# Biddeford Municipal Airport

# AIRPORT MASTER PLAN UPDATE

AIP No. 03-23-0009-14-2020

Final Report

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## EXECUTIVE SUMMARY

The Biddeford Municipal Airport Master Plan was last updated in 2005. Since that time, the Airport, FAA, and MaineDOT have made significant investments to improve safety and infrastructure, including conducting environmental assessments, acquiring permits, installing an airport beacon, installing fencing and gates, acquiring avigation easements and property, removing vegetation from the runway approaches, and, most recently, reconstructing Runway 06-24. With a newly constructed runway environment and clear approaches, a re-evaluation of the Airport's priorities was necessary.

The 2021 Airport Master Plan Update (2021 AMPU) reviewed the adequacy of the Airport's landside and airside facilities with respect to compliance with Federal Aviation Administration (FAA) design standards and ability to address the needs of the Airport through the 20-year planning period (2020-2039). Projects explored as part of the 2021 AMPU included runway extension construction, taxiway construction, hangar construction, Automated Weather Observing System (AWOS) or weather monitoring camera installation, fuel farm construction, perimeter fence construction, snow removal equipment (SRE) building construction, and apron reconfiguration. The following sections review the forecasted demand, design aircraft identification, recommended projects, and implementation schedule.

## COVID-19 STATEMENT

The Aerospace Forecast is a document produced by FAA each year to review national aviation trends at towered U.S. airports and predict future growth across the industry. According to the FAA Aerospace Forecast published in 2021, the aviation industry experienced steady increases in profitability in the eleven years (2008-2019) preceding the COVID-19 pandemic. The beginning of 2020 brought a sharp end to those years, resulting in significant losses across the board. Though the industry experienced unparalleled impacts, the FAA Aerospace Forecast expects a strong rebound, with airlines focusing on meeting the rate of recovery as demand rises and falls with fluctuating COVID cases, vaccination rates, and government restrictions. The FAA predicts that the airline industry will continue to recover as the economy recovers, with pent-up demand "expected to drive the commercial operations back to the pre-COVID level."

The General Aviation industry was also significantly impacted by the COVID-19 pandemic, but to a far lesser extent than the commercial airline sector. Many business travelers began flying via private jets due to concerns about the virus. Additionally, many newcomers included student, private, and commercial pilots, who began flying piston aircraft out of smaller airports and larger airports that had experienced a decrease in commercial flights. The Aerospace Forecast states that "the total hours flown by the GA aircraft is forecast to increase by an average of 1.0 percent per year, after declining by 9.7 percent between 2019 and 2020, and recovering partially, with a growth of 4.9 percent in 2021 from the previous year."

The long-term outlook for General Aviation is positive overall, and though GA operations at contract tower airports declined by 8.8 percent between 2019 and 2021, they are projected to recover to pre-

pandemic levels by 2026 and continue to grow moderately at an average annual growth rate of 0.8 percent per year through 2041.

## FORECAST OF AVIATION DEMAND AND CAPACITY

The two major elements of the forecast of aviation demand in Chapter 4 is a comparison of historic airport operations and recorded based aircraft to regional and national trends, and the prediction of future airport activity over the next 20 years and the designation of a design aircraft. The table below highlights the recommended forecast, as approved by FAA, for the 5-, 10-, and 20-year planning horizons.

**Summary of Recommended Forecast**

| *Year* | *Itinerant* | | | *Local* | | | |
|---|---|---|---|---|---|---|---|
| | Air Taxi | General Aviation | Military | Civil | Military | Total Operations | Based Aircraft |
| *2024* | 0 | 1,462 | 0 | 6,227 | 0 | 7,689 | 40 |
| *2029* | 0 | 1,447 | 0 | 6,775 | 0 | 8,222 | 42 |
| *2039* | 0 | 1,418 | 0 | 8,019 | 0 | 9,437 | 45 |

*Source: FAA TAF, Gale Associates Analysis 2020*

### DESIGN AIRCRAFT

FAA design standards for airports are based on the dimensions of a design aircraft, which is the most demanding aircraft (or grouping of similar aircraft) that makes regular use (i.e., at least 500 annual operations) of an airport. Aircraft are categorized according to their approach speed (Aircraft Approach Category) and wingspan and tail height (Airplane Design Group), as defined in the table below:

**Aircraft Approach Categories (AAC) and Airplane Design Groups (ADG)**

| *AAC* | *Speed (Knots)* | *ADG* | *Tail Height* | *Wingspan* |
|---|---|---|---|---|
| A | < 91 | I | < 20’ | < 49’ |
| B | 91 - < 121 | II | 20’ - < 30’ | 49’- < 79’ |
| C | 121 - < 141 | III | 30’ - < 45’ | 79’- < 118’ |
| D | 141 - < 166 | IV | 45’- <60’ | 118’- < 171’ |
| E | ≥ 166 | V | 60’- <66’ | 171’- < 214’ |
| | | VI | 66’- <80’ | 214’- <262’ |

*Source: AC 150/5300-13A*

A design aircraft analysis was completed as part of the 2005 Airport Master Plan for B19. At that time, the Pilatus PC-12 was identified as the design aircraft. Subsequent projects since that determination, including the Runway 06-24 reconstruction project in 2020, were designed to the dimensions of the PC-12, or A-II (approach speeds lower than 91 knots, tail heights 20' - < 30', and wingspans 49'- < 79').

The design aircraft was re-evaluated as part of this Master Plan, which involved a survey of airport management, tenants, and businesses to gain information about the types of aircraft that most often use the Airport. Through these surveys, it was revealed that airfield business Skydive Coastal Maine operates a 1956 Cessna 182A for all skydiving operations, making a total of approximately 1,000 operations per year. It appears that this aircraft is the most demanding aircraft making regular use of the Airport. The 1956 Cessna 182A has an approach speed of 70-80 knots (Approach Category A), with a wingspan of 39.17 feet (including 3-foot wing extensions) and a tail height of 9 feet (Airplane Design Group I). Further, because the maximum certified takeoff weight of the Cessna 182A is under 12,500 pounds, it is categorized as a "small aircraft" (A-I small). Additionally, it was determined that all based aircraft at B19 are category A-I small aircraft. This evaluation concluded that a change from an A-II to an A-I facility is warranted at this time, and that the 1956 Cessna 182A will be utilized as the design aircraft for the planning period.

## RECOMMENDED PROJECTS

The 2021 AMPU includes an inventory of all facilities in Chapter 2 to document their size, age, and condition; documentation of known environmental conditions in Chapter 3 to assist in anticipating potential environmental impacts of future projects; a facility analysis in Chapter 5 to determine improvements required to address capacity shortfalls, non-compliant designs, and outdated facility conditions; and an alternatives analysis in Chapter 6 to explore ways to implement projects to correct deficiencies and to allow the Airport Commission to select recommended alternatives. The following sections review the identified deficiencies and recommended development concepts that emerged as a result of the analyses.

## FACILITY REQUIREMENTS FINDINGS AND RECOMMENDATIONS

The following recommendations were made in Chapter 5 to address facility needs. Facilities not listed below were determined to be adequate through the planning period; however, it was noted that routine maintenance activities (including but not limited to pavement preservation and obstruction monitoring/removal activities) be conducted to maximize the useful life of facilities and maintain clear, safe approaches to Runway 06-24.

### *Runway 06-24 Length*

**Recommendation**: As funding permits, the Airport should make considerations for a runway extension to 3,200 feet on its Airport Layout Plan for potential long-term development to serve its existing fleet by meeting the minimum runway length recommendations for an approach with vertical guidance in the future.

### *Runway 06-24 Approach Obstructions*

**Recommendation:** The Airport should consult a professional surveyor to identify obstructions to the 20:1 approach surfaces and promptly remove them in advance of the Flight Procedures flight check. remove any identified obstructions before the flight check takes place. Following certification that the Runway 06-24 approach surfaces are clear, it is recommended that the Airport conduct periodic vegetation management activities in accordance with the VMP to ensure that their protected surfaces remain clear.

### *Parallel Taxiway*

**Recommendation:** Though FAA has confirmed that there is no near-term justification for construction of a parallel taxiway at this time, the Airport should evaluate the impacts of constructing a partial parallel taxiway to allow aircraft a safe place to turn around to position for takeoff, eliminate direct apron-to-runway access, and remove the direct line from the vehicle access gate to the runway. It is recommended that a taxiway alternative be included on the Ultimate Airport Layout Plan with the understanding that actual demand must materialize before the project can be implemented.

### *Main (Terminal) and West (GA) Aprons*

**Recommendation:** The Airport should consider reconstructing the Aprons as funding allows. Timing for the Main Apron reconstruction should be carefully considered due to the upcoming 2028 expiration of the Airport's underground fuel storage tank, which is currently located under the Main Apron. Removal of some tie-down spaces from the West Apron may be required to accommodate construction of hangars. Apron reconstruction presents a target of opportunity to reconfigure the terminal area to accommodate construction of future facilities, which should be considered during the development and evaluation of alternatives.

### *Hangar Buildings*

**Recommendation:** The Airport should designate areas on airport property for the construction of additional hangar units in preparation for the private development of hangars on airport property. Further, it is recommended that the Airport create a "developer's tool kit" outlining federal, state, and local requirements necessary to build additional hangars at the Airport.

### *Weather Monitoring Equipment*

**Recommendation:** Identify a suitable location for the construction of an AWOS or consider the installation of weather monitoring cameras as an alternative or interim solution.

### *Terminal Building*

**Recommendation:** The Airport should renovate the terminal building to repair corrosion and leaks, and to comply with accessibility requirements in the short-term.

### *Fuel Facility*

**Recommendation:** The Airport should explore alternative locations for constructing an aboveground fuel facility. The existing 100-LL fuel tank should be replaced or relocated in advance of the UST expiration date, prior to the reconstruction of the Main Apron. An aboveground fuel facility should be sited in a location that will allow for the addition of Jet-A fuel as demand warrants in the future.

### *Perimeter Fence*

**Recommendation:** Construct perimeter fencing as necessary.

### *Snow Removal Equipment*

**Recommendation:** The Airport should maintain existing equipment and replace as funding allows and consider purchasing a second carrier vehicle as necessary and as funding permits.

### *Snow Removal Equipment Building*

**Recommendation:** Construct a snow removal equipment building as funding allows.

### *Skydiving Landing Zone*

**Recommendation:** Identify alternative locations for the skydiving landing zone as additional facilities are constructed.

## RECOMMENDED ALTERNATIVES

As a result of the Alternatives Evaluation, the Airport Commission recommended the following projects for B19:

### *Construct Runway 06 Extension and RSA to Achieve 3,200 Feet*

This project will construct an additional 199 feet of runway pavement and 139 additional feet of Runway Safety Area (RSA) to meet the recommendations of AC 150/5300-13A and AC 150/5325-4B. This will provide airport users with the following:

- 06 TODA 3,200 feet
- 24 TODA 3,200 feet
- 06 LDA 3,200 feet (tree clearing likely necessary)
- 24 LDA 3,200 feet

**Impacts:**

- Approx. 18,200 SF of wetland impacts
- Approx. 14,900 SF of impervious surface
- Permitting: SLOD, EA, NRPA, USACE
- Obstruction survey to determine additional easements and tree clearing

**Estimated Cost: $515,000** (Construction of extension only. Does not include costs to obtain additional easements or conduct tree clearing in the Runway 06 approach.)

### *Construct Partial Parallel Taxiway at Midfield*

This project will construct a partial parallel taxiway running from the west side of the West Apron to the east side of the existing hangar complex. This alternative will eliminate the existing non-compliant stub taxiway from Runway 06-24 to the Main Apron.

**Impacts:**

- Direct apron-to-runway access eliminated
- Access gate no longer in direct line with Runway 06-24
- Hangar tenants no longer required to cross Main Apron to access hangars
- Meets taxiway recommendations for a potential reduction to visibility minimums
- No anticipated wetland impacts
- Approx. 26,200 SF of impervious surface
- Permitting: SLOD, EA, NRPA, USACE

**Estimated Cost: $1.9M - $2.1 M**

### *Construct Hangars Adjacent to Existing Hangar Complex*

This project will construct 18 T-Hangar Units in the area of the existing hangar complex, including taxilane reconfiguration.

**Impacts:**

- 18 additional hangar units
- Approx. 19,900 SF of wetland impacts
- No Tree Clearing
- Approx. 14,500 SF of impervious surface
- Permitting: SLOD, EA, NRPA, USACE
- Geotechnical investigation
- Additional rental revenue
- Potential increased fuel sales
- Community economic contributions
- Assumes construction will be funded by private developers.

### *Reservation of West Apron for Future T-Hangar or Tie-Down Development*

This project will reserve the West (GA) Apron for future T-Hangar or tie-down development.

**Impacts:**

- Allows the airport to construct hangar units or tie-down spaces
- Removal of tie-downs required if hangars are constructed
- No anticipated wetland impacts
- No tree clearing
- No additional impervious surface
- Permitting: SLOD, EA, NRPA, USACE
- Additional rental revenue
- Potential increased fuel sales
- Assumes construction will be funded by private developers.

### *Install Weather Monitoring Cameras*

This project will install weather monitoring cameras as at the Airport, in place of an AWOS system.

**Impacts:**

- Real-time photos of weather conditions
- Local weather details (e.g., wind speed, wind direction, visibility, etc.) not provided
- Does not allow for reduction in ceiling minimums
- No anticipated wetland impacts
- No tree clearing required
- No impervious surface
- No permits required
- Not AIP eligible
- Will not tie up NPE
- Lead time for installation as little as a few weeks

**Estimated Cost: $20,000**

### *Construct Aboveground Fuel Facility in Terminal Area*

This project will construct a fuel facility consisting of one (1) 10,000-gallon aboveground fuel tank for 100-LL, concrete fuel pad, access taxilanes, fueling apron, and associated dispensing and electrical components in the vacant area between the Main Apron and the existing hangar complex.

**Impacts:**

- Relocates fuel in advance of UST expiration
- No removal of new apron pavement required
- Sized and sited to accommodate future Jet-A
- Can be designed with tank outside the fence – no fuel trucks in movement areas

- Fueling moved from high traffic area preventing backups onto Runway 06-24
- No anticipated wetland impacts
- No tree clearing required
- Approx. 2,800 SF of ledge removal required
- Approx. 11,000 SF of impervious surface
- Permitting: SLOD, EA, NRPA, USACE
- Prevents loss of revenue during UST replacement
- Pilots able to fuel during UST replacement
- **100-LL installation is not AIP eligible**
- Investigation required to determine extent of ledge removal

**Estimated Cost: $825,000**

#### *Construct Full Perimeter Fencing Around Airport Property*

This project will construct of approximately 15,250 LF of perimeter fencing to fully enclose the airfield.

**Impacts:**

- Safety and security enhanced by minimizing trespassing
- Risk of wildlife strikes on the ground reduced due to airfield being fully enclosed
- Approximately 14,500 SF of wetland impacts
- No additional impervious surface
- Permitting: EA, NRPA, USACE
- Maintenance efforts to keep fence line clear significantly increased
- Coordination with City for fencing on City-owned land

**Estimated Cost: $850,000**

#### *Construct SRE Building Behind EAA Hangar*

This project will construct a 1,600 square-foot snow removal equipment building behind the EAA hangar.

