deviating from the taxiway.

TWY Taxiway

USACE United States Army Corps of Engineers

USFWS United States Fish and Wildlife Service

USDOT United States Department of Transportation

VASI Visual Approach Slope Indicator

VFR Visual Flight Rules

VFR conditions generally occur whenever the cloud ceiling is at least 1,000 feet above ground level (AGL) and the visibility is at least three statute miles.

VMC Visual Meteorological Conditions (see also VFR)

VOR Very-High Frequency Omnidirectional Range

Wetlands

The USACE regulates activities in wetlands that have a significant nexus to TNWs under Section 404 of the CWA. The USACE requires that an area have predominately hydrophytic vegetation, hydric soils, and wetland hydrology present in order to be considered a wetland. In addition, EO 11990 - *Protection of Wetlands*, states that federal agencies shall provide leadership and shall act to "minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance natural and beneficial values of wetlands" in carrying out the agency's responsibilities. Under EO 11990, wetlands are defined as those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

The Maine DEP also regulates wetlands within the state under chapter 310 of the NRPA. There are three tiers of the review process for alterations of wetlands, with Tier 1 applying to any activity that involves a freshwater wetland alteration of up to 15,000 square feet; Tier 2 applying to any activity that involves a freshwater wetland alteration of 15,000 square feet up to one acre; and Tier 3 applies to any activity that involves freshwater wetland alteration of one acre or more, or an alteration of a freshwater wetland listed in subsection 4 or 5 (wetlands of special significance).

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-542) describes river areas eligible to be included in a system afforded protection under the Act as free-flowing and possessing "…outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or similar values."

A.6. FAA 150/5300-13B Non-Standard Geometry Items

A.6.1. Wide Expanse of Pavement at Runway-Taxiway Interface

Wide pavement areas result in the placement of airfield signs far from a pilot's view, thus reducing the conspicuousness of critical visual cues (signs, markings, lighting). This increases the risk for pilot loss of situational awareness.

A.6.2. Entrance Taxiway Intersecting Runway at Other Than a Right Angle

Entrance taxiways intersecting a runway at other than a right angle increase the risk of a runway incursion. The acute angle reduces a pilot's field of view in one direction making it difficult for a pilot to detect an aircraft operating on the runway. This configuration also increases the width of the entrance pavement reducing the pilot's ability to maintain situational awareness.

A.6.3. Complex Runway-Taxiway and Taxiway-Taxiway Intersections

Complex intersections increase the possibility of pilot error due to loss of situational awareness. Complex intersections can preclude standard installation of signs, markings, and lighting that provide key visual cues for navigation.

A.6.4. Complex Intersections Exceeding the "Three-Path Concept"

Excessive options at complex intersections create the potential for loss of situational awareness that increase the risk of runway incursions and wrong surface takeoffs. Complex intersections often produce wide expanses of pavement, which place signs, markings, and lighting in non-standard or unexpected locations

A.6.5. Runway-Taxiway Intersections that Coincide with Two or More Runways

The large expanse of pavement prevents standard placement of signs, markings, and lighting. Potential for pilot loss of situational awareness can contribute to a wrong runway takeoff.

A.6.6. Y-Shaped Taxiways

Multiple path choices present opportunities for ground navigation errors that can lead to a runway incursion. Potential for conflict with two aircraft or two vehicles converging to a single taxiway

A.6.7. Direct Access from the Apron to a Runway

Taxiways leading directly from an apron to a runway, as shown in Figure J-20, can create the false expectation of a parallel taxiway prior to the runway. This results in pilot confusion that could lead to a runway incursion. Taxiway geometries forcing the pilot to make turns promotes situational awareness and minimizes the risk of runway incursions.

A.6.8. High-Speed Exit Crossing a Connecting Taxiway

This configuration results in a wide expanse of pavement creating non-standard signs, markings, and lighting. The lack of visual cues can lead to pilot confusion, increasing risks to safety. High-speed taxiways co-located with another taxiway increase the risk of a pilot using the exit taxiway as a runway entrance or crossing point, thus providing a limited range of view when entering a runway.

A.6.9. High-Speed Exits Leading Directly into or Across Another Runway

Aircraft exiting from a high-speed exit may not have sufficient distance to decelerate and stop prior to encountering an adjacent runway hold line. This configuration increases the probability of a runway incursion.

A.6.10. Wide Expanse of Pavement at Apron-Taxiway Interface.

Contiguous, parallel taxiways with apron pavement create a wide expanse of pavement void of critical visual cues such as elevated signs (e.g., taxiway location and direction signs). This lack of visual cues can contribute to pilot loss of situational awareness. Additionally, the lack of surface markings induces nonchannelized taxiing, which increases the risk of wingtip conflicts.

A.6.11. Short (Stub) Taxiway Connection to a Runway

Short (stub) taxiway configurations between runways result in aircraft encountering a runway holding position almost immediately upon entry onto the taxiway segment. Pilots not familiar with the location may fail to hold short, thus resulting in a runway incursion. Taxiway stubs also create challenges of holding an aircraft or vehicle without adversely affecting one of the runways.

A.6.12. Wide Expanse of Holding Bay Pavement

The wide pavement area of holding bays limits the proper placement of signs, surface markings, and lighting. The diminished visual cues increase the risk of pilot loss of situational awareness. Certain wide holding bay configurations encourage non-channelized taxiing involving judgmental steering, particularly when pavement markings are insufficient. This situation does not ensure proper wingtip clearance during maneuvering of aircraft into and out of the holding bay.

A.6.13. Co-located High-speed Exit Taxiways

Co-located high-speed exit taxiways create a wide, expansive pavement area at the runway-taxiway interface that precludes proper placement of lighting and signage.

A.6.14. Fillet Pavement Between Parallel Taxiways

Turning movements from an outer parallel taxiway to an inner parallel taxiway at the runway end are uncommon. Providing fillet pavement for this uncommon turn creates a wide pavement throat a pilot may misconstrue as the runway. This loss of situational awareness can lead to a wrong surface departure event.

A.6.15. Aligned taxiways

An aligned taxiway is one whose centerline coincides with a runway centerline. Aligned taxiways represent an elevated hazard risk due to the potential for taxiing aircraft to take a position in direct line with departing or landing aircraft. Aligned taxiways can also contribute to a pilot's loss of situational awareness.