**Impacts:**

- Protection for FAA-funded equipment
- Opens up hangar space for aircraft
- Does not occupy potential hangar areas
- No wetland impacts
- Approx. 2,600SF of impervious surface
- Permitting: SLOD, EA, NRPA, USACE
- Reduces the size of the long-term parking lot

**Estimated Cost: $1,100,000**

## IMPEMENTATION SCHEDULE

The implementation schedule below is based on the facility needs identified in *Chapter 5, Facility Requirements* and the recommended development concepts from *Chapter 6, Development and Evaluation of Alternatives*. Projects are arranged according to short-term (2022-2026), mid-term (2027-2031), and long-term (2032-2041), planning periods, as identified and outlined in Chapter 7, Schedule of Improvements. It should be noted that projects will be considered on an individual basis, and implementation will occur as actual demand and funding warrants. If the anticipated need does not materialize as indicated below, improvements may be deferred to future years. Similarly, if an improvement becomes necessary sooner than anticipated, improvements may be prioritized to reflect the needs of the airport at that time.

### SHORT-TERM PROJECTS (2022-2026)

- Reconstruct West Apron
- Construct Aboveground Fuel Facility
- Reconstruct Main Apron
- Construct Hangars Adjacent to Existing Hangar Complex
- Terminal Building Improvements

### MID-TERM PROJECTS (2027-2031)

- Construct Snow Removal Equipment Building
- Acquisition of Snow Removal Equipment
- Install Weather Monitoring Cameras
- Reconstruct Hangar Taxilane – Hangar Row 1
- Reconstruct Hangar Taxilane – Hangar Row 2
- Construct Full Perimeter Fencing Around Airport Property

### LONG-TERM PROJECTS (2032-2041)

- Complete Parallel Taxiway
- Construct Runway 06 End and RSA to Achieve 3,200 Feet
- Apron Expansion

# CHAPTER 1 - INTRODUCTION

This chapter provides a brief introduction of the Biddeford Municipal Airport (B19 or the Airport), documents master planning history at the Airport, and defines the intended objectives of the Master Plan.

## 1.1 BIDDEFORD MUNICIPAL AIRPORT

The Biddeford Municipal Airport is a public use airport, owned by the City of Biddeford, located at 88 Landry Street in Biddeford, York County, Maine. The Airport is situated in the southern region of Maine, approximately five miles from the Atlantic Ocean. The Airport is conveniently located approximately three miles from downtown Biddeford.

**Figure 1-1: Biddeford Municipal Airport**

The Airport has one runway, designated Runway 6-24, and is located approximately 20 miles south of Portland, Maine and approximately 30 miles from the New Hampshire border. The Airport can be accessed via U.S. Route 95 from the north or south. Land uses surrounding Airport property include single family residential, highway business, and general industrial, while the Airport itself is located on airport industrial land.

### 1.1.1 GOVERNANCE

B19 is represented by a 7-member Airport Commission tasked with the care, custody and responsibility for the management of the Airport. Members of the Commission are appointed by the Mayor, with day-to-day operations of the Airport being overseen by the Airport Manager, Peter Donaher. The members of the Commission are:

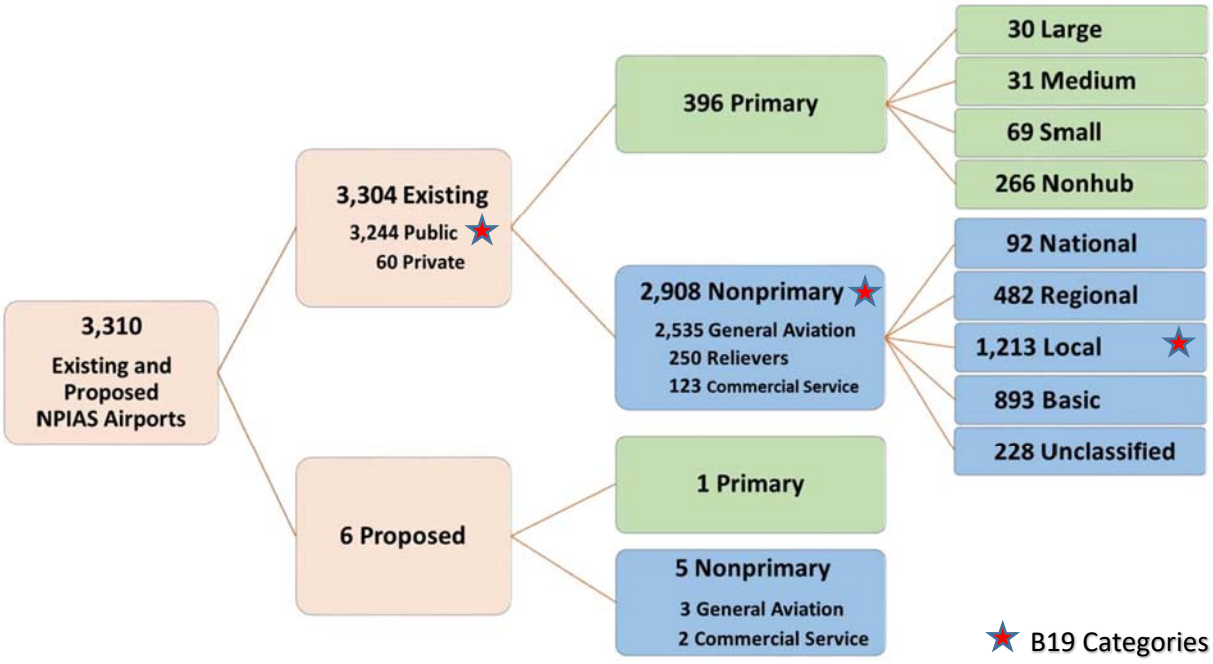
Rick Laverriere, Chair
Carmen Bernier, Vice-Chair
Gerald Bernier
Thomas Bryand
Frederick Oliver
Roland Pelletier
Dean Tourigny

## 1.2 NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS

B19 is included in the National Plan of Integrated Airport Systems (NPIAS) and is one of 3,310 existing and proposed civilian-use airports in the U.S. that the Federal Aviation Administration (FAA) considers significant to the national air transportation system. This designation means that B19 is eligible to receive Federal grants under the FAA's Airport Improvement Program (AIP).

Within the NPIAS, airports are grouped into two major categories: primary and nonprimary as shown in Figure 1-2. B19 is categorized as a nonprimary, general aviation (GA) airport. According to the most recent NPIAS GA community survey, GA activities are primarily comprised of personal use, instructional, corporate/executive (with paid flight crew), business (without paid flight crew), aerial observation, and public aircraft operations (inland search and rescue services, homeland security, law enforcement, and disaster relief), among others. B19 is further categorized as a local airport, according to FAA's ASSET classification criteria. According to NPIAS classification, "local airports are a critical component of our general aviation system, providing communities with access to local and regional markets. Typically, local airports are located near larger population centers but not necessarily in metropolitan areas. They also accommodate flight training and emergency services. These airports account for 37 percent of all NPIAS airports and have moderate levels of activity… Local airports average about 32 based propeller-driven aircraft and no jets." Development at local airports consists primarily of bringing airports into compliance with design standards, reconstructing airfield pavements, increasing capacity, and upgrading security features.

**Figure 1-2: NPIAS Categories of U.S. Civilian Airports**




*Source: National Plan of Integrated Airport Systems 2021-2025*

## 1.3 HISTORY OF FEDERALLY FUNDED PROJECTS

As a NPIAS airport, B19 is eligible to receive Airport Improvement Program (AIP) grant funding for the planning and development of the Airport. Table 1-1 provides a history of federally funded projects at B19 dating back to 1983:

**Table 1-1: History of Federally Funded Projects**

| *Federal Fiscal Year* | *AIP Number* | *Project Description* | *Total Cost* |
|---|---|---|---|
| *1983* | 3-23-0009-01-1983 | Conduct Airport Master Plan Study | $47,923.00 |
| *1986* | 3-23-0009-03-1986 | Acquire Land for Runway 24 Approach | $48,317.00 |
| *2002* | 3-23-0009-04-2002 | Update Airport Master Plan Study | $114,210.00 |
| *2004* | 3-23-2300-04-2004 | Acquire Snow Removal Equipment | $237,600.00 |
| *2005* | 3-23-0009-05-2005 | Environmental Assessment for Runway Safety Areas, Vegetation Management Plan, Stormwater Pollution Prevention Plan | $160,047.00 |
| *2006* | 3-23-0009-06-2006 | Vegetative Obstruction Removal and Permitting | $205,390.00 |
| *2007* | 3-23-0009-07-2007 | Environmental Mitigation: Preparation of Permit Application | $23,662.00 |
| *2011* | 3-23-0009-08-2011 | Environmental Mitigation: Airport Vegetation Restoration for Stormwater Management | $58,546.00 |
| *2014* | 3-23-0009-09-2014 | Install Airport Beacon | $136,578.06 |
| *2014* | 3-23-0009-09-2014 | Install Perimeter Fencing | $200,000.00 |
| *2015* | 3-23-0009-010-2015 | Conduct Environmental Assessment for Land Acquisition and Tree Removal | $160,786.78 |
| *2016* | 3-23-0009-011-2016 | Land Acquisition Runway 06 Approach | $124,867.80 |
| *2016* | 3-23-0009-012-2016 | Runway 06 Approach Obstruction Removal | $366,398.48 |
| *2018* | 3-23-0009-013-2018 | Easement Acquisitions Runway 24 Approach | $347,258.80 |
| *2020* | 3-23-0009-014-2020 | Update Airport Master Plan Study | $168,299.00 |
| *2020* | 3-23-0009-014-2020 | Airport Wildlife Hazard Assessment/Management Plan | $5,555.00 |
| *2020* | 3-23-0009-015-2020 | Reconstruct Runway 06-24 and Runway 24 Approach Obstruction Removal | $5,783,470.00 |

*Source: FAA, MaineDOT and Gale Records*

## 1.4 MASTER PLANNING AT BIDDEFORD MUNICIPAL AIRPORT

The last Airport Master Plan and Airport Layout Plan Update for B19 was completed in 2005. Preferred development concepts that emerged as a result of this study included the construction of compliant runway safety areas, acquisition of property and avigation easements, development of a Vegetation Management Plan, removal and mitigation of obstructions from FAR Part 77 surfaces, and construction of additional aircraft hangar units.

The purpose of this current Airport Master Plan Update (AMPU) is to provide the Airport with its first comprehensive update in approximately 15 years. The objectives of this AMPU are to review the adequacy of the Airport's landside and airside facilities with respect to compliance with FAA design standards and ability to address the needs of the Airport through the planning period (2020-2039). This AMPU will address the need for or the adequacy of taxiways and taxilanes, hangar buildings, fuel facility, terminal area, perimeter fencing, snow removal equipment, snow removal equipment storage building, and other similar facilities based on expected growth. A schedule of improvements will be generated based on this information and organized in terms of required short (0-5 years), medium (6-10 years), and long term (11-20 years) improvements.

### 1.4.1 AIRPORT MASTER PLAN UPDATE FUNDING

The FAA is contributing to the financing of this AMPU through two funding programs. B19 is eligible to receive Federal funding assistance for this project pursuant to the AIP program. AIP funding is provided through a Federal aviation trust fund, funded through "user fees" paid by passengers on commercial flights, aviation fuel tax, cargo fees, and over-flight fees. This project is receiving 90 percent of total project funding through the AIP program. The remaining 10 percent of this project is being funded through the Coronavirus Aid, Relief, and Economic Security (CARES) Act. The CARES Act was established in April of 2020 in response to the COVID-19 health crisis, and a portion of the Act included additional funding for NPIAS airports to eliminate the local and state shares for all projects planned for FY-2020.

## 1.5 PLANNING PROCESS

Guidance for the AMPU planning process comes from FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans, and other relevant FAA ACs, Orders, and Federal Aviation Regulations (FARs), as applicable. Advisory Circulars, or ACs, are non-regulatory documents published by FAA to provide guidance for compliance with regulations, standards, operational, and other requirements. This AMPU planning process considers the needs and demands of airport tenants, users, and the general public. This AMPU planning process provides opportunities for airport users, political entities, and the public to participate in the development of the Airport's aviation plans and goals. These opportunities have been built into the process through public meetings, Client Group meetings, and Airport Commission meetings. The Client Group responsible for contributing to and approving this Master Plan consists of members of the Airport Commission, the Federal Aviation Administration (FAA), and the Maine Department of Transportation, Aviation Program (MaineDOT).

This AMPU process will be broken down into phases at logical decision points:

- Initial data collection and aviation activity forecasts will make up the foundation from which all other decisions in this project are made;
- Aviation facility needs analysis and alternative development options will be identified for each of the three planning periods (short, intermediate, and long term); and
- Environmental, financial, and graphical depictions of the recommended airport development will complete the process.

## 1.6 HOW TO READ THIS REPORT

This report was written and organized so that information is presented in a logical, readable format with minimal duplication of information. The graphics contained in the report are to be found as follows:

**Tables-** all tables are located in the Chapters and sections to which they apply. At times, cross-references to tables are necessary, but these have been kept to a minimum. The tables are identified in numerical sequence starting with the Chapter number so that the third table in Chapter 3 is identified as Table 3-3, etc.

**Figures-** all figures are found in the Chapters and report sections to which they apply and are numbered sequentially starting with the Chapter number so that the second figure in Chapter 6 is identified as Figure 6-2, etc.

**Sheets-** sheets are Airport Layout Plan (ALP) sheets in their various stages of development. All sheets are located at the end of the report, before the appendices. Sheets will be developed in stages as the plan is developed, therefore not all plan sheets may be contained in the report until the full draft report has been prepared for final review by the Airport Commission, FAA, and MaineDOT. Below is a listing of ALP plan sheets as required by the Airport Commission, FAA, and MaineDOT that will become part of the final Master Plan Report:

Sheet 1- Title Sheet
Sheet 2- Airport Data Sheet
Sheet 3- Existing Facilities
Sheet 4- Ultimate Airport Layout Plan
Sheet 5- TERPS Approach Plan and Profile Runway 6-24
Sheet 6- Inner Portion of Approach Plan and Profile
Sheet 7- 14 CFR Part 77 Surfaces Plan
Sheet 8 – Zoning and Land Use Plan

# CHAPTER 2 – INVENTORY OF EXISTING FACILITIES

This chapter documents the existing facilities and infrastructure that support the Airport for the purposes of providing a comprehensive foundation from which facility requirements and improvement recommendations will be made. The inventory of Airport facilities was conducted through telephone discussions with the Airport Manager and confirmation with resident engineers assigned to the 2020 runway reconstruction project to supplement information previously obtained through a review of Airport drawings, previous reports, and interviews with the Client Group. See Figure 2-1, Existing Conditions and Sheet 3 of the Airport Layout Plan (ALP) for a depiction of existing facilities.

## 2.1 GEOMETRY AND DESIGN STANDARDS

FAA *AC 150/5300-13A, Airport Design*, provides standards and recommendations for the geometric layout and engineering design of airport facilities including runways and runway associated environments such as Runway Safety Areas (RSAs), Obstacle Free Zones (OFZs), Object Free Areas (OFAs), clearways and stopways, among other elements. Use of the design standards contained within AC 150/5300-13A is mandatory for all projects funded through the federal Airport Improvement Program (AIP).