A.6.16. Taxiway Connections to V-shaped Runways

Crossing-taxiways (or connecting taxiways) located between runways that converge (e.g., V-shaped runways) can increase runway incursion risks when the taxiway length between runways is short. The associated risks include, hold lines in close proximity to each other similar to the risk associated with a short-stub taxiway. Taxiways that intersect runways at other than 90 degrees, thus providing pilots a limited field of view to a portion of the runway. Align the taxiway to reach the runway end.

A.6.17. Parallel Taxiways/Runway Intersection

The intersection of a parallel taxiway with a crossing runway may induce runway incursion risks if the intersection angle is less than 75 degrees. Long straight taxi paths prior to a runway intersection also increase the risk of a pilot missing the hold line. Additionally, the pavement fillets for an acute angle intersection can create nonstandard conditions for pavement markings and signage. It is not necessary for a parallel taxiway to be equidistant to the runway it serves for the entire length of the taxiway. When intersecting a crossing runway, adjust the alignment of the parallel taxiway to establish a 90-degree angle, plus or minus 15 degrees, with the runway centerline. Interrupting the straight taxi path also represents a cue to the pilot they are approaching a runway environment.

Waterville Regional Airport

ENVIRONMENTAL DOCUMENTATION
APPENDIX B

McFARLAND JOHNSON

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

November 9, 2022

Jordan Tate
McFarland Johnson
5 Depot Street, Suite 25
Freeport, ME 04032

Via email: jtate@mjinc.com

Re: Rare and exemplary botanical features in proximity to: Master Plan Update, Waterville Robert-LaFleur Airport, Waterville, Maine

Dear Ms. Tate:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received November 7, 2022 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Waterville, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

DEPARTMENT OF Agriculture Conservation & Forestry

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Lisa St. Hilaire

Lisa St. Hilaire | Information Manager | Maine Natural Areas Program
207-287-8044 | lisa.st.hilaire@maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: #21-111, Garlough Subdivision, Map 9 Lots 6-6 and 6-7, Taylor Smith Road and Quail Run, Bethel, ME

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Adder's Tongue Fern						
	E	S1	G5	1924-07	8	Non-tidal rivershore (non-forested, seasonally wet),Open
Alpine Rush						
	SC	S3	G5T5	1898-09	5	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S3	G5T5	1916-07-06	6	Non-tidal rivershore (non-forested, seasonally wet)
American Lopseed						
	PE	SH	G5	1916-08	4	Non-tidal rivershore (non-forested, seasonally
Awned Flatsedge						
	SC	S2	G5	1898-09-02	2	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G5	1898-09-02	5	Non-tidal rivershore (non-forested, seasonally wet)
Bottlebrush Grass						
	SC	S3	G5	1905-08-05	11	Hardwood to mixed forest (forest, upland)
	SC	S3	G5	1916-08-18	12	Hardwood to mixed forest (forest, upland)
Broad Beech Fern						
	SC	S2	G5	1953-08-21	2	Hardwood to mixed forest (forest, upland)
	SC	S2	G5	1915-08-13	11	Hardwood to mixed forest (forest, upland)
Clinton's Bulrush						
	SC	S3	G4	1917-07-21	13	Open wetland, not coastal nor rivershore (non-forested,
Foxtail Sedge						
	PE	SH	G5	1916-07-06	2	Forested wetland
Garber's Sedge						
	SC	S2	G5	2020-06-12	1	Open wetland, not coastal nor rivershore (non-forested,
	SC	S2	G5	1984-06-22	2	Open wetland, not coastal nor rivershore (non-forested,
Hairy Wood Brome-grass						

Hairy Wood Brome-grass					
SC	S2	G5	1915-08-10	6	Hardwood to mixed forest (forest, upland),Non-tidal
Horned Beak-rush					
T	S1	G4G5	1993-07-20	1	Open wetland, not coastal nor rivershore (non-forested,
Houghton's Flatsedge					
E	S1	G4?	1905-07-22	1	Dry barrens (partly forested, upland),Non-tidal rivershore
Long-leaved Bluet					
SC	S2S3	G5TNR	1984-06-22	2	Non-tidal rivershore (non-forested, seasonally wet)
SC	S2S3	G5TNR	1987-06-17	18	Non-tidal rivershore (non-forested, seasonally wet)
Meadow Sedge					
E	S1	G5	2017-11	5	
Narrow-leaf Arrowhead					
SC	S2	G4G5	2003-09-11	7	
Pale Green Orchis					
SC	S2	G4?T4Q	1892-07-15	9	Non-tidal rivershore (non-forested, seasonally wet),Open
SC	S2	G4?T4Q	1916-07-06	21	Non-tidal rivershore (non-forested, seasonally wet),Open
Rivershore Outcrop					
	S2	G3	1984-06-22	2	
	S2	G3	1987-06-17	3	
Shining Ladies'-tresses					
T	S1	G4	1993-07-20	1	Non-tidal rivershore (non-forested, seasonally wet),Open
T	S1	G4	1984-06-22	2	Non-tidal rivershore (non-forested, seasonally wet),Open
T	S1	G4	1941	14	Non-tidal rivershore (non-forested, seasonally wet),Open
T	S1	G4	1909-07-01	18	Non-tidal rivershore (non-forested, seasonally wet),Open
Showy Lady's-slipper					
SC	S3	G4G5	1903-06	33	Forested wetland,Open wetland, not coastal nor
Showy Orchis					
E	S1	G5	1896-06-05	11	Hardwood to mixed forest (forest, upland)
E	S1	G5	1915-08-12	12	Hardwood to mixed forest (forest, upland)

Showy Orchis						
	E	S1	G5	1915-08-12	13	Hardwood to mixed forest (forest, upland)
	E	S1	G5	1941	16	Hardwood to mixed forest (forest, upland)
Silver Maple Floodplain Forest						
		S3	GNR	2020-09-08	74	
Soft-leaf Muhly						
	SC	S3	G5	1993-07-20	1	Open wetland, not coastal nor rivershore (non-forested,
White Adder's-mouth						
	E	S1	G5T4T5	1916-07-06	16	Forested wetland
Wild Chervil						
	PE	SH	G5	1916-08-18	3	Hardwood to mixed forest (forest, upland)
	PE	SH	G5	1936-07	4	Hardwood to mixed forest (forest, upland)
Wild Garlic						
	SC	S2	G5	1983-07-14	4	Forested wetland,Hardwood to mixed forest (forest,

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Conservation Status Ranks

State and Global Ranks: This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of critically imperiled (1) to secure (5). Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
S1 **G1**	**Critically Imperiled** – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
S2 **G2**	**Imperiled** – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 **G3**	**Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 **G4**	**Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 **G5**	**Secure** – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
SX **GX**	**Presumed Extinct** – Not located despite intensive searches and virtually no likelihood of rediscovery.
SH **GH**	**Possibly Extinct** – Known from only historical occurrences but still some hope of rediscovery.
S#S# **G#G#**	**Range Rank** – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
SU **GU**	**Unrankable** – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR **SNR**	**Unranked** – Global or subnational conservation status not yet assessed.
SNA **GNA**	**Not Applicable** – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems.
Qualifier	**Definition**
S#? **G#?**	**Inexact Numeric Rank** – Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority** – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The "Q" modifier is only used at a global level.
T#	**Infraspecific Taxon (trinomial)** – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Status: Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
E	**Endangered** – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
T	**Threatened** – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
SC	**Special Concern** – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
PE	**Potentially Extirpated** – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

Element Occurrence (EO) Ranks: Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
A	**Excellent** – Excellent estimated viability/ecological integrity.
B	**Good** – Good estimated viability/ecological integrity.
C	**Fair** – Fair estimated viability/ecological integrity.
D	**Poor** – Poor estimated viability/ecological integrity.
E	**Extant** – Verified extant, but viability/ecological integrity not assessed.
H	**Historical** – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
X	**Extirpated** – Documented loss of population/destruction of habitat.
U	**Unrankable** – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
NR	**Not Ranked** – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information
http://www.maine.gov/dacf/mnap

maine DEPARTMENT OF Agriculture Conservation & Forestry
NATURAL AREAS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

December 14, 2022

Jordan Tate
McFarland Johnson
5 Depot Street
Freeport, ME 04032

RE: Information Request – Waterville, Robert LaFleur Airport Project

Dear Jordan:

Per your request received on November 10, 2022, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Robert LaFleur Airport* project in Waterville. Note that as project details are lacking, our comments are non-specific and should be considered preliminary.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Upland Sandpiper - Upland sandpipers, a State Threatened species, have been historically documented in the project area. Upland sandpipers nest only on the ground and use both native and cultivated vegetation for nesting sites. Due to lack of recent survey efforts, it is unknown if upland sandpipers are still present in this area. Upland sandpipers are protected under Maine's Endangered Species Act and, as such, are afforded special protection against activities that may cause "Take" (kill or cause death), "harassment" (create injury or significantly disrupt normal behavior patterns), and other adverse actions.

Significant Wildlife Habitat

Significant Vernal Pools - At this time MDIFW Significant Wildlife Habitat (SWH) maps indicate no known presence of SWHs subject to protection under the Natural Resources Protection Act (NRPA) within the project area, which include Waterfowl and Wading Bird Habitats, Seabird Nesting Islands, Shorebird Areas, and Significant Vernal Pools. However, a comprehensive statewide inventory for

Significant Vernal Pools has not been completed and it is unknown if surveys for vernal pools have been conducted in the airport project area.

Fisheries Habitat

If a project is proposed, we generally recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To: December 21, 2022
Project Code: 2023-0013408
Project Name: Waterville Robert-LaFleur Airport - Master Plan Update

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

Project Summary

Project Code: 2023-0013408
Project Name: Waterville Robert-LaFleur Airport - Master Plan Update
Project Type: Airport - Maintenance/Modification
Project Description: The Airport is conducting a master plan update, which involves evaluating environmental resources on airport property and immediate vicinity.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.5327461,-69.67731603550598,14z

Counties: Kennebec County, Maine

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

Fishes

NAME	STATUS
Atlantic Salmon *Salmo salar* Population: Gulf of Maine DPS There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2097	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Atlantic Salmon *Salmo salar* https://ecos.fws.gov/ecp/species/2097#crithab	Final

IPaC User Contact Information

Agency: McFarland Johnson
Name: Jordan Tate
Address: 5 Depot Street
Address Line 2: Suite 25
City: Freeport
State: ME
Zip: 04032
Email jtate@mjinc.com
Phone: 2078695419

Lead Agency Contact Information

Lead Agency: Federal Aviation Administration

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JANET T. MILLS
GOVERNOR

KIRK F. MOHNEY
DIRECTOR

November 29, 2022

Mr. Jordan Tate
McFarland Johnson
5 Depot St
Suite 25
Freeport, ME 04032

Project: MHPC# 2095-22 Robert LaFleur Airport Master Plan Update

Town: Waterville, ME

Dear Mr. Tate:

In response to your recent request, the Commission has reviewed the information received November 21, 2022 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

As you may know, our office determined that the LaFleur Airport is eligible for listing in the National Register of Historic Places in 2004. Any future improvements that use federal monies or need federal permitting will be subject to review under Section 106 of the National Historic Preservation Act of 1966, as amended.

In addition, there is potential for the presence of presence of a homestead on the north side of Webb Road and several structures on the west side of Mitchell Road. We recommend that any ground disturbing activities in the vicinity of Webb Road to the south and Mitchell Road to the west are subject to review on a case by case basis.