### 2.1.1 CURRENT DESIGN AIRCRAFT/DESIGN GROUP

Airports are designed according to their Approach and Departure Reference Codes (ARC and DRC), formerly referred to as the Airport Reference Code (ARC), which is determined by selecting a "design aircraft" for the airport. A design aircraft, as defined by FAA AC 150/5300-13A, is "an aircraft with characteristics that determine the application of airport design standards. This aircraft can be a specific aircraft model, or a composite of several aircraft using, expected to use, or intended to use the airport or part of the airport." According to FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, the FAA uses a minimum of 500 annual operations as the basis for determining the most demanding aircraft. An operation is defined as one takeoff or one landing, so an aircraft that has landed and taken off from the same airport is considered to have made two operations at that airport. The dimensions and speed of the design aircraft are used to determine the Aircraft Approach Category (determined by approach speed and denoted by letters A through E) and Airplane Design Group (determined by tail height and wingspan and denoted by Roman numerals I through V). See Tables 2-1 and 2-2.

According to the 2005 Airport Master Plan, the most demanding aircraft known to use B19 was the Pilatus PC-12. With an approach speed of 87 knots, the Pilatus PC-12 falls under approach category A, and with a wingspan of 53.33 feet and a tail height of 14.00 feet, it falls under design group II. Therefore, B19 was determined to be a A-II facility, and all improvements implemented since that time were designed according to those standards.

**Table 2-1: Aircraft Approach Category**

| *Aircraft Approach Category* | *Approach Speed* |
|---|---|
| *A* | **Speed less than 91 knots** |
| *B* | Speed 91 knots or more but less than 121 knots |
| *C* | Speed 121 knots or more but less than 141 knots |
| *D* | Speed 141 knots or more but less than 166 knots |
| *E* | Speed 166 knots or more |

*Source: AC 150/5300-13A*

***Bold= B19's Aircraft Approach Category**

**Tale 2-2: Airplane Design Group**

| *Airplane Design Group* | *Tail Height [ft. (m)]* | *Wingspan [ft. (m)]* |
|---|---|---|
| *I* | < 20' (<6 m) | <49' (<15m) |
| ***II*** | **20' - < 30' (6m- <9m)** | **49'- <79' (15m- <24m)** |
| *III* | 30' - < 45' (9m- <13.5m) | 79'- <118' (24m- <36m) |
| *IV* | 45'- <60' (13.5m- <18.5m) | 118'- <171' (36m- <52m) |
| *V* | 60'- <66' (18.5m- <20m) | 171'- <214' (52m- <65m) |
| *VI* | 66'- <80' (20m- <24.5m) | 214'- <262' (65m- <80m) |

*Source: AC 150/5300-13A*

***Bold= B19's Airplane Design Group**

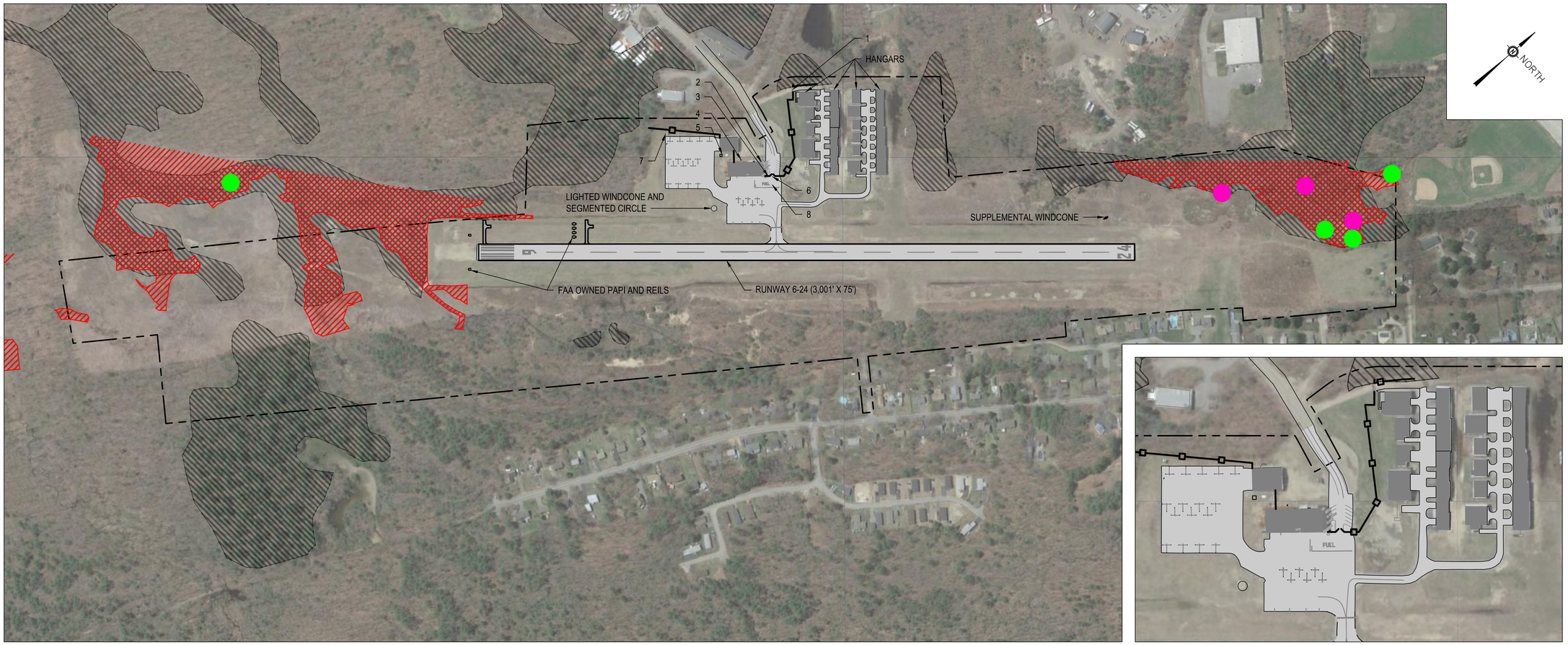
## 2.2 INVENTORY AND DESCRIPTION OF AIRSIDE FACILITIES

Airside facilities include all areas required for the movement, takeoff, and landing of aircraft. At B19, these areas include the runway, taxiway, taxilanes, hangars, aprons, tie-downs, and navigational/visual/communication aids. These facilities are further described below.

### 2.2.1 RUNWAY

Runway 06-24 is B19's only runway, which is paved, 3,001 feet in length by 75 feet in width, and served by medium intensity runway lights (MIRLS). Runway 06 is marked as non-precision and is currently served by a 4-box precision approach path indicator(PAPI) and runway end identifier lights (REILS). Runway 24 is marked as basic and is not served by a PAPI or REILS. Runway 06-24 was reconstructed in the summer of 2020, and the pavement is currently in good condition.

**Figure 2-2: Runway 06-24 During Construction**




## FIGURE 2-1: EXISTING CONDITIONS

1" = 250'

### AIRPORT FACILITIES

| NUMBER | DESCRIPTION |
|---|---|
| 1 | MOTORIZED SLIDE GATE |
| 2 | AIRPORT ADMINISTRATION BUILDING/HANGAR |
| 3 | PEDESTRIAN GATE |
| 4 | ROTATING BEACON |
| 5 | AIRFIELD ELECTRICAL VAULT |
| 6 | MOTORIZED SLIDE GATE |
| 7 | FAA OWNED EQUIPMENT SHELTER/VAULT |
| 8 | UNDERGROUND FUEL FACILITY |

### LEGEND

| ITEM | (E) EXISTING |
|---|---|
| AIRPORT PROPERTY LINE | |
| WETLANDS DELINEATED BY NEW EARTH IN 2019 | |
| WETLANDS DATA FROM NATIONAL WETLANDS INVENTORY (SEE NOTE 1) | |
| SIGNIFICANT VERNAL POOLS DELINEATED BY NEW EARTH IN 2019 | |
| VERNAL POOLS DELINEATED BY NEW EARTH IN 2019 | |
| BUILDINGS | |
| PAVEMENT | |
| FENCE | |

## NOTES:

1. WETLAND DATA FROM NWI IS NOT DELINEATED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Boston Baltimore Orlando Hartford




PROJECT
AIRPORT MASTER PLAN AND AIRPORT LAYOUT PLAN UPDATE

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | FIGURE 2-1 |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | OCTOBER, 2020 |
| DRAWING SCALE | 1" = 250' |

GRAPHIC SCALE
0 125 250 500

SHEET TITLE
FIGURE 2-1

DRAWING NO.
1

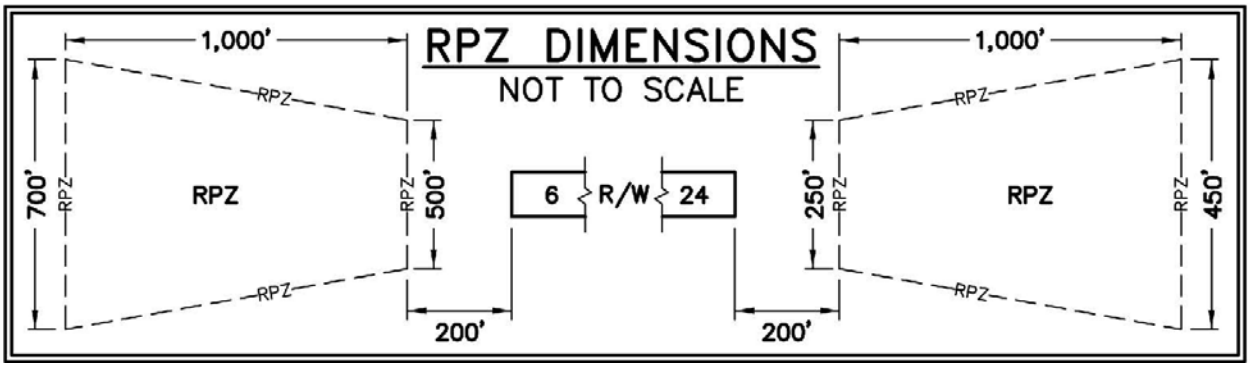
### 2.2.2 RUNWAY SAFETY AREA

According to FAA Advisory Circular 150/5300-13A, a runway safety area (RSA) "enhances the safety of aircraft which undershoot, overrun, or veer off the runway, and it provides greater accessibility for firefighting and rescue equipment during such incidents." The Airport's existing RSA was designed to A-II standards in 2020 with a width of150 feet, centered on the runway centerline, running parallel along the entire width of the runway, and extending 300 feet beyond the Runway 06 end and 300 feet beyond the Runway 24 end.

### 2.2.3 RUNWAY PROTECTION ZONE

A runway protection zone (RPZ) is a trapezoidal area of land off either runway located under the airport's approach. The purpose of an RPZ is to enhance the protection of people and property on the ground. According to FAA AC 150/5300-13A, "this is best achieved through airport owner control over RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities." Figure 2-3 below provides a diagram of the RPZs at B19:

**Figure 2-3: B19 Runway Protection Zone**




### 2.2.4 RUNWAY OBJECT FREE AREA

A runway object free area (ROFA) is the area of land surrounding the runway, centered on the runway centerline, that must be kept clear of objects (e.g. structures, vegetation, terrain), other than those necessary for air navigation. The ROFA at B19 is 250 feet in width and extends 240 feet beyond each runway end.

### 2.2.5 APPROACH PROCEDURES

Table 2-3 presents a summary of the various instrument approach procedures available by runway at the Airport.

**Table 2-3: Instrument Approach Procedures**

| Runway* | Category** | Minimums by Aircraft Category*** | | | |
|---|---|---|---|---|---|
| | RNAV (GPS) RWY 6 | A | B | C | D |
| *06* | LNAV MDA | 680-1 | | 680-1½ | NA |
| *06* | Circling GPS | 780-1 | | 780-1¾ | NA |
| | VOR RWY 6 | | | | |
| *06* | S-6 VOR | 680-1 | | 680-1½ | NA |
| *06* | Circling VOR | 700-1 | | 700-1½ | NA |

**Runway 06-24 is not authorized (NA) at night.*
***Terminal Instrument Procedures (TERPS), Aircraft Categories (ceiling in feet, visibility in nautical miles):*
*Category A- Speed less than 91 knots; weight less than 30,001 pounds.*
*Category B- Speed 91 knots or more but less than 121 knots, weight 30,001 pounds or more but less than 60,001.*
*Category C- Speed 121 knots or more but less than 141 knots; weight 60,001 pounds or more but less than 150,001.*
*Category D- Speed 141 knots or more but less than 166 knots; weight 150,001 pounds or more.*
**** Minimums given by either (ceiling in feet- visibility in miles) or ceiling height/Runway Visibility Range)*
*Source: U.S. Terminal Procedures- NE-1, 21 JUN 2018 to 19 JUL 2018*

### 2.2.6 TAXIWAYS AND TAXILANES

The purpose of a taxiway is to move aircraft to and from the runway, while the purpose of a taxilane is to move aircraft between taxiways, aprons, and other areas of the airfield. B19 has one stub taxiway, approximately 90 feet long by 50 feet wide, connecting the Main Apron to Runway 06-24. The stub taxiway was reconstructed in 2020 as part of the Runway 06-24 reconstruction project, and the pavement is currently in good condition.

**Figure 2-4: Taxiway During Construction**

The Airport also has a system of taxilanes connecting the Main Apron to the West Apron and hangar development. These connecting taxilanes are varying lengths and widths and are shown in Figure 2-1: Existing Facilities. According to MaineDOT's 2018 pavement evaluation data, the taxilane serving hangar row 1 is in very poor condition, and the taxilane serving hangar row 2 is in fair condition.

### 2.2.7 APRONS AND TIE DOWNS

Aprons provide a place for aircraft to park so that they can be boarded, loaded, unloaded, or fueled. There are two (2) aircraft parking aprons at B19. The Main Apron, located southeast of the airport administration building, is marked for ten aircraft. The West Apron, located southwest of the airport administration building, can accommodate up to 16 aircraft. According to MaineDOT's 2018 pavement evaluation data, both the Main Apron and West Apron are in poor condition.

**Figure 2-5: Apron**

### 2.2.8 PAVEMENT CONDITION INDEX

MaineDOT conducted a Pavement Condition Index (PCI) study of all Maine airports in 2018. The results of the study are provided in Table 2-4 below. It should be noted that the PCI is expected to fall between 1 and 3 points per year if pavements are left unmaintained.

**Table 2-4: 2018 PCI Results**

| *Facility* | *PCI Rating* |
|---|---|
| *Runway 06-24** | 54 (Poor) |
| *Runway to Apron Stub Taxiway** | 56 (Poor) |
| *Main Apron to West Apron Stub Taxiway* | 41 (Poor) |
| *Main Apron* | 42 (Poor) |
| *West Apron* | 41 (Poor) |
| *Hangar Row 1 Taxilane* | 39 (Very Poor) |
| *Hangar Row 2 Taxilane* | 69 (Fair) |

*Source: MaineDOT 2018 Pavement Condition Report*

** Reconstructed in 2020, after Pavement Condition Report was published*

### 2.2.9 AIRPORT LIGHTING

Runway 06-24 is equipped with radio-activated medium intensity taxiway lights (MIRLS), as well as runway end identifier lights (REILS) on the Runway 06 end. Both runway ends are also equipped with threshold lights located to the side of the runway. The Airport's stub taxiway is equipped with five taxiway lights on each side. These lights were added in 2020 as part of the Airport's Runway 06-24 reconstruction project.

**Figure 2-6: REIL During Construction**

### 2.2.10 HANGARS

There are currently 30 box hangar buildings on the airfield with a capacity for 34 aircraft, which were constructed between 1993 and 2004. There are no T-Hangar buildings on the airfield. The Airport's hangar buildings are full at this time, with an additional 12 people on the hangar waiting list.

**Figure 2-7: Hangar Complex**

### 2.2.11 NAVIGATIONAL AND APPROACH AIDS

The Airport is served by the following navigational and approach aids:

**Figure 2-8: Rotating Beacon**

- LED precision approach path indicator (PAPI) lights located on the Runway 06 end
- Lighted windcone with segmented circle located southwest of the Main Apron
- Supplemental windcone located approximately 100 feet to the west of the Runway 24 end
- Rotating beacon, located behind the maintenance hangar, consisting of alternating green and white (or clear) lights

### 2.2.12 PAVEMENT MARKINGS

Table 2-5 below presents an inventory of pavement markings on the airfield:

**Table 2-5: Inventory of Pavement Markings**

| *Location* | *Marking* |
|---|---|
| *Runway 06 End* | Runway 06 Designation Marking |
| *Runway 06 End* | Non-precision Instrument Approach Markings |
| *Runway 24 End* | Runway 24 Designation Marking |
| *Runway 06-24* | Runway Centerline |
| *Stub Taxiway* | Runway Hold Line |
| *Stub Taxiway* | Taxiway Lead-In Lines |
| *Taxilanes* | Taxilane Centerlines |
| *Aprons* | Apron Tie-Down Markings |
| *Main Apron* | Fueling Safety Area |

*Source: Airport Records*

### 2.2.13 GUIDANCE SIGNS

There are three guidance signs on the airfield, as follows: One (1) runway guidance sign, two (2) taxiway exit signs on either side of the Main Apron stub taxiway, and one (1) hold sign at the hold line.


**Figure 2-9: Guidance Sign**

### 2.2.14 FUEL FACILITIES

The Airport's fuel facility consists of one (1), 10,000-gallon jacketed double-walled, underground storage tank (UST) for 100-LL AvGas. The system is administered via a QTpod service system and was installed in 1998.


**Figure 2-10: Fuel Facility**

## 2.3 INVENTORY AND DESCRIPTION OF LANDSIDE FACILITIES

Landside facilities include all areas of the airport not required for the movement of aircraft and provide for the movement of passengers, freight, and ground transportation vehicles. At B19, these areas include the airport terminal building, automobile parking, and fuel facility. These facilities are further described below.

### 2.3.1 TERMINAL BUILDING AND MAINTENANCE HANGAR

The Airport's terminal building consists of an approximately 1,550 square-foot facility that includes a pilot lounge area, restrooms, a service desk, conference room, office space, and storage. The terminal building is connected to the Airport's maintenance hangar. According to discussions with Airport personnel, the airport administration building and maintenance hangar were constructed in approximately 1985.

**Figure 2-11: Terminal Building**

### 2.3.2 STORAGE HANGAR

Adjacent to the Airport's maintenance hangar is the storage hangar, which was constructed in the 1970s. The building is in fair condition, and is scheduled for a roof replacement in the near future to address leaks.

**Figure 2-12: Storage Hangar**

### 2.3.3 AIRPORT BUSINESSES

The Airport is home to two aviation businesses, as outlined below:

**Screaming Eagle Aviation –** Air banners, aerial photography, and scenic flights.

**Skydive Coastal Maine** – Seasonal (May through October) skydiving featuring tandem parachuting by experienced instructors, fully rated by the United States Parachute Association.

### 2.3.4 ELECTRICAL VAULTS

There are two vaults located on the airfield. One is an FAA-owned vault located adjacent to the west apron to run the FAA-owned PAPI and REILS. The second vault was constructed as part of the 2020 Runway 06-24 reconstruction project and is located between the maintenance hangar and the support building. The new vault provides power to the runway and taxiway lights, signs, gates, control panel for terminal building, and rotating beacon.

### 2.3.5 AUTOMOBILE PARKING

The Airport's automobile parking lot is located adjacent to the terminal building, at the terminus of Landry Street, and is marked for 14 vehicles.

**Figure 2-13: Parking Lot**

## 2.4 INVENTORY AND DESCRIPTION OF MISCELLANEOUS FACILITIES AND EQUIPMENT

In addition to airside and landside facilities, the Airport also has miscellaneous facilities and equipment that aid in safe operations at the Airport. These include the airport fencing, snow removal equipment, and mowing equipment. These items are further described below.

### 2.4.1 FENCING

Approximately 1,500 linear feet of 8-foot high, chain-link fencing was constructed in 2014 and runs from the vehicle parking lot, behind the first row of hangars and to the dirt access road behind the hangar complex. The fence system includes two (2) motorized slide gates, one located at the vehicle parking lot and the other located at the hangar building access road, and one pedestrian gate adjacent to the terminal building.

**Figure 2-14: Gate 2 and Pedestrian Gate**

### 2.4.2 SNOW REMOVAL EQUIPMENT

The Airport currently has the following snow removal vehicle and attachments:

- 2004 John Deere articulated loader Model 624J with 3-yard bucket
- American 14-foot snow blade
- Tenco snow blower, Model #TCS-172 LMM-31263ATAAC
- Craig 5-yard snow basket

**Figure 2-15: John Deere Loader**

The Airport's snow removal equipment was purchased in 2004.

### 2.4.3 MOWING EQUIPMENT

The Airport has a John Deere XUV 855M Gator utility vehicle and a John Deere 3320 tractor with mower and bush attachments.

**Table 2-6: Conditions of Existing Facilities**

| *Facility* | *Date of Construction or Last Rehabilitation* | *Condition*[1] | *Useful Life*[2] | *Eligible for Replacement* |
|---|---|---|---|---|
| Runway 6-24 | 2020 | Good | 20 years | 2040 |
| Runway Lights | 2020 | Good | 20 years | 2040 |
| Threshold Lights | 2020 | Good | 20 years | 2040 |
| Runway to Apron Stub Taxiway | 2020 | Good | 20 years | 2040 |
| Main Apron to West Apron Stub Taxiway | 1987 | Poor | 20 years | 2007 |
| Taxiway Lights | 2020 | Good | 20 years | 2040 |
| Hangar Row 1 Taxilane | 1993 | Very Poor | 20 years | 2013 |
| Hangar Row 2 Taxilane | 1996 | Fair | 20 Years | 2016 |
| Main Apron | 1977 | Poor | 20 years | 1997 |
| West Apron | 1987 | Poor | 20 years | 2007 |
| Rotating Beacon | 2014 | Good | 20 Years | 2034 |
| Vehicle Parking Lot | Unknown | Fair | N/A | N/A |
| Terminal Building | 1985 | Good | N/A | N/A |
| Maintenance Hangar | 1985 | Good | N/A | N/A |
| Storage Hangar | 1970s | Fair | N/A | N/A |
| Hangars | 1993-2004 | Varied | N/A | N/A |
| Electrical Vault | 2020 | Good | 20 years | 2040 |
| Fuel Facility | 1998 | Good | N/A | N/A[3] |
| Fence and Gates | 2014 | Good | 20 years | 2034 |
| John Deer 624J Loader | 2004 | Good | 10 years | N/A |

*Source: Airport Records*

[1] Pavement conditions obtained from MaineDOT 2018 Pavement Condition Report. Runway 06-24 and the runway to apron stub taxiway reconstructed after the Pavement Condition Report was published.

[2] Useful life determinations as identified by FAA Order 5100.38D, The AIP Handbook.

[3] Constructing a new fuel farm if the airport already has a fuel farm, even if the existing fuel farm has reached the end of its useful life is not AIP eligible. AIP can only fund initial construction, then the facility is expected to be self-supporting. (FAA Order 5100.38D)

# CHAPTER 3 – EXISTING ENVIRONMENTAL CONDITIONS AND SENSITIVE AREAS

This chapter documents the existing environmentally sensitive areas and key environmental issues at the Airport using data from previously completed Master Plan studies, planning studies, environmental studies, and other readily-available sources. This information is an integral component to the master planning process as consideration of environmental factors is critical to the evaluation of airport development alternatives and understanding subsequent environmental permitting requirements.

FAA Orders 1050.1F *Environmental Impacts: Policies and Procedures* and 5050.4B *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* provide policies and procedures for compliance with the NEPA, and requirements for airport actions pursuant to FAA authority. It is important to note that the environmental analysis included in this Master Plan Update is not a document intended to satisfy the need for formal NEPA analysis. Prior to the implementation of a proposed action, the Airport will need to coordinate with the FAA to determine the appropriate level of NEPA review. Depending on the required level of review, the following list of applicable environmental impact categories outlined in FAA Order 1050.1F may need be addressed:

- Air Quality
- Biological resources (including fish, wildlife, and plants)
- Climate
- Coastal resources
- Department of Transportation Act, Section 4(f)
- Farmlands
- Hazardous materials, solid waste, and pollution prevention
- Historical, architectural, archeological, and cultural resources
- Land use
- Natural resources and energy supply
- Noise and compatible land use
- Socioeconomic, environmental justice, and children's environmental health and safety risks
- Visual effects (including light emissions)
- Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)

## 3.1 ENVIRONMENTAL CONDITIONS

The most recent documentation of environmental conditions at the Airport occurred in 2016 as part of the Natural Resource Protection Act permit application process and Environmental Assessment for the easement acquisition and obstruction removal project, and again in 2019 as part of the Natural Resource Protection Act (NRPA) permit application process for the Runway 06-24 reconstruction project. Areas studied as part of these projects included water resources (wetlands and vernal pools), rare species (Northern Long Eared Bat), and historic resources and are the primary basis for environmental impact categories identified in subsequent sections of this chapter. As the Airport plans for future improvements, the previously mentioned environmental impact categories may need to be evaluated.

### 3.1.1 WETLANDS

In preparation for the 2016 easement acquisition and obstruction removal project, the Airport prepared an Environmental Assessment, which included a field delineation of wetlands and waterbodies on

Airport property (see Figure 2-1, Existing Conditions). The resulting report indicated the presence of four wetland complexes within the project area, both on and off airport property, where trees obstructing the Runway 06-24 approach were proposed for removal. This Assessment required direction from the Maine Department of Environmental Protection (MaineDEP), Bureau of Land Resources regarding several pools located on airport property. The resulting determination identified eight vernal pools in the project area, three of which met the criteria for designation as a "Significant Vernal Pool" and clarified specific measures for tree clearing activities in Significant Vernal Pool habitat, including mitigation. According to MaineDEP, "vernal pools or "spring pools" are shallow depressions that usually contain water for only part of the year. "Significant vernal pools" are a subset of vernal pools with particularly valuable habitat."[1]

### 3.1.2 RARE SPECIES

According to the Maine Office of Geographic Information Systems, State Listed Animal Habitat exists in the southern portion of Airport property. Maine Department of Inland Fisheries and Wildlife's review of the 2016 NRPA application confirmed that spotted turtles (State Threatened) and ribbon snakes (Special Concern) were documented in the wetlands on Airport grounds, and that the surrounding areas were known to support these species, as well as Blanding's turtle (State Endangered).

Additionally, the Airport is located in the range of the Northern Long Eared Bat, which is a federally-listed threatened species. Subsequently, as part of the Airport's 2016 Environmental Assessment, a Biological Assessment was conducted for potential impacts to the Northern Long Eared Bat resulting from the easement acquisition and obstruction removal project. Guidance from the National Fish and Wildlife Service indicated that the proposed action (obstruction removal) qualified as "excepted activities" under section 4(d) of the Endangered Species Act (ESA).

### 3.1.3 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

In advance of projects undertaken at B19, the Airport seeks input from the Maine Historic Preservation Commission, State Historic Preservation Office (SHPO) regarding potential impacts to historic properties, as defined by Section 106 of the National Historic Preservation Act. The Airport has received the following determinations from SHPO:

- October 11, 2018: Conclusion of no historic properties affected in relation to the extension of the Runway 06 end runway safety area by approximately 85 feet.

[1] https://www.maine.gov/dep/land/nrpa/vernalpools/

- March 25, 2015: Conclusion of no historic properties affected in relation to obstruction removal on and off airport property, in the approaches to Runway 06 and Runway 24.
- June 1, 2006: Conclusion of no historic properties affected in relation to the expansion of the Runway 06 end runway safety area.

### 3.1.4 SURROUNDING LAND USES

According to the City of Biddeford's Official Zoning Map dated July 3, 2012, the Airport is located in zone I2: Airport Industrial. Zones surrounding the Airport include I1: General Industrial to the south and west and R1A: Single Family Residential to the north, west, and east.

# CHAPTER 4 – FORECASTS OF AVIATION DEMAND AND CAPACITY

In order to identify Airport facility needs during the planning period, it is necessary to accurately depict the current aviation use of the Airport, and to project future aviation demand levels. This chapter summarizes current aircraft usage at the Airport and documents the projected aviation demand for the Airport during the 20-year planning period of this study.

The forecasts presented in this chapter provide short-(0-5 years), mid-(6-10 years), and long-term (11-20 years) projections of aviation activity at B19 for the years 2024, 2029, and 2039. It is important, however, to view the projections independently of specific years and to consider the actual growth of activity as the impetus that influences the need for future airport facilities. Similarly, slower than projected growth may warrant deferment of planned improvements. Actual growth activity should be periodically (i.e. annually) compared to projected growth, so corrections can be identified and implemented.

## 4.1 OVERVIEW OF AVIATION FORECASTS

The objective of forecasting an airport's activity is to identify the factors that influence aviation demand so that future infrastructure and facility needs can be determined. The FAA's Terminal Area Forecast (TAF)[1] is the standard benchmark of an airport's future activity and serves as the basis for FAA planning. Therefore, this forecast uses the most recent TAF (2019-2045) as a starting point for analysis. In addition to the TAF, FAA Aerospace Forecasts[2] and airport historic reports are reviewed and analyzed to further complement the TAF.

Forecasting aviation activity serves two primary purposes in the development of this master plan. Specifically, forecasts provide the basis for:

- Determining the necessary capacity of the airfield and terminal area; and
- Identifying the future facilities required to support demand, including determining the size and implementation thereof.

The demand for aviation facilities is typically expressed in terms of based aircraft and aircraft operations. Preparation of aviation activity forecasts is essential in assessing the needs and requirements for future aviation development. B19's aviation forecasts serve as an overall planning guide for identifying airport capacity needs and as the basis for preparing development alternatives. This forecast consists of layers of information that build upon each other to provide a foundation to support final conclusions. These layers include:

- Defining the various forecasting methodologies employed;
- Historical aviation data upon which forecasting methods rely;
- Analysis of the validity of the forecast; and

[1] FAA Terminal Area Forecasts (https://www.faa.gov/data_research/aviation/taf/)
[2] FAA Aerospace Forecasts (https://www.faa.gov/data_research/aviation/aerospace_forecasts/)

- Provision of a summary of the forecast's findings.

Once the aviation forecasts are complete, the relationship between aviation demand, airfield capacity, and facilities is established. This is done in the next chapter, Chapter 5 – Facility Requirements.

The following terms are used frequently in airport forecasts, and their meanings are often confused with each other even though they are quite different. For clarification, the meaning of each of these terms is presented below.

**Based Aircraft**- this term refers to where an airplane makes its home or, in the case of B19, an aircraft whose "home" is at the Airport for more than 6 months of the year.