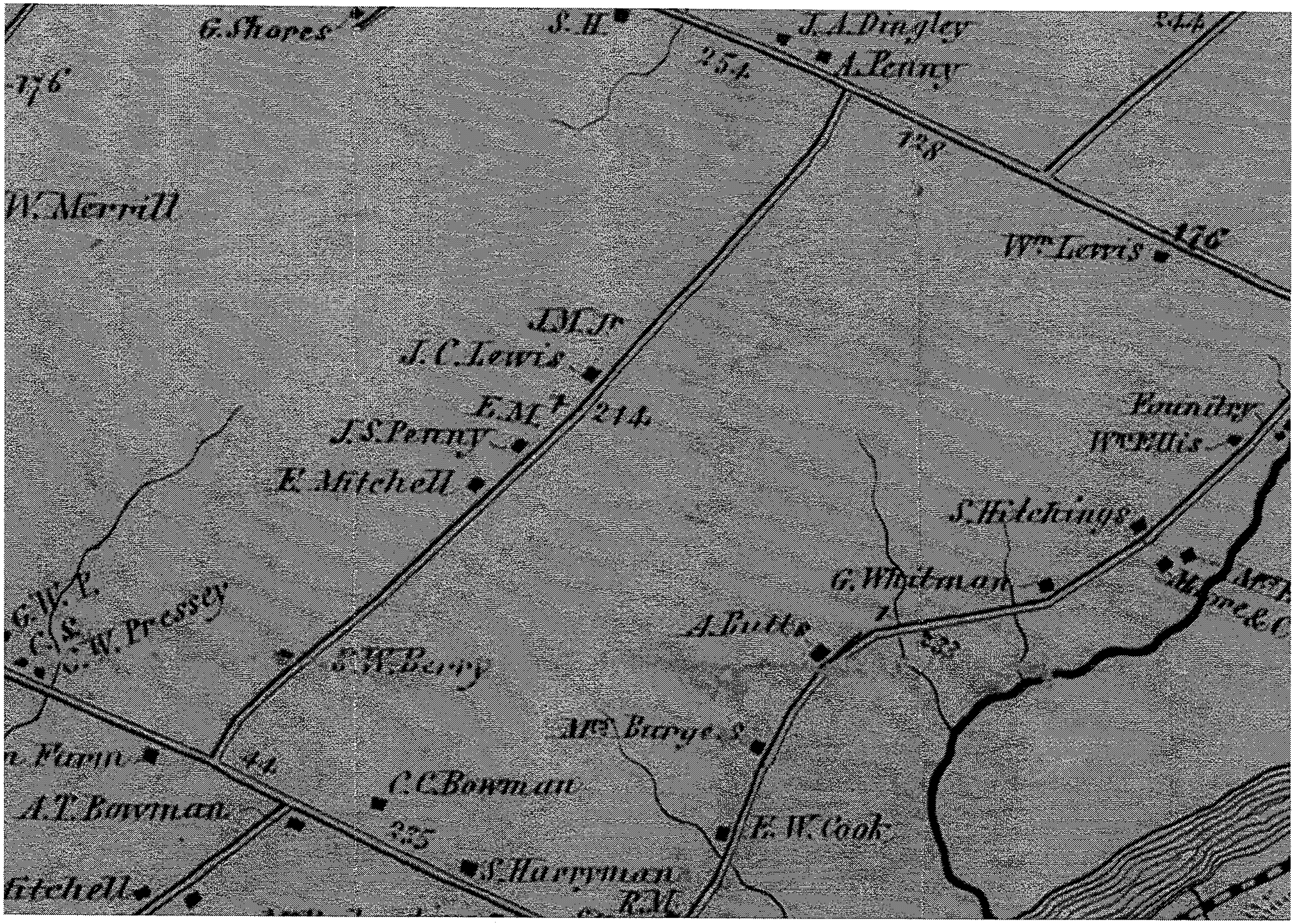
No known prehistoric archaeological sites are located within the presumed area of potential effect.

Please contact Megan M. Rideout of our staff if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
State Historic Preservation Officer


G. Shores
S. H.
J. A. Dingley
A. Penny
254
128
176
W. Merrill
Wm Lewis
176
J.M. Jr
J. C. Lewis
E. M.
214
J. S. Penny
E. Mitchell
Foundry
Wm Ellis
S. Hitchings
G. Whitman
A. Butts
G. W. P.
C. S.
W. Pressey
S. W. Berry
Mrs Burge's
Farm
44
C. C. Bowman
A. T. Bowman
E. W. Cook
225
S. Harryman
R. M.
itchell

Waterville Robert-LaFleur Airport
2 Lafleur Rd, Waterville, ME 04901
prepared for: McFarland Johnson
Ref:

2022-12-02

Environmental Radius Report

NETRONLINE

2055 E. Rio Salado Pkwy
Tempe, AZ 85381
480-967-6752

Summary

Federal

	< 1/4	1/4 - 1/2	1/2 - 1
Lists of Federal NPL (Superfund) sites	0	0	0
Lists of Federal Delisted NPL sites	0	0	-
Lists of Federal sites subject to CERCLA removals and CERCLA orders	0	0	-
Lists of Federal CERCLA sites with NFRAP	0	0	-
Lists of Federal RCRA facilities undergoing Corrective Action	0	0	-
Lists of Federal RCRA TSD facilities	0	0	-
Lists of Federal RCRA generators	0	-	-
Federal institutional control/engineering control registries	0	-	-
Federal ERNS list	0	-	-

State

	< 1/4	1/4 - 1/2	1/2 - 1
Lists of state and tribal Superfund equivalent sites	0	0	0
Lists of state and tribal hazardous waste facilities	1	1	-
Lists of state and tribal landfills and solid waste disposal facilities	0	0	-
Lists of state and tribal leaking storage tanks	0	0	-
Lists of state and tribal registered storage tanks	3	-	-
State and tribal institutional control/engineering control registries	0	-	-
Lists of state and tribal voluntary cleanup sites	0	0	-
Lists of state and tribal brownfields sites	0	0	-

Other

	< 1/4	1/4 - 1/2	1/2 - 1
State and/or tribal lists of spills and spill responses	0	0	-
State and/or tribal lists of clandestine laboratory cleanups	0	0	-
State and/or tribal lists of registered aboveground storage tanks (ASTs)	0	0	-
State and/or tribal lists of permitted facilities	0	-	-
Resource Conservation and Recovery Act Information (RCRAInfo)	1	1	-
U.S. EPA Underground Storage Tanks (UST)	0	-	-

Lists of Federal NPL (Superfund) sites

The National Priorities List (NPL) is the list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation. The NPL is updated periodically, as mandated by CERCLA.

There were no Federal NPL sites found within a one-mile radius of the target property.

Lists of Federal Delisted NPL sites

The EPA may delete a final NPL site if it determines that no further response is required to protect human health or the environment. Under Section 300.425(e) of the NCP (55 FR 8845, March 8, 1990), a site may be deleted when no further response is appropriate if EPA determines that one of the following criteria has been met: 1) EPA, in conjunction with the state, has determined that responsible parties have implemented all appropriate response action required, 2) EPA, in consultation with the state, has determined that all appropriate Superfund-financed responses under CERCLA have been implemented and that no further response by responsible parties is appropriate, 3) A remedial investigation/feasibility study (RI/FS) has shown that the release poses no significant threat to public health or the environment and, therefore, remedial measures are not appropriate.