**Transient Aircraft**- this term refers to an airplane whose "home" is at an airport other than the airport for which the forecast is being produced. In other words, any aircraft that uses B19, but whose home base is at another airport is considered a transient aircraft.

**Local Operation**- a local operation is one where an aircraft operates within 20 nautical miles of the airport for which the forecast is prepared. A local operation can be performed by either a based or transient aircraft.

**Itinerant Operation**- an itinerant operation is one where an aircraft operates at a greater distance than 20 nautical miles of the airport for which the forecast is prepared. Again, an itinerant operation can be performed by either a based or transient aircraft.

### 4.1.1 TERMINAL AREA FORECAST

The TAF represents the FAA's forecast of aviation activity for U.S. airports and provides a summary of historical and forecast statistics on passenger demand and aviation activity. The TAF is prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public. Forecasts of itinerant general aviation operations and local civil operations at FAA facilities are based primarily on time series analysis. Because military operations forecasts have national security implications, the Department of Defense provides only limited information on future aviation activity. Hence, the TAF projects military activity at its present level except when FAA has specific knowledge of a change. These operation levels are held constant for the forecast unless otherwise specified by a local or regional FAA official.

### 4.1.2 FAA AEROSPACE FORECAST

The second set of FAA forecasts consulted were the FAA Aerospace Forecasts, FY 2020-2040. The Aerospace Forecast provides an overview of aviation industry trends and expected growth for the commercial passenger carrier, cargo carriers, and general aviation activity sectors. National growth rates in enplanements, operations, fleet growth, and fleet mix for the general aviation fleet are provided over a 20-year forecast horizon.

A review of the FY 2020-2040 Aerospace Forecast states that the general aviation industry recorded an increase of 1.4 percent in deliveries in 2019, with piston engine aircraft up by 6.5 percent and a decline in turboprop by 3.2 percent, while turbojet deliveries saw an increase of 6.3 percent. General aviation

activity at FAA and contract tower airports recorded a 3.3 percent increase in 2019 as local operations rose by 6.1 percent, and itinerant operations rose by 0.8 percent, setting a record for the highest increase over the last 20 years.

According to the 2020-2040 Aerospace Forecast, the long-term outlook for general aviation, driven by turbine aircraft activity, remains stable. The active general aviation fleet is projected to decrease slightly from its current level, as the declines in the fixed-wing piston fleet remain just above the increases in turbine, experimental and light sport fleets.

## 4.2 AIRPORT SERVICE AREA

Determining B19's service area is an important component in estimating future aviation demand. This report relies on the NPIAS definition of an airport service area, which states, "The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically by having most of the population within 20 nautical miles of a NPIAS airport." Therefore, B19's service area is determined to be within 20 nautical miles of B19. The following airports exist within B19's Service Area:

- Portland International Jetport (PWM), Portland, ME: PWM is a towered NPIAS airport categorized as a small hub with two paved runways – Runway 11-29 (7200 x 150) and Runway 18-36 (6100 x 150) providing scheduled commercial service through a number of passenger airlines including American Airlines, Cape Air, Delta, Elite Airways, Frontier Airlines, JetBlue, Southwest, Sun Country Airlines, and United. PWM also offers a wide variety of services and facilities to GA aircraft operators, including several FBOs providing fuel, deicing, maintenance, ground handling, charter airline service and a world-class terminal, recently constructed in 2016, among other amenities. According to 2020 TAF projections, PWM is estimated to experience over 107,000 operations with over 19,000 of those being air carrier operations and over 17,000 being itinerant general aviation operations.

- Sanford Seacoast Regional Airport (SFM), Sanford, ME: SFM is a public use, reliever General Aviation NPIAS airport with two paved runways – Runway 07-25 (6389 ft x 100 ft) and Runway 14-32 (4999 ft x 100 ft.). GA services available at SFM include full FBO services, aircraft ground handling, oxygen service, aircraft parking (ramp or tie-down), hangars, hangar leasing/sales, passenger terminal and lounge, pilot school, flight training, and an on-site restaurant. The 2020 TAF estimates that SFM will experience over 53,000 operations, with over 18,000 being itinerant general aviation operations and 32,000 being local civil operations.

- Limington-Harmon Airport (63B), Limington, ME: 63B is a privately-owned, public use airport not included in the NPIAS, with one paved runway – Runway 11-29 (2,973 ft x 50 ft), which is marked as basic. Amenities available at 63B include a passenger terminal and lounge, 24-hour self-serve 100-LL fuel, aircraft parking, hangars, aircraft maintenance and modifications, and aircraft painting. Just southeast of the Runway 29 end, sits the Runway Restaurant, a farm to table establishment offering daily breakfast and lunch. According to airnav.com, 70 aircraft are based at 63B, and the airport experiences an average of 41 operations per day (approx. 15,000 annual).

## 4.3 HISTORIC AVIATION DATA

This section presents the historical aviation statistics for B19 including based aircraft and annual operations. This information is used to help identify and evaluate factors that influence aviation demand, which in turn is used to determine forecasts of future aviation activity.

### 4.3.1 BASED AIRCRAFT

Prior to 2009 and the integration of FAA's National Based Aircraft Inventory Program, airport managers were responsible for counting the number of based aircraft and reporting totals to the FAA and state inspectors. These totals would then appear on the airport's master record form, also known as the "5010". At the time, little guidance was provided on how the based aircraft counts should be determined, and there was no method of validating the counts. As a result, based aircraft counts were often unreliable, and duplicated.

The FAA defines "based aircraft" as an aircraft that is operational and airworthy, which is typically based at the facility in question for a majority of the year. Based aircraft categories include single-engine piston, multi-engine piston, jet, and rotorcraft.

Based aircraft are major economic contributors to the airport. They help generate revenues in part from tie-down fees, hangar leases, fuel sales, and maintenance. Based aircraft forecasts are used to evaluate the size of an apron, number of required tie-downs and hangars, and other facilities necessary to support the continued growth of based aircraft.

According to the 2019 FAA TAF for B19, the number of reported based aircraft at the Airport in 2019 was 38, fluctuating mildly, experiencing a low of 36 in 2010 and a high of 43 in 2016 respectively, with an average annual growth rate (AAGR) of 0.9 percent. Table 4-1 presents historical TAF data of based aircraft over the past 10 years at B19.

**Table 4-1: B19 Based Aircraft History**

| *Year* | *B19 Based Aircraft History* | *AAGR%* |
|---|---|---|
| *2010* | 36 | |
| *2011* | 33 | -8.3% |
| *2012* | 34 | 3.0% |
| *2013* | 39 | 14.7% |
| *2014* | 41 | 5.1% |
| *2015* | 43 | 4.9% |
| *2016* | 43 | 0.0% |
| *2017* | 38 | -11.6% |
| *2018* | 38 | 0.0% |
| *2019* | 38 | 0.0% |
| | ***AAGR*** | **0.9%** |
| | ***2010-2019 Growth*** | **5.6%** |

*Source: FAA TAF 2019-2045*

### 4.3.2 MAINE LOCAL GENERAL AVIATION BASED AIRCRAFT

According to the NPIAS, there are 14 airports within the state of Maine that are classified as having the same role as B19 ("Local General Aviation"). Between 2010 and 2019, these airports experienced a slight average annual increase in based aircraft of 0.6 percent, similar to the growth seen at B19. Table 4-2 presents historic based aircraft counts over the past 10 years for airports in Maine classified under the NPIAs as Local GA:

**Table 4-2: Maine Local GA Based Aircraft History**

| *Year* | *Maine Local GA Based Aircraft History* | *AAGR%* |
|---|---|---|
| *2010* | 409 | |
| *2011* | 401 | -2.0% |
| *2012* | 456 | 13.7% |
| *2013* | 452 | -0.9% |
| *2014* | 457 | 1.1% |
| *2015* | 428 | -6.3% |
| *2016* | 452 | 5.6% |
| *2017* | 452 | 0.0% |
| *2018* | 427 | -5.5% |
| *2019* | 427 | 0.0% |
| | ***AAGR*** | **0.6%** |
| | ***2010-2019 Growth*** | **4.4%** |

*Source: FAA TAF 2019-2045*

### 4.3.3 REGIONAL TAF BASED AIRCRAFT

According to FAA, the New England Region experienced a decrease in based aircraft of 10.4 percent between 2010 and 2019 at an average annual decrease of 1.1 percent per year. The FAA New England Region includes the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. Table 4-3 presents historic based aircraft counts over the past 10 years in the FAA New England Region (ANE).

**Table 4-3: New England Region Based Aircraft History**

| *Year* | *ANE Based Aircraft History* | *AAGR%* |
|---|---|---|
| *2010* | 6,233 | |
| *2011* | 6,047 | -3.0% |
| *2012* | 5,791 | -4.2% |
| *2013* | 5,973 | 3.1% |
| *2014* | 6,278 | 5.1% |
| *2015* | 5,716 | -9.0% |
| *2016* | 5,943 | 4.0% |
| *2017* | 5,667 | -4.6% |
| *2018* | 5,538 | -2.3% |
| *2019* | 5,587 | 0.9% |
| | ***AAGR*** | **-1.1%** |

*Source: FAA TAF 2019-2045*

### 4.3.4 NATIONAL TAF BASED AIRCRAFT

FAA TAF data indicates that, between 2010 and 2019, national based aircraft increased slightly at an average annual rate of approximately 0.1 percent for a gain of 1,372 based aircraft. Table 4-4 presents historic national based aircraft growth over the past 10 years.

**Table 4-4: National Based Aircraft History**

| *Year* | *National Based Aircraft History* | *AAGR%* |
|---|---|---|
| *2010* | 165,183 | |
| *2011* | 160,160 | -3.0% |
| *2012* | 163,176 | 1.9% |
| *2013* | 166,781 | 2.2% |
| *2014* | 170,216 | 2.1% |
| *2015* | 163,872 | -3.7% |
| *2016* | 173,762 | 6.0% |
| *2017* | 166,909 | -3.9% |
| *2018* | 165,200 | -1.0% |
| *2019* | 166,555 | 0.8% |
| | **AAGR** | **0.1%** |

*Source: FAA TAF 2010-2019*

## 4.4 HISTORIC ANNUAL AIRCRAFT OPERATIONS

In airport planning terms, "airport operations" are defined as the number of arrivals and departures from an airport. Therefore, an airplane that arrives and then departs from an airport is considered to have made two operations. Operations are further classified as either local or itinerant.

- Local operations are performed by aircraft that: (a) operate in the local traffic pattern or within sight of the airport; (b) are known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the airport; (c) execute simulated instrument approaches or low passes at the airport.
- Itinerant operations are all aircraft operations other than local operations, such as landing or take off of a flight departing from or arriving at another airport greater than 20 miles away.

Aircraft operations are also defined by type, such as air carrier, regional/commuter, air taxi, general aviation, or military. According to the TAF, aircraft operations at B19 over the past ten years have been comprised mainly of itinerant general aviation and local civil operations, though past operations included a small percentage of air taxi/commuter and military.

### 4.4.1 B19 HISTORIC TAF OPERATIONS

The TAF indicates that operations at B19 remained level from 2010-2013 with 23,150 operations per year. From 2014-2019, operations reportedly remained level at 15,000 per year, without an explanation of the apparent 35.2% decrease in operations from 2013 to 2014. It is important to note here that FAA TAF operations counts are based on information provided to the FAA via the airport's annual 5010 Airport Master Record. Because B19 is a non-towered airport, these numbers are estimates, and lacking a more accurate counting system, operations are often carried over from year-to-year. Further, the Airport lacks historic operations data, offering no way to validate the counts. The apparent decrease in operations between 2013 and 2014 could easily be attributed to a variety of factors, including different counting methods employed at the airport due to several changes in airport management, lack of airport support within the community, and deteriorating runway conditions.

Given that operations are often carried over year-to-year (as the case appears to be), it is not reasonable to assume that the Airport experienced no fluctuation in operations whatsoever between 2010 and 2013, followed by a significant drop in operations in 2014, and again followed by no fluctuation from 2014 to present. Evidence of this can be seen in 2018, when Skydive Coastal Maine (SCM) began running its operation out of B19. According to SCM management, the company accounts for approximately 500 flights (or 1,000 operations) per year. Presumably, some fluctuation in operations should have been reflected in the TAF data starting in 2018 due to the addition of this business, yet no growth was reported.

Although methods for accurately counting operations at non-towered airports are currently available, a summary of reported historic operations at B19 for the period of 2010-2019 can be found in Table 4-5.

**Table 4-5: FAA TAF Operations History at B19 (2010-2019)**

| *Year* | *Itinerant GA Operations* | *Itinerant Military Operations* | *Local Civil Operations* | *Total Operations* |
|---|---|---|---|---|
| *2010* | 5,800 | 50 | 17,300 | 23,150 |
| *2011* | 5,800 | 50 | 17,300 | 23,150 |
| *2012* | 5,800 | 50 | 17,300 | 23,150 |
| *2013* | 5,800 | 50 | 17,300 | 23,150 |
| *2014* | 2,600 | 0 | 12,400 | 15,000 |
| *2015* | 2,600 | 0 | 12,400 | 15,000 |
| *2016* | 2,600 | 0 | 12,400 | 15,000 |
| *2017* | 2,600 | 0 | 12,400 | 15,000 |
| *2018* | 2,600 | 0 | 12,400 | 15,000 |
| *2019* | 2,600 | 0 | 12,400 | 15,000 |
| | | | **AAGR** | **-3.9%** |

*Source: FAA TAF 2019-2045*

### 4.4.2 B19 HISTORIC GARD OPERATIONS

The Airport began collecting GARD (General Audio Recording Device) data in May of 2014. GARD technology captures the number of radio transmissions made to a particular radio frequency to estimate the number of operations at an airport. In the case of B19, prior to January of 2016, the system was estimating two (2) radio transmissions per plane arrival, one (1) radio transmission per plane departure, and zero (0) radio transmissions per day by maintenance vehicles. In January of 2016, the Airport experienced a change in management, and the GARD settings were updated. At that time, the GARD settings were changed to estimate three (3) radio transmissions per plane arrival, two (2) radio transmissions per departure, and one (1) radio transmission per day by maintenance vehicles. This resulted in more radio transmissions required to estimate one (1) operation.

In addition to the change in GARD counting methods, there are data gaps where no counting occurred between September 7, 2018 to October 18, 2018 and also from March 2019 into 2020. The change in counting methods, gaps in data, and limited historical range make GARD data an unreliable source for estimating operational growth trends at this time. Due to the issues noted above, including various monitoring systems utilized at B19 since the implementation of the GARD system in 2014, it is not recommended that GARD data be utilized as a source for forecasting growth in this Master Plan; however, according to discussions with FAA and Invisible Intelligence (the company that was hired by MaineDOT in 2020 to install and monitors GARD systems throughout the State of Maine) they do provide a reasonable snapshot of baseline operations. The average number of annual operations between 2015 and 2017 was 6,200[3]. Considering that Skydive Coastal Maine began operating out of B19

[3] Discussions with Invisible Intelligence, LLC confirmed that GARD data from 2018 and 2019 seemed unreliable due to inconsistent monitoring; therefore, those years have been excluded from this average.