There were no Federal Delisted NPL sites found within a half-mile radius of the target property.

Lists of Federal sites subject to CERCLA removals and CERCLA orders

CERCLA identifies the classes of parties liable under CERCLA for the cost of responding to releases of hazardous substances. In addition, CERCLA contains provisions specifying when Federal installations must report releases of hazardous substances and the cleanup procedures they must follow. Executive Order No. 12580, Superfund Implementation, delegates response authorities to EPA and the Coast Guard. Generally, the head of the Federal agency has the delegated authority to address releases at the Federal facilities in its jurisdiction.

There were no Federal sites subject to CERCLA removals and/or orders found within a half-mile radius of the target property.

Lists of Federal CERCLA sites with NFRAP

No Further Remedial Action Planned (NFRAP) is a decision made as part of the Superfund remedial site evaluation process to denote that further remedial assessment activities are not required and that the facility/site does not pose a threat to public health or the environment sufficient to qualify for placement on the National Priorities List (NPL) based on currently available information. These facilities/sites may be re-evaluated if EPA receives new information or learns that site conditions have changed. A NFRAP decision does not mean the facility/site is free of contamination and does not preclude the facility/site from being addressed under another federal, state or tribal cleanup program.

There were no Federal CERCLA sites with No Further Remedial Action Planned (NFRAP) decisions found within a half-mile radius of the target property.

Lists of Federal RCRA facilities undergoing Corrective Action

Corrective action is a requirement under the Resource Conservation and Recovery Act (RCRA) that facilities that treat, store or dispose of hazardous wastes investigate and cleanup hazardous releases into soil, ground water, surface water and air. Corrective action is principally implemented through RCRA permits and orders. RCRA permits issued to TSDFs must include provisions for corrective action as well as financial assurance to cover the costs of implementing those cleanup measures. In addition to the EPA, 44 states and territories are authorized to run the Corrective Action program.

There were no Federal RCRA facilities undergoing corrective action(s) found within a half-mile radius of the target property.

Lists of Federal RCRA TSD facilities

The final link in RCRA's cradle-to-grave concept is the treatment, storage, and disposal facility (TSDF) that follows the generator and transporter in the chain of waste management activities. The regulations pertaining to TSDFs are more stringent than those that apply to generators or transporters. They include general facility standards as well as unit-specific design and operating criteria.

There were no Federal RCRA treatment, storage and disposal facilities (TSDFs) found within a half-mile radius of target property.

Lists of Federal RCRA generators

A generator is any person who produces a hazardous waste as listed or characterized in part 261 of title 40 of the Code of Federal Regulations (CFR). Recognizing that generators also produce waste in different quantities, EPA established three categories of generators in the regulations: very small quantity generators, small quantity generators, and large quantity generators. EPA regulates hazardous waste under the Resource Conservation and Recovery Act (RCRA) to ensure that these wastes are managed in ways that protet human health and the environment. Generators of hazardous waste are regulated based on the amount of hazardous waste they generate in a calendar month, not the size of their business or facility.

There were no Federal RCRA generators found at the target property and/or adjoining properties.

Federal institutional control/engineering control registries

Institutional Controls (IC) are defined as non-engineered and/or legal controls that minimize the potential human exposure to contamination by limiting land or resource use. Whereas, Engineering Controls (EC) consist of engineering measures (e.g, caps, treatment systems, etc.) designed to minimize the potential for human exposure to contamination by either limiting direct contact with contaminated areas or controlling migration of contaminants through environmental media.

There were no Federal institutional or engineering controls found at the target property.

Federal ERNS list

The Emergency Response Notification System (ERNS) is a database used to store information on notification of oil discharges and hazardous substances releases. The ERNS program is a cooperative data sharing effort encompassing the National Response Center (NRC), operated by the US Coast Guard, EPA HQ and EPA regional offices. ERNS data is used to analyze release notifications, track EPA responses and compliance to environmental laws, support emergency planning efforts, and assist decision-makers in developing spill prevention programs.

There were no Federally recorded releases of oil and/or hazardous substances at the target property.

Lists of state and tribal Superfund equivalent sites

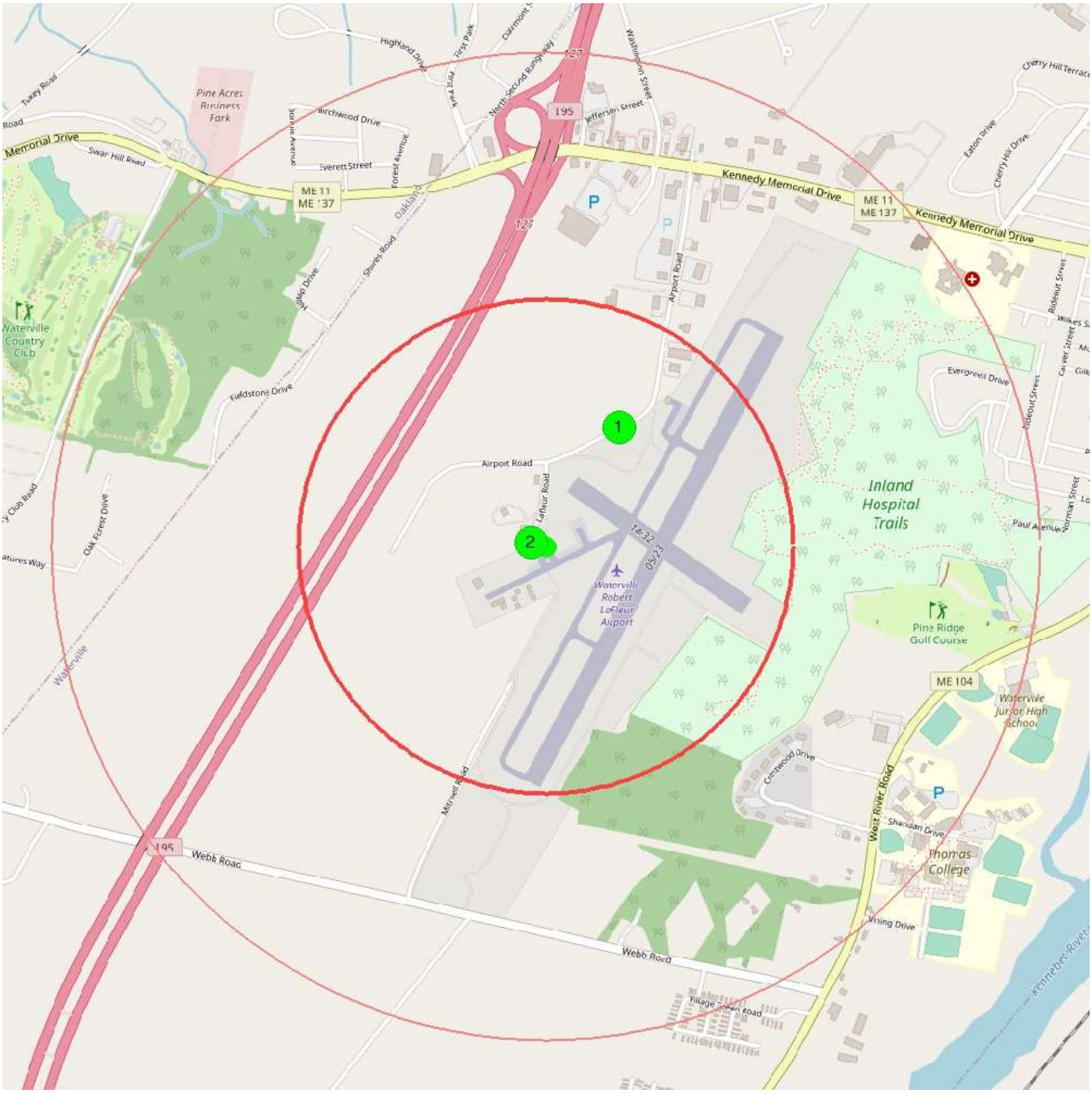
In order to maintain close coordination with the states and tribes in the NPL listing decision process, the EPA's policy is to determine the position of states and tribes on sites that EPA is considering for listing. Consistent with this policy, since 1996, it has been the EPA's general practice to seek the state or tribe's position on sites under consideration for NPL listing by submitting a written requiest to the governor/state environmental agency or tribe. Various states may have their own program for identifying, investigating and cleaning up sites where consequential amounts of hazardous waste may have been disposed that work in conjunction with the EPA's Superfund remedial program.

There were no State and/or tribal Superfund equivalent sites found within a one-mile radius of target property.

Lists of state and tribal hazardous waste facilities

MEDEP - RCRA HAZARDOUS WASTE FACILITIES

The Resource Conservation and Recovery Act's (RCRA) hazardous waste permitting program ensures the safe management of hazardous wastes. Under this program, EPA establishes requirements regarding the treatment, storage and disposal of hazardous wastes. The permitting program is important to the cradle-to-grave management system for hazardous wastes, which prevents dangerous releases and avoids costly Superfund cleanups. Permits are issued by authorized state or EPA regional offices. State and EPA cooperate to implement RCRA. Hazardous waste management facilities receive hazardous wastes for treatment, storage, or disposal. These facilities are often referred to as treatment, storage and disposal facilities, or TSDFs. This data set was searched to return all records within a half-mile of the target property.



center 44.533525 -69.680047 0.5 mile 1.0 mile

1

RCRA Name	**LEAD BETTER TRUCK SALES INC**
Source ID	**MED981070337**
Street Address	**AIRPORT RD**
City	**WATERVILLE**
Registry ID	**110008436996**
Significant Non-Compliance	**No**
distance from center (miles)	0.2823
data source	last updated 2022-03-29 from MEDEP-HWF

2

RCRA Name	**PINE TREE WASTE**
Source ID	**MEX020007748**
Street Address	**3 LAFLEUR RD**
City	**WATERVILLE**
Registry ID	**110070861896**
Significant Non-Compliance	**No**
distance from center (miles)	0.0306
data source	last updated 2022-03-29 from MEDEP-HWF

Lists of state and tribal landfills and solid waste disposal facilities

Title 40 of the CFR parts 239 through 259 contain the regulations for non-hazardous solid waste programs set up by the states. EPA has requirements for state solid waste permit programs, guidelines for the processing of solid waste, guidelines for storage and collection of commercial, residential and institutional solid waste, and the criteria for municipal solid waste landfills. State solid waste programs may be more stringent than the federal code requires.

There were no State and/or tribal landfills or solid waste disposal facilities found within a half-mile radius of the target property.