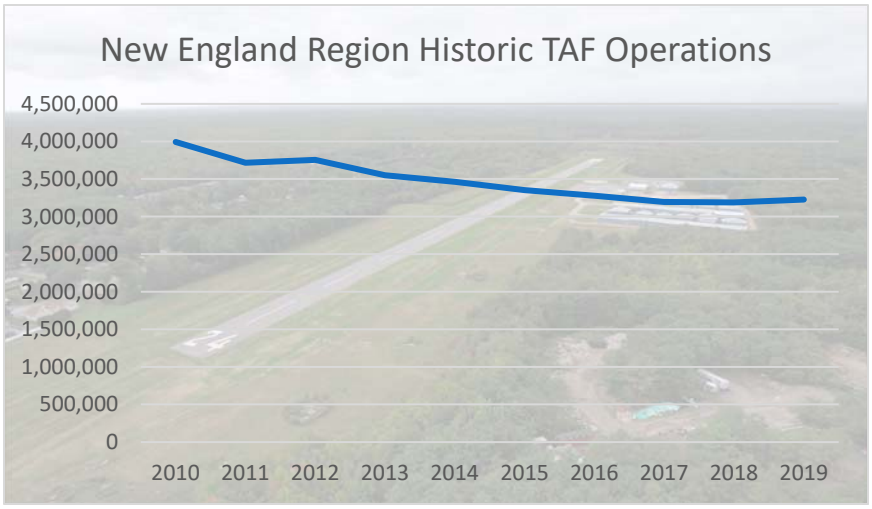
in 2018 and estimates approximately 500 flights (i.e. 1,000 operations) per year, it is reasonable to assume that annual operations at B19 are around 7,200 operations per year

In 2020, MaineDOT approved funding for the installation of upgraded GARD systems at all Maine Airports. A complete, upgraded GARD system, including a new ADSB receiver, computer, and hard drive was installed at B19 in November 2020. One of the many benefits to this system is that summary data will be automatically uploaded, and system monitoring will be maintained at the state level to confirm system functionality. It is expected that the GARD system will become a more reliable system for counting operations in the near future.

### 4.4.3 NEW ENGLAND REGIONAL TAF TRENDS

Historic aircraft operations for FAA New England Region were obtained from the FAA TAF. According to the data shown in Table 4-6 below, the New England Region experienced a decrease in operations from 2010-2019 of approximately 21.5 percent over this period with an average annual decrease of 2.3 percent per year.

**Table 4-6: New England Region Historic TAF Operations**




*Source: FAA TAF*

### 4.4.4 NATIONAL HISTORIC TAF TRENDS

Historic aircraft operations for the nation were obtained from the FAA TAF. According to the data shown in Table 4-7 below, the nation experienced a decrease in operations from 2010-2019 of approximately 3.7 percent, with an average annual decrease of 0.1 percent per year.

**Table 4-7: National Historic TAF Operations**


*Source: FAA TAF*

### 4.4.5 HISTORIC GENERAL AVIATION OPERATIONS AT NEARBY TOWERED AIRPORTS

In addition to historic TAF data for B19, New England Region, and the nation, recent historic operations at nearby towered airports were also reviewed. While TAF data for B19 relies on estimates reported via FAA Form 5010, TAF data at towered airports relies on more accurate air traffic control tower counts, providing a snapshot of local trends. The four (4) towered airports in closest proximity to B19 include: Portland International Jetport (PWM) in Portland, Maine; Portsmouth International Airport at Pease (PSM) in Portsmouth, New Hampshire; Manchester-Boston Regional Airport (MHT) in Manchester, New Hampshire; and Bangor International Airport (BGR) in Bangor, Maine. TAF data for these airports indicates a slight annual decrease in itinerant operations of 0.2 percent, an annual increase in local operations of 1.7 percent, and an overall annual increase in general aviation operations of 0.5 percent between 2010 and 2019. Tables 4-8 and 4-9 outline historic itinerant and local general aviation operations at the above-mentioned airports for the recent historic period of 2010-2019:

**Table 4-8: Itinerant GA Operations at Nearby Towered Airports (2010-2019)**

| Year | PWM | PSM | MHT | BGR | Total Itinerant |
|---|---|---|---|---|---|
| 2010 | 19,174 | 2,463 | 11,350 | 12,965 | **45,952** |
| 2011 | 17,583 | 2,463 | 10,466 | 13,087 | **43,599** |
| 2012 | 17,122 | 2,543 | 10,018 | 14,048 | **43,731** |
| 2013 | 16,467 | 2,345 | 9,477 | 13,233 | **41,522** |
| 2014 | 15,161 | 1,998 | 10,430 | 12,480 | **40,069** |
| 2015 | 14,697 | 2,156 | 10,416 | 12,954 | **40,223** |
| 2016 | 15,472 | 2,084 | 11,485 | 13,054 | **42,095** |
| 2017 | 15,151 | 2,424 | 10,501 | 13,910 | **41,986** |
| 2018 | 16,483 | 2,424 | 11,881 | 13,216 | **44,004** |
| 2019 | 17,255 | 2,424 | 11,947 | 13,265 | **44,891** |
| AAGR | -1.0 | 0.2% | 0.9% | 0.4% | **-0.2%** |

*Source: FAA TAF 2010-2019*

**Table 4-9: Local Civil Operations at Nearby Towered Airports (2010-2019)**

| Year | PWM | PSM | MHT | BGR | Total Local |
|---|---|---|---|---|---|
| 2010 | 5,883 | 23,123 | 2,552 | 4,556 | **36,114** |
| 2011 | 3,995 | 23,123 | 2,168 | 4,511 | **33,797** |
| 2012 | 4,406 | 24,394 | 2,831 | 6,338 | **37,969** |
| 2013 | 3,772 | 19,699 | 1,839 | 2,624 | **27,934** |
| 2014 | 1,925 | 22,215 | 1,912 | 2,978 | **29,030** |
| 2015 | 2,221 | 22,296 | 2,066 | 3,254 | **29,837** |
| 2016 | 3,557 | 26,257 | 2,624 | 3,170 | **35,608** |
| 2017 | 2,804 | 26,603 | 2,624 | 3,811 | **35,842** |
| 2018 | 3,955 | 26,603 | 4,074 | 3,481 | **38,113** |
| 2019 | 4,827 | 26,603 | 3,721 | 3,938 | **39,089** |
| AAGR | 3.6% | 2.1% | 7.3% | 2.9% | **1.7%** |

*Source: FAA TAF 2010-2019*

### 4.4.6 HISTORIC NATIONAL GENERAL AVIATION OPERATIONS AT TOWERED AIRPORTS

According to the FAA Aerospace Forecast[4], national trends of general aviation operations show positive growth. The Aerospace forecast provides historic operations counts for all towered airports across the nation. As outlined in Table 4-10 below, itinerant general aviation operations decreased at an annual average rate of 0.5 percent between 2010 and 2019, while local general aviation operations increased at a rate of 1.3 percent for the same period. Overall, national general aviation operations increased at an average annual rate of 0.3 percent between 2010 and 2019.

**Table 4-10: National GA Operations at Towered Airports (2015-2019)[5]**

| *Year* | *Itinerant GA Operations* | *AAGR* | *Local GA Operations* | *AAGR* | *Total GA Operations* | *AAGR%* |
|---|---|---|---|---|---|---|
| *2010* | 14,864,000 | | 11,716,000 | | 26,580,000 | |
| *2011* | 14,528,000 | -2.3% | 11,437,000 | -2.4% | 25,965,000 | -2.3% |
| *2012* | 14,522,000 | 0.0% | 11,608,000 | 1.5% | 26,130,000 | 0.6% |
| *2013* | 14,117,000 | -2.8% | 11,668,000 | 0.5% | 25,816,000 | -1.2% |
| *2014* | 13,979,000 | -1.0% | 11,675,000 | 0.1% | 25,654,000 | -0.6% |
| *2015* | 13,887,000 | -0.7% | 11,691,000 | 0.1% | 25,579,000 | -0.3% |
| *2016* | 13,905,000 | 0.1% | 11,633,000 | -0.5% | 25,538,000 | -0.2% |
| *2017* | 13,839,000 | -0.5% | 11,732,000 | 0.9% | 25,571,000 | 0.1% |
| *2018* | 14,130,000 | 2.1% | 12,354,000 | 5.3% | 26,485,000 | 3.6% |
| *2019 (E)* | 14,245,000 | 0.8% | 13,109,000 | 6.1% | 27,354,000 | 3.3% |
| | **AAGR** | **-0.5%** | **AAGR** | **1.3%** | **AAGR** | **0.3%** |

*Source: FAA Aerospace Forecast 2020-2040*

## 4.5 HISTORIC FUEL SALES

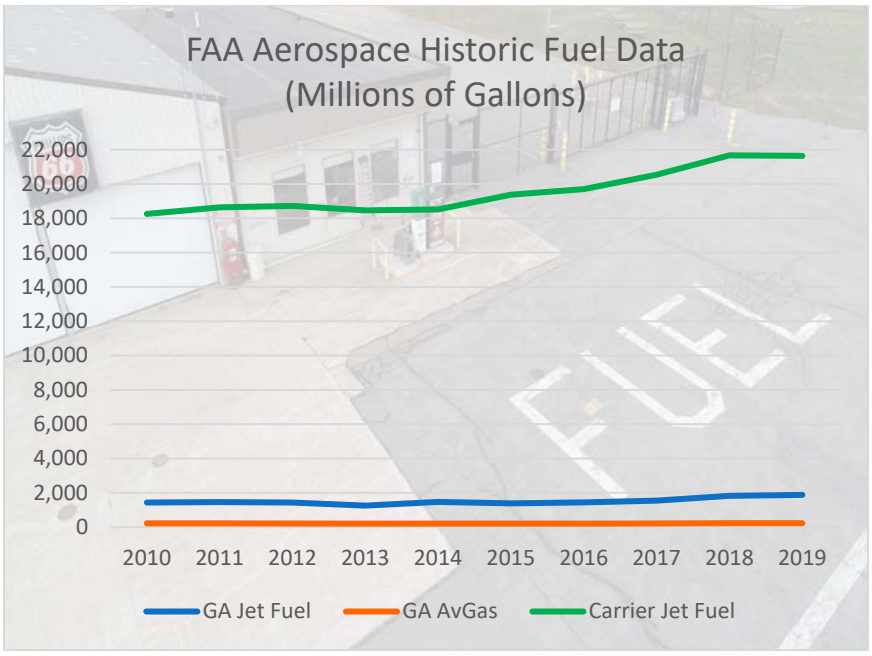
Fuel sales are often considered a good indicator of aviation activity at an airport and can help determine future fuel storage needs. Although historic fuel data at B19 is not available, national trends for jet fuel and avgas consumption are available via FAA's Aerospace Forecast and provide valuable insight about growth within the aviation industry.

### 4.5.1 FAA AEROSPACE FORECAST FUEL TREND

National trends, as reported by the FAA Aerospace Forecast, indicate that between 2010 and 2019, GA AvGas fuel consumption increased by 4.5 percent at an average annual growth rate of 0.7 percent, while GA jet fuel consumption increased by 30.9 percent at an average annual growth rate of 3.4 percent per year, and commercial jet fuel consumption increased by 18.5 percent at an average annual growth rate of 1.9 percent per year. These trends indicate steady, consistent growth within the aviation industry and are highlighted in Table 4-11 below.

[4] Historic data taken from the 2020-2040 Aerospace Forecast and the 2016-2036 Aerospace Forecast
[5] Rounded to the nearest 1,000.

**Table 4-11: FAA Aerospace Historic Fuel Data**




*Source: FAA Aerospace Forecast*

## 4.6 AVIATION ACTIVITY FORECASTS

This section presents the aviation forecasts for B19 for the planning period of 2020-2039. The forecasts provide short-, mid-, and long-term projections for the years 2024, 2029, and 2039. These represent the 5-, 10-, and 20-year estimates of aviation activity at the Airport. Activity projections include based aircraft, itinerant operations, local operations, and total operations. Forecasts developed by B19 require review and approval by the FAA.

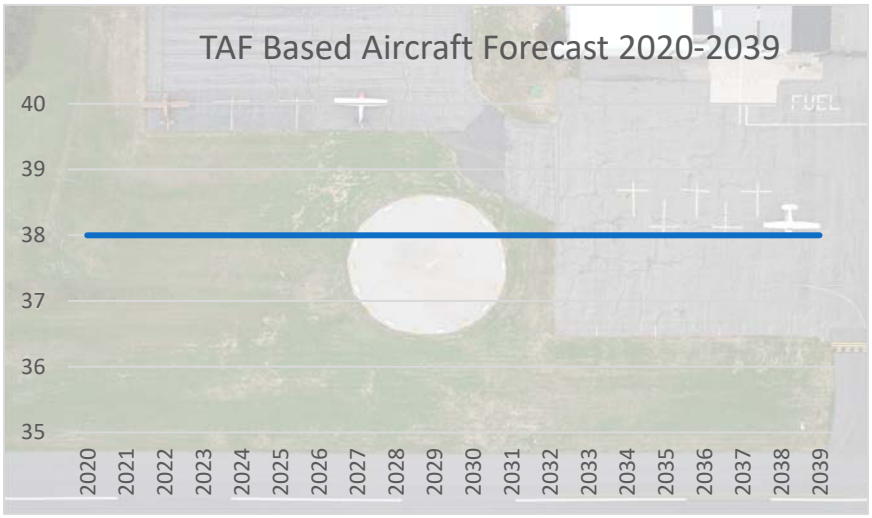
FAA AC 150/5070-6B provides guidance on the FAA review process, and states that the FAA will find a locally developed airport planning forecast acceptable if it meets any of the following three conditions for a general aviation and reliever airport:

1. The forecast differs less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period;
2. The forecast activity levels do not affect the timing or scale of an airport project; or
3. The forecast activity levels do not affect the role of the airport as defined in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems.

### 4.6.1 TAF BASED AIRCRAFT FORECAST

According to the 2020-2039 TAF, based aircraft at B19 are projected to remain stagnant through the planning period, as presented in Table 4-12 below:

**Table 4-12: TAF Based Aircraft at B19 2020-2039**




*Source: FAA Terminal Area Forecast*

There are two factors unique to B19 that contradict the TAF's assumption of no growth, which should be taken into consideration before applying a zero-growth rate to based aircraft at B19 through the planning period, including:

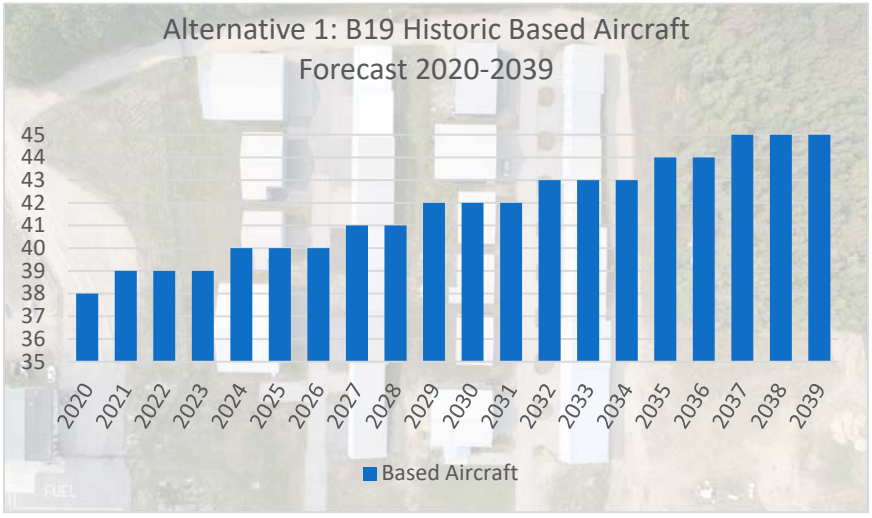
1. The Airport's existing hangar buildings are full (30 total units). Since B19 is located in a region that experiences significant snowfall during the winter months, having no available hangar units limits the Airport's ability to attract additional based aircraft. According to airport management, B19 has a waiting list of about a dozen people wanting to base in Biddeford when hangar units become available. Presumably, if additional hangar units are constructed in the future, the Airport will be able to fill them quickly, thereby increasing the number of based aircraft significantly beyond TAF projections.
2. According to TAF records of historic based aircraft, and despite hangar units being full, the Airport has experienced a small increase in the number of based aircraft over the past ten years.

The following section accounts for the unique factors presented above and offers an alternative based aircraft forecast for B19.

#### 4.6.1.1 Based Aircraft Forecast – Alternative 1: B19 Historic Based Aircraft Forecast

As outlined in *Section 4.3.1 Based Aircraft*, according to the FAA TAF, B19 experienced an increase in the number of based aircraft of 5.6 percent between 2010 and 2019, with an average annual increase of 0.9 percent. Using the TAF based aircraft count for 2019 as the baseline year, the Alternative 1 based aircraft forecast utilizes B19's historic growth rate of 0.9 percent projected through the planning period of 2020-2039. Assuming this growth rate continues, B19 could expect a fleet of approximately 45 based aircraft by 2039. See Table 4-13 below:

**Table 4-13: Alternative 1 – B19 Historic Based Aircraft Forecast**

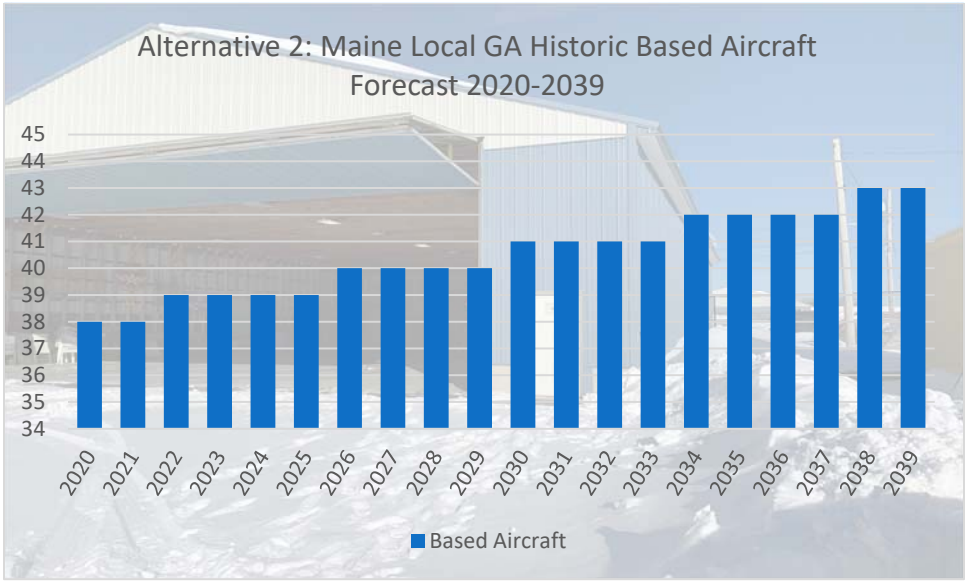



*Source: FAA Terminal Area Forecast*

#### *4.6.1.2 Based Aircraft Forecast – Alternative 2: Maine Local GA Historic Based Aircraft Forecast*

As outlined in *Section 4.3.2 Maine Local General Aviation Based Aircraft*, according to the FAA TAF, airports in the State of Maine with the same role classification as B19 (Local GA) experienced an increase in the number of based aircraft of 4.4 percent between 2010 and 2019, with an average annual increase of 0.6 percent. Using the TAF based aircraft count for 2019 as the baseline year, the Alternative 2 based aircraft forecast utilizes the Maine Local GA historic growth rate of 0.6 percent projected through the planning period of 2020-2039. Application of this growth rate results in a projected fleet of 43 based aircraft by 2039. See Table 4-14 below:

**Table 4-14: Alternative 2: Maine Local GA Historic Based Aircraft Forecast**




*Source: FAA Terminal Area Forecast*

#### 4.6.1.3 Recommended Based Aircraft Growth Rate

Assuming that the Airport continues to experience a nominal growth rate, coupled with an increase in hangar capacity, it is not unrealistic that B19 could expect its based aircraft fleet to increase by 7 aircraft by 2039, to a total of 45 based aircraft. This is further supported by similar documented historic growth in the number of based aircraft at airports of similar roles within the State. Therefore, it is recommended that the Airport adopt the Alternative 1 based aircraft forecast growth rate of 0.9 percent through 2039 and implement future development assuming that its based aircraft fleet will grow slightly, from 38 based aircraft to 45 based aircraft, over the planning period. For a detailed outline of projected based aircraft growth over the planning period, see Table 4-15.

**Table 4-15: B19 Based Aircraft Forecast**

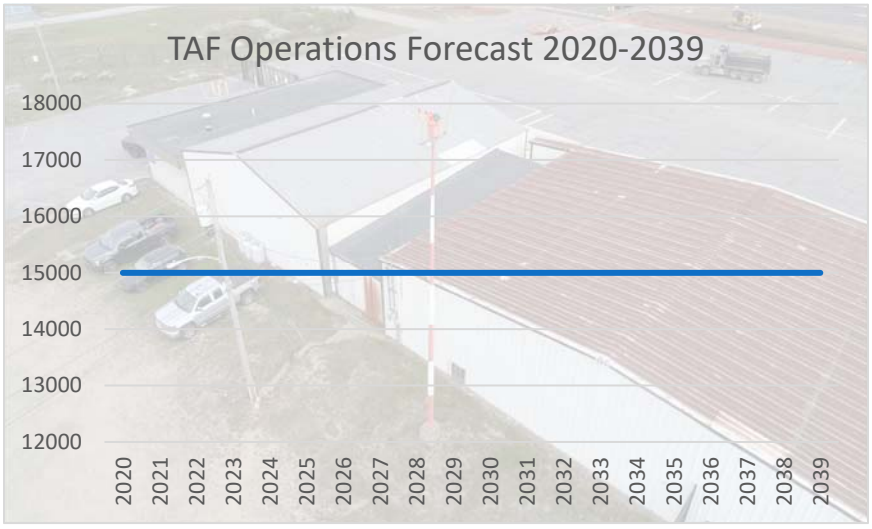
| *Year* | *B19 Based Aircraft* | *AAGR%* |
|---|---|---|
| *2019* | 38 | |
| *2020* | 38 | 0.9% |
| *2021* | 39 | 0.9% |
| *2022* | 39 | 0.9% |
| *2023* | 39 | 0.9% |
| *2024* | 40 | 0.9% |
| *2025* | 40 | 0.9% |
| *2026* | 40 | 0.9% |
| *2027* | 41 | 0.9% |
| *2028* | 41 | 0.9% |
| *2029* | 42 | 0.9% |
| *2030* | 42 | 0.9% |
| *2031* | 42 | 0.9% |
| *2032* | 43 | 0.9% |
| *2033* | 43 | 0.9% |
| *2034* | 43 | 0.9% |
| *2035* | 44 | 0.9% |
| *2036* | 44 | 0.9% |
| *2037* | 45 | 0.9% |
| *2038* | 45 | 0.9% |
| *2039* | 45 | 0.9% |
| | ***AAGR*** | **0.9%** |
| | ***2020-2039 Growth*** | **19.6%** |

*Source: FAA TAF, Gale Analysis*

### 4.6.2 AIRCRAFT OPERATIONS FORECAST

According to the 2020-2039 TAF, operations at B19 are projected to have no increase or decrease over the planning period, as presented in Table 4-16 below:

**Table 4-16: TAF Operations at B19 2020-2039**




*Source: FAA Terminal Area Forecast*

Since FAA TAF projections at non-towered airports often assume zero growth due to unreliable and often unverifiable methods of counting operations (as discussed in section 4.4.1), it is important to consider other data sources that provide a more realistic depiction of expected growth. To assume no increase or decrease of even a single operation over a 20-year planning period is not realistic. Recent historic operations counts at several nearby towered airports indicate that general aviation operations in the local area have increased over the past ten years, and national historic general aviation operations at airports with tower service, as captured by the FAA's Aerospace Forecast, have experienced a slight increase in general aviation operations over the same period. Additionally, considering that Skydive Coastal Maine, which reports an average of 500 flights (i.e. 1,000 operations) per year, began operating out of B19 in 2018, coupled with a latent demand for additional hangar units, modest growth is a reasonable expectation. The following sections present three alternative operations forecasts based on B19's historic operations, historic operations at nearby towered airports, and FAA Aerospace forecast growth rates.

#### 4.6.2.1 Operations Forecast – Alternative 1: B19 Historic Operations Forecast

As outlined in *Section 4.4.1 B19 Historic Operations*, according to the FAA TAF, B19 experienced a decrease of 35.2 percent total operations between 2010 and 2019, with an average annual decrease of 3.9 percent. As stated in Section 4.4.1, this apparent decrease is likely attributed to a change in the method used to capture operations data and does not reflect an actual decrease in operations.

As a basis for comparison, Alternative 1 was developed to show the significant impacts of applying the TAF negative growth rate to B19's operations through the planning period. The GARD estimate of 7,200 annual operations from Section 4.4.2 has been used as the baseline for Alternative 1, which applies B19's historic negative growth rate of 3.9 percent through the planning period of 2020-2039, resulting in a total projected decrease of 3,951 operations. See Table 4-17 below.

**Table 4-17: Alternative 1 – B19 Historic Operations Forecast**

| *Year* | *Itinerant Operations* | | | | *Local Operations* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Air Taxi & Commuter** | **GA** | **Military** | **Total** | **Civil** | **Military** | **Total** | **Total Operations** |
| *2019* | 0 | 1,476 | 0 | 1,476 | 5,724 | 0 | 5,724 | **7,200** |
| *2020* | 0 | 1,418 | 0 | 1,418 | 5,501 | 0 | 5,501 | **6,919** |
| *2021* | 0 | 1,363 | 0 | 1,363 | 5,286 | 0 | 5,286 | **6,649** |
| *2022* | 0 | 1,310 | 0 | 1,310 | 5,080 | 0 | 5,080 | **6,390** |
| *2023* | 0 | 1,259 | 0 | 1,259 | 4,882 | 0 | 4,882 | **6,141** |
| *2024* | 0 | 1,210 | 0 | 1,210 | 4,692 | 0 | 4,692 | **5,901** |
| *2025* | 0 | 1,163 | 0 | 1,163 | 4,509 | 0 | 4,509 | **5,671** |
| *2026* | 0 | 1,117 | 0 | 1,117 | 4,333 | 0 | 4,333 | **5,450** |
| *2027* | 0 | 1,074 | 0 | 1,074 | 4,164 | 0 | 4,164 | **5,237** |
| *2028* | 0 | 1,032 | 0 | 1,032 | 4,001 | 0 | 4,001 | **5,033** |
| *2029* | 0 | 992 | 0 | 992 | 3,845 | 0 | 3,845 | **4,837** |
| *2030* | 0 | 953 | 0 | 953 | 3,695 | 0 | 3,695 | **4,648** |
| *2031* | 0 | 916 | 0 | 916 | 3,551 | 0 | 3,551 | **4,467** |
| *2032* | 0 | 880 | 0 | 880 | 3,413 | 0 | 3,413 | **4,293** |
| *2033* | 0 | 846 | 0 | 846 | 3,280 | 0 | 3,280 | **4,125** |
| *2034* | 0 | 813 | 0 | 813 | 3,152 | 0 | 3,152 | **3,964** |
| *2035* | 0 | 781 | 0 | 781 | 3,029 | 0 | 3,029 | **3,810** |
| *2036* | 0 | 751 | 0 | 751 | 2,911 | 0 | 2,911 | **3,661** |
| *2037* | 0 | 721 | 0 | 721 | 2,797 | 0 | 2,797 | **3,518** |
| *2038* | 0 | 693 | 0 | 693 | 2,688 | 0 | 2,688 | **3,381** |
| *2039* | 0 | 666 | 0 | 666 | 2,583 | 0 | 2,583 | **3,249** |
| *AAGR* | | | | | | | **AAGR** | **-3.9%** |

*Source: FAA Terminal Area Forecast*

#### 4.6.2.2 Operations Forecast – Alternative 2: Local Towered Airports Historic Operations Forecast

As outlined in Section 4.4.5 Historic General Aviation Operations at Nearby Towered Airports, TAF data between 2010-2019 for the four towered airports in closest proximity to B19 indicates a slight annual decrease in itinerant GA operations of 0.2 percent, an annual increase in local civil operations of 1.7 percent, and an overall annual increase in general aviation operations of 0.5 percent. This suggests that similar growth at nearby non-towered general aviation airports is also possible. The GARD estimate of 7,200 annual operations from Section 4.4.2 has been used as the baseline for Alternative 2, which applies the historic local towered airport decrease of 0.2 percent per year to itinerant GA operations and increase of 1.7 percent per year to local civil operations though the planning period, resulting in a total projected increase of 2,237 operations through the planning period with an average annual growth rate of 1.4 percent per year. See Table 4-18 below:

**Table 4-18: Alternative 2 – Local Towered Airports Historic Growth Forecast**

| *Year* | *Itinerant Operations* | | | | *Local Operations* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Air Taxi & Commuter** | **GA** | **Military** | **Total** | **Civil** | **Military** | **Total** | **Total Operations** |
| *2019* | 0 | 1,476 | 0 | 1,476 | 5,724 | 0 | 5,724 | **7,200** |
| *2020* | 0 | 1,473 | 0 | 1,473 | 5,821 | 0 | 5,821 | **7,294** |
| *2021* | 0 | 1,470 | 0 | 1,470 | 5,920 | 0 | 5,920 | **7,390** |
| *2022* | 0 | 1,467 | 0 | 1,467 | 6,021 | 0 | 6,021 | **7,488** |
| *2023* | 0 | 1,464 | 0 | 1,464 | 6,123 | 0 | 6,123 | **7,587** |
| *2024* | 0 | 1,461 | 0 | 1,461 | 6,227 | 0 | 6,227 | **7,689** |
| *2025* | 0 | 1,458 | 0 | 1,458 | 6,333 | 0 | 6,333 | **7,792** |
| *2026* | 0 | 1,455 | 0 | 1,455 | 6,441 | 0 | 6,441 | **7,896** |
| *2027* | 0 | 1,453 | 0 | 1,453 | 6,550 | 0 | 6,550 | **8,003** |
| *2028* | 0 | 1,450 | 0 | 1,450 | 6,662 | 0 | 6,662 | **8,111** |
| *2029* | 0 | 1,447 | 0 | 1,447 | 6,775 | 0 | 6,775 | **8,222** |
| *2030* | 0 | 1,444 | 0 | 1,444 | 6,890 | 0 | 6,890 | **8,334** |
| *2031* | 0 | 1,441 | 0 | 1,441 | 7,007 | 0 | 7,007 | **8,448** |
| *2032* | 0 | 1,438 | 0 | 1,438 | 7,126 | 0 | 7,126 | **8,565** |
| *2033* | 0 | 1,435 | 0 | 1,435 | 7,248 | 0 | 7,248 | **8,683** |
| *2034* | 0 | 1,432 | 0 | 1,432 | 7,371 | 0 | 7,371 | **8,803** |
| *2035* | 0 | 1,429 | 0 | 1,429 | 7,496 | 0 | 7,496 | **8,926** |
| *2036* | 0 | 1,427 | 0 | 1,427 | 7,624 | 0 | 7,624 | **9,050** |
| *2037* | 0 | 1,424 | 0 | 1,424 | 7,753 | 0 | 7,753 | **9,177** |
| *2038* | 0 | 1,421 | 0 | 1,421 | 7,885 | 0 | 7,885 | **9,306** |
| *2039* | 0 | 1,418 | 0 | 1,418 | 8,019 | 0 | 8,019 | **9,437** |
| *AAGR* | | | | | | | **AAGR** | **1.4%** |

*Source: FAA Terminal Area Forecast*

#### 4.6.2.3 Operations Forecast – Alternative 3: Aerospace Forecast National Historic Operations Forecast

As outlined in Section 4.4.5 Historic National General Aviation Operations at Towered Airports, FAA Aerospace Forecast historic records indicate an average annual decrease of 0.5 percent for itinerant operations and an average annual increase of 1.3 percent for local operations. The GARD estimate of 7,200 annual operations from Section 4.4.2 has been used as the baseline for Alternative 3, which applies the FAA Aerospace Forecast historic growth rates of -0.5 percent to transient operations and 1.3 percent to local operations through the planning period of 2020-2039. This results in a projected average annual growth rate of 1.0 percent, or an increase of 1,546 total operations by 2039. See Table 4-19 below.