Lists of state and tribal leaking storage tanks

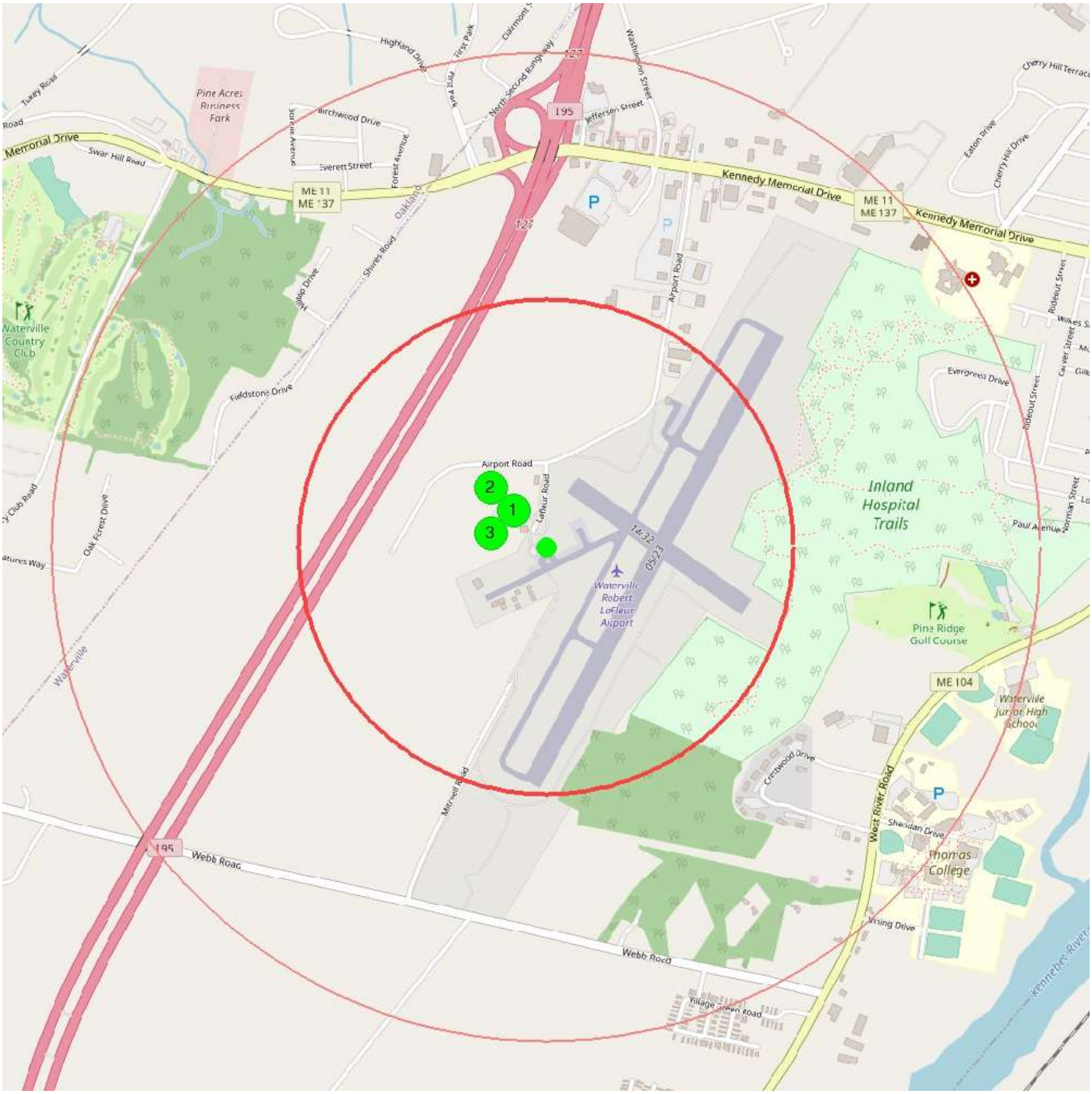
A typical leaking underground storage tank (LUST) scenario involves the release of a fuel product from an underground storage tank (UST) that can contaminate surrounding soil, groundwater, or surface waters, or affect indoor air spaces. Once a leak is confirmed, immediate response actions must be taken to minimize or eliminate the source of the release and to reduce potential harm to human health, safety, and the environment. Each state has unique requirements for initiating responses to a release, and it is up to the UST owner or operator to conduct actions in compliance with his/her local rules.

There were no State and/or tribal leaking storage tanks found within a half-mile radius of the target property.

Lists of state and tribal registered storage tanks

MEDEP - UNDERGROUND STORAGE TANK PROGRAM

The Main Department of Environmental Protection's Underground Storage Tank (UST) Program is responsible for protecting public health and the environment, in particular groundwater, by preventing oil discharges to the greatest extent possible. The UST Program staff provide technical expertise, training, and outreach to UST facility owners and operators.



center 44.533525 -69.680047 0.5 mile 1.0 mile

1

Registration Number	**21526**
Master Tank ID	**21526002**
Facility Name	**PINE TREE WASTE INC**
Address	**3 LAFLEUR ROAD**
City	**WATERVILLE**
Near Public Water	**No**
Near Private Water	**No**
Near Other Water	**No**
On Aquifer	**No**
Tank Number	**2**
Tank Material	**STEEL_SECONDARY_CONTAINMENT**
Tank Installation Date	**2009-02-03**
Tank Status	**PLANNED**
Status Date	**2009-02-03**
distance from center (miles)	0.0973
data source	last updated 2021-12-15 from MEDEP-TANKS

2

Registration Number	**21526**
Master Tank ID	**21526003**
Facility Name	**PINE TREE WASTE INC**
Address	**3 LAFLEUR ROAD**
City	**WATERVILLE**
Near Public Water	**No**
Near Private Water	**No**
Near Other Water	**No**
On Aquifer	**No**
Tank Number	**3**
Tank Material	**STEEL_SECONDARY_CONTAINMENT**
Tank Installation Date	**2009-02-03**
Tank Status	**PLANNED**
Status Date	**2009-02-03**
distance from center (miles)	0.0973
data source	last updated 2021-12-15 from MEDEP-TANKS

3

Registration Number	**21526**
Master Tank ID	**21526001**
Facility Name	**PINE TREE WASTE INC**
Address	**3 LAFLEUR ROAD**
City	**WATERVILLE**
Near Public Water	**No**
Near Private Water	**No**
Near Other Water	**No**
On Aquifer	**No**
Tank Number	**1**
Tank Material	**STEEL_ASPHALT_COATED**
Tank Installation Date	**2009-02-01**
Tank Status	**PLANNED**
Status Date	**2009-02-03**
distance from center (miles)	0.0973
data source	last updated 2021-12-15 from MEDEP-TANKS

State and tribal institutional control/engineering control registries

Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Engineering controls consist of engineering measures (e.g, caps, treatment systems, etc.) designed to minimize the potential for human exposure to contamination by either limiting direct contact with contaminated areas or controlling migration of contaminants through environmental media. It is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable.

There were no State and/or tribal institutional and/or engineering controls found filed against the target property.

Lists of state and tribal voluntary cleanup sites

State cleanup programs play a significant role in assessing and cleaning up contaminated sites. State cleanup programs typically are programs authorized by state statutes to address brownfields and other lower-risk sites that are not of federal interest. The EPA has historically supported the use of state cleanup programs and continues to provide grant funding to establish and enhance the programs. This approach was codified in 2002 as Section 182 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

There were no State and/or tribal voluntary cleanup sites found within a half-mile radius of the target property.