**Table 4-19: Alternative 3 – Aerospace Forecast Historic Growth Forecast**

| *Year* | *Itinerant Operations* | | | | *Local Operations* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Air Taxi & Commuter** | **GA** | **Military** | **Total** | **Civil** | **Military** | **Total** | **Total Operations** |
| *2019* | 0 | 1,476 | 0 | 1,476 | 5,724 | 0 | 5,724 | **7,200** |
| *2020* | 0 | 1,469 | 0 | 1,469 | 5,798 | 0 | 5,798 | **7,267** |
| *2021* | 0 | 1,461 | 0 | 1,461 | 5,874 | 0 | 5,874 | **7,335** |
| *2022* | 0 | 1,454 | 0 | 1,454 | 5,950 | 0 | 5,950 | **7,404** |
| *2023* | 0 | 1,447 | 0 | 1,447 | 6,028 | 0 | 6,028 | **7,474** |
| *2024* | 0 | 1,439 | 0 | 1,439 | 6,106 | 0 | 6,106 | **7,545** |
| *2025* | 0 | 1,432 | 0 | 1,432 | 6,185 | 0 | 6,185 | **7,618** |
| *2026* | 0 | 1,425 | 0 | 1,425 | 6,266 | 0 | 6,266 | **7,691** |
| *2027* | 0 | 1,418 | 0 | 1,418 | 6,347 | 0 | 6,347 | **7,765** |
| *2028* | 0 | 1,411 | 0 | 1,411 | 6,430 | 0 | 6,430 | **7,841** |
| *2029* | 0 | 1,404 | 0 | 1,404 | 6,513 | 0 | 6,513 | **7,917** |
| *2030* | 0 | 1,397 | 0 | 1,397 | 6,598 | 0 | 6,598 | **7,995** |
| *2031* | 0 | 1,390 | 0 | 1,390 | 6,684 | 0 | 6,684 | **8,073** |
| *2032* | 0 | 1,383 | 0 | 1,383 | 6,771 | 0 | 6,771 | **8,153** |
| *2033* | 0 | 1,376 | 0 | 1,376 | 6,859 | 0 | 6,859 | **8,235** |
| *2034* | 0 | 1,369 | 0 | 1,369 | 6,948 | 0 | 6,948 | **8,317** |
| *2035* | 0 | 1,362 | 0 | 1,362 | 7,038 | 0 | 7,038 | **8,400** |
| *2036* | 0 | 1,355 | 0 | 1,355 | 7,130 | 0 | 7,130 | **8,485** |
| *2037* | 0 | 1,349 | 0 | 1,349 | 7,222 | 0 | 7,222 | **8,571** |
| *2038* | 0 | 1,342 | 0 | 1,342 | 7,316 | 0 | 7,316 | **8,658** |
| *2039* | 0 | 1,335 | 0 | 1,335 | 7,411 | 0 | 7,411 | **8,746** |
| *AAGR* | | | | | | | **AAGR** | **1.0%** |

*Source: FAA Aerospace Forecast*

#### 4.6.2.4 Recommended Operations Growth Rate

As stated in Sections 4.6.2 and 4.6.2.1 above, it is unrealistic to expect zero or negative growth at B19 over the planning period. There are several unique local factors that support modest growth projections at B19 through 2039, including an anticipated increase in based aircraft due to latent demand for additional hangar units, which would likely result in additional operations; the addition of a growing skydiving business in 2018 accounting for approximately 1,000 additional annual operations; and historic growth in general aviation operations in Northern New England, as validated by local towered airport data. Considering these factors, it is recommended that the Airport adopt the Alternative 2 Local Towered Airport Historic Operations Forecast growth rate of 1.4 percent per year, as Alternative 2 presents the most realistic depiction of what is occurring in the local market. Based on this recommended forecast, it is anticipated that operations at B19 will increase at an average annual rate of 1.4 percent per year with approximately 9,437 operations by 2039. For a detailed outline of recommended operations growth over the planning period, see Table 4-20.

**Table 4-20: Recommended Operations Forecast**

| *Year* | *Itinerant Operations* | | | | *Local Operations* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Air Taxi & Commuter** | **GA** | **Military** | **Total** | **Civil** | **Military** | **Total** | **Total Operations** |
| *2019* | 0 | 1,476 | 0 | 1,476 | 5,724 | 0 | 5,724 | **7,200** |
| *2020* | 0 | 1,473 | 0 | 1,473 | 5,821 | 0 | 5,821 | **7,294** |
| *2021* | 0 | 1,470 | 0 | 1,470 | 5,920 | 0 | 5,920 | **7,390** |
| *2022* | 0 | 1,467 | 0 | 1,467 | 6,021 | 0 | 6,021 | **7,488** |
| *2023* | 0 | 1,464 | 0 | 1,464 | 6,123 | 0 | 6,123 | **7,587** |
| *2024* | 0 | 1,461 | 0 | 1,461 | 6,227 | 0 | 6,227 | **7,689** |
| *2025* | 0 | 1,458 | 0 | 1,458 | 6,333 | 0 | 6,333 | **7,792** |
| *2026* | 0 | 1,455 | 0 | 1,455 | 6,441 | 0 | 6,441 | **7,896** |
| *2027* | 0 | 1,453 | 0 | 1,453 | 6,550 | 0 | 6,550 | **8,003** |
| *2028* | 0 | 1,450 | 0 | 1,450 | 6,662 | 0 | 6,662 | **8,111** |
| *2029* | 0 | 1,447 | 0 | 1,447 | 6,775 | 0 | 6,775 | **8,222** |
| *2030* | 0 | 1,444 | 0 | 1,444 | 6,890 | 0 | 6,890 | **8,334** |
| *2031* | 0 | 1,441 | 0 | 1,441 | 7,007 | 0 | 7,007 | **8,448** |
| *2032* | 0 | 1,438 | 0 | 1,438 | 7,126 | 0 | 7,126 | **8,565** |
| *2033* | 0 | 1,435 | 0 | 1,435 | 7,248 | 0 | 7,248 | **8,683** |
| *2034* | 0 | 1,432 | 0 | 1,432 | 7,371 | 0 | 7,371 | **8,803** |
| *2035* | 0 | 1,429 | 0 | 1,429 | 7,496 | 0 | 7,496 | **8,926** |
| *2036* | 0 | 1,427 | 0 | 1,427 | 7,624 | 0 | 7,624 | **9,050** |
| *2037* | 0 | 1,424 | 0 | 1,424 | 7,753 | 0 | 7,753 | **9,177** |
| *2038* | 0 | 1,421 | 0 | 1,421 | 7,885 | 0 | 7,885 | **9,306** |
| *2039* | 0 | 1,418 | 0 | 1,418 | 8,019 | 0 | 8,019 | **9,437** |
| *AAGR* | | | | | | | **AAGR** | **1.4%** |

*Source: FAA Terminal Area Forecast*

#### 4.6.2.5 Operations Forecast (Local vs. Itinerant Split)

The FAA TAF provides the activity split between local and itinerant operations. As shown in Table 4-21, from 2010 to 2019 local operations on average accounted for 79.5 percent of total operations, while itinerant operations accounted for approximately 20.5 percent.

**Table 4-21: Historic Itinerant vs. Local Operations**

| Year | Itinerant Operations | Itinerant Percent | Local Operations | Local Percent | Total Operations |
|---|---|---|---|---|---|
| 2010 | 5,800 | 25.3% | 17,300 | 74.7% | 23,150 |
| 2011 | 5,800 | 25.3% | 17,300 | 74.7% | 23,150 |
| 2012 | 5,800 | 25.3% | 17,300 | 74.7% | 23,150 |
| 2013 | 5,800 | 25.3% | 17,300 | 74.7% | 23,150 |
| 2014 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| 2015 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| 2016 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| 2017 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| 2018 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| 2019 | 2,600 | 17.3% | 12,400 | 82.7% | 15,000 |
| | **10-Year Average** | **20.5%** | **10-Year Average** | **79.5%** | |

*Source: FAA TAF 2010-2019*

#### 4.6.2.6 Baseline Operational Fleet Mix

The type of aircraft utilizing the Airport plays a key role in planning future airport facilities. In general, based aircraft are often considered to be a good representation of local operations. Lacking available operational data, it is difficult to ascertain the percentage split of local operations conducted by a based or transient aircraft at B19. Therefore, for purposes of this section, it is assumed that all local operations (79.5 percent of total operations) at B19 are performed by single engine piston aircraft. According to FAA's Traffic Flow Management System Counts (TFMSC)[6] for 2019, Instrument Flight Rule (IFR) operations at B19 are broken down into the following groups: 81.5 percent single engine piston, 10.8 percent multi engine piston, 6.3 percent turboprop, 0.6 jet, and 0.6 percent rotorcraft (helicopter). Assuming that, in general, FAA's TFMSC is a good representation of itinerant operations, 20.5 percent of total operations should be attributed to the above-listed aircraft types. Using the assumptions that local operations (79.5 percent) are performed by based aircraft and itinerant operations (20.5 percent) are performed by aircraft captured in the TFMSC, the Airport's annual operational fleet mix is estimated to be broken down into the following groups:

- Single engine piston- 96.2%
- Multi engine piston- 2.2%
- Turboprop- 1.3%

[6] FAA's TFMSC includes data for flights that fly under Instrument Flight Rules (IFR) and are captured by the FAA's enroute computers. Most VFR and some non-enroute IFR traffic is excluded. TFMSC source data are created when pilots file flight plans and/or when flights are detected by the National Airspace System (NAS), usually via RADAR.

- Rotorcraft (Helicopter)- 0.1%
- Jet- 0.1%

#### *4.6.2.7 Projected Operational Fleet Mix*

While B19 supports a variety of aircraft, the majority of current operations are estimated to be conducted by single-engine aircraft. As discussed in the previous section, the percent of operational fleet mix is based on available airport data and FAA's TFMSC. Utilizing the recommended operations forecast presented in Section 4.6.2.4 and estimated local vs. itinerant operations, Table 4-22 projects the operational fleet mix over the planning period.

***Table 4-22: Projected Operational Fleet Mix***

| Aircraft Category | Itinerant | | | Local | | |
|---|---|---|---|---|---|---|
| | ***2024*** | ***2029*** | ***2039*** | ***2024*** | ***2029*** | ***2039*** |
| Single-Engine | 1,191 | 1,179 | 1,156 | 6,227 | 6,775 | 8,019 |
| Multi-Engine | 158 | 157 | 154 | 0 | 0 | 0 |
| Turboprop | 93 | 92 | 90 | 0 | 0 | 0 |
| Helicopter | 9 | 9 | 9 | 0 | 0 | 0 |
| Jet | 9 | 9 | 9 | 0 | 0 | 0 |
| **Total** | **1,462** | **1,447** | **1,418** | **6,227** | **6,775** | **8,019** |

*Source: FAA TAF 2019-2045, Gale 2020 Analysis*

## 4.7 PEAK ACTIVITY ESTIMATES

Many airport facility needs are related to the levels of activity during peak periods. Peak characteristics are typically defined as peak month, average day, and peak hour activity. When projecting future activity levels at an airport, it is important to identify and project peak period activity levels. These projections help facilitate future planning decisions and highlight an airport's ability to accommodate future aviation activity demand.

The values for average day peak month and for the peak hour have been calculated by taking the number of operations calculated for the peak month and dividing that figure by the number of days in the peak month. According to FAA TFMSC records, the busiest month in terms of IFR flights for 2019 was the month of August. Lacking better data, for the purposes of this exercise, it is assumed that August represents the peak month at B19 with 31 days. For planning purposes, the peak month is calculated assuming it represents 20 percent of total annual operations. As the Airport experienced approximately 7,200 annual operations in 2019, 1,440 operations (20 percent) are expected to occur in the peak month. It is then estimated that 15 percent of the average day peak month represents the number of peak hour operations. The calculation of peak activity is illustrated in the formula below and in Table 4-23.

[(Total Annual Operations*20%)/31]*15% = Peak Hour (ADPM)

**Table 4-23: Peak Activity Estimates**

| | *Total Annual Operations* | *Peak Month* | *Average Day in Peak Month* | *Peak Hour (ADPM)* |
|---|---|---|---|---|
| ***Base Year - 2019*** | **7,200** | **1,440** | **46** | **7** |
| *Forecast* | | | | |
| *2024* | 7,689 | 1,538 | 50 | 7 |
| *2029* | 8,222 | 1,644 | 53 | 8 |
| *2039* | 9,437 | 1,887 | 61 | 9 |

*Source: FAA TAF, Gale Associates Analysis 2020*

## 4.8 SUMMARY OF FORECASTS

A summary of the recommended forecast for aviation activity for B19 can be found in Table 4-24. This shows projected demand for the 5-, 10-, and 20- year planning periods discussed in Section 4.6.2.4 Recommended Operations Growth Rate. These projections will be used to assess the capacity of existing facilities and determine improvements required to satisfy future activity levels in subsequent chapters of this Master Plan.

**Table 4-24: Summary of Recommended Forecast**

| *Year* | *Itinerant* | | | *Local* | | | |
|---|---|---|---|---|---|---|---|
| | Air Taxi | General Aviation | Military | Civil | Military | Total Operations | Based Aircraft |
| *2024* | 0 | 1,462 | 0 | 6,227 | 0 | 7,689 | 40 |
| *2029* | 0 | 1,447 | 0 | 6,775 | 0 | 8,222 | 42 |
| *2039* | 0 | 1,418 | 0 | 8,019 | 0 | 9,437 | 45 |

*Source: FAA TAF, Gale Associates Analysis 2020*

### 4.8.1 DESIGN AIRCRAFT

As referenced in Chapter 2, all airports are designed according to the dimensions of a "design aircraft", which is the most demanding aircraft type or grouping of aircraft with similar characteristics that make regular use of the Airport. Regular use is a minimum of 500 annual operations, with one operation being either a takeoff