Lists of state and tribal brownfields sites

Since its inception in 1995, EPA's Brownfields and Land Revitalization Program has grown into a proven, results-oriented program that has changed the way communities address and manage contaminated property. The program is designed to empower states, tribes, communities, and other stakeholders to work together to prevent, assess, safely clean up, and sustainably reuse brownfields. Beginning in the mid-1990s, EPA provided small amounts of seed money to local governments that launched hundreds of two-year Brownfields pilot projects and developed guidance and tools to help states, communities and other stakeholders in the cleanup and redevelopment of brownfields sites.

There were no State and/or tribal brownfields sites found within a half-mile radius of the target property.

State and/or tribal lists of spills and spill responses

No records found

State and/or tribal lists of clandestine laboratory cleanups

No records found

State and/or tribal lists of registered aboveground storage tanks (ASTs)

No records found

State and/or tribal lists of permitted facilities

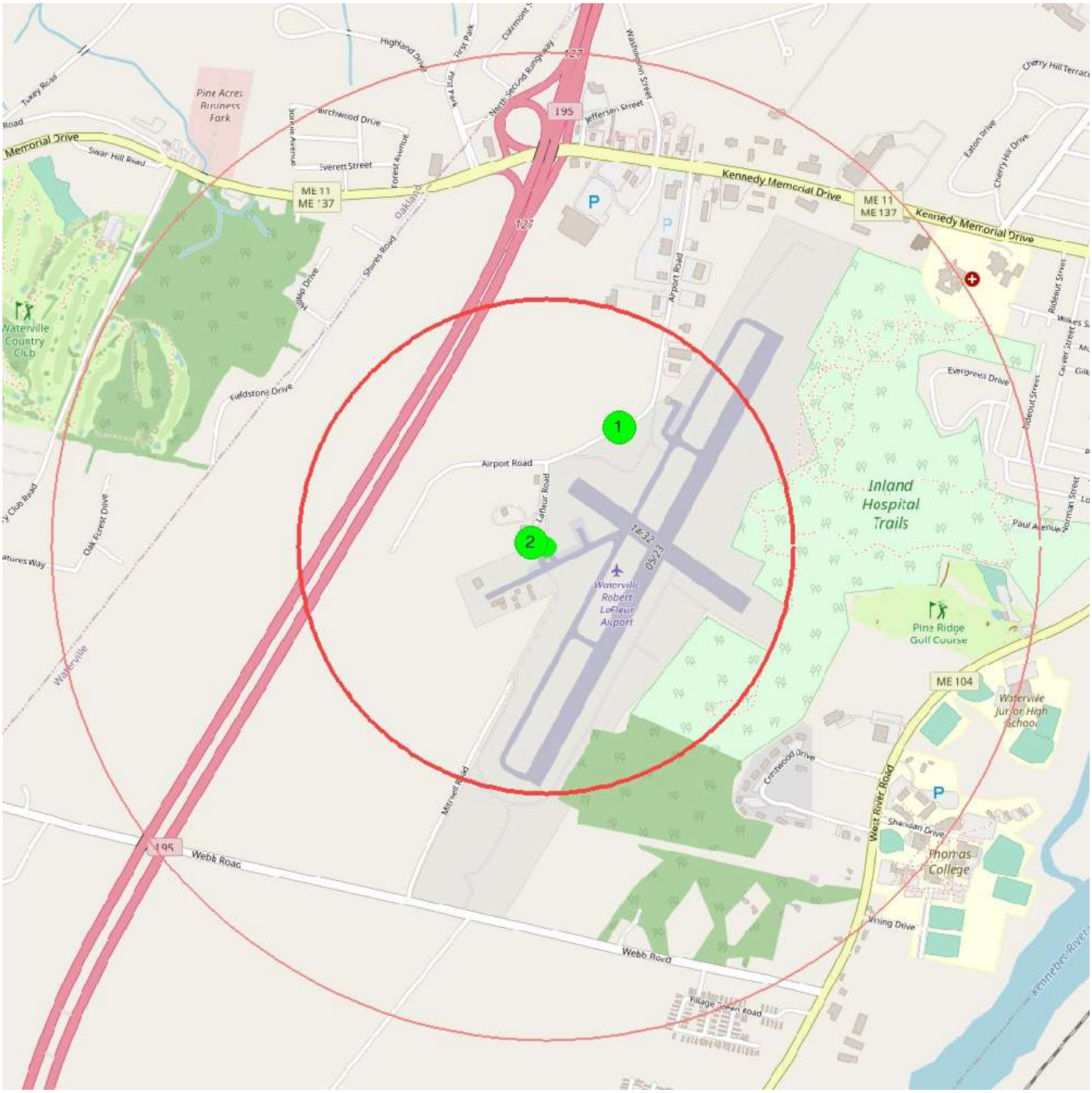
No State and/or tribal permitted facilities found within a half-mile of the target property.

Resource Conservation and Recovery Act Information (RCRAInfo)

RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM

RCRAInfo is EPA's comprehensive information system that supports the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984 through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste.

Please note that RCRAInfo contains all hazardous waste handlers in addition to TSDFs, generators, and facilities undergoing RCRA corrective action. One may encounter duplicate records from the TSDF, generators, and/or the RCRA corrective action sections. This source was searched for all records within a half-mile of the target property.



center 44.533525 -69.680047 0.5 mile 1.0 mile

1

Registry ID	**110008436996**
Name	**LEAD BETTER TRUCK SALES INC**
Address	**AIRPORT RD**
City	**WATERVILLE**
Site Type	**STATIONARY**
Program Acronyms	**RCRAINFO:MED981070337**
Interest Type	**SQG**
Point of Reference Description	**ENTRANCE POINT OF A FACILITY OR STATION**
Date Created	**01-MAR-00**
Date Updated	**26-JAN-12**
FRS Facility Detail Report URL	**Link**
distance from center (miles)	0.2823
data source	last updated from FACILITY REGISTRY SERVICE

2

Registry ID	**110070861896**
Name	**PINE TREE WASTE**
Address	**3 LAFLEUR RD**
City	**WATERVILLE**
Site Type	**STATIONARY**
Program Acronyms	**RCRAINFO:MEX020007748**
Interest Type	**VSQG**
Point of Reference Description	**CENTER OF A FACILITY OR STATION**
Date Created	**14-OCT-20**
FRS Facility Detail Report URL	**Link**
distance from center (miles)	0.0306
data source	last updated from FACILITY REGISTRY SERVICE

U.S. EPA Underground Storage Tanks (UST)

No records found

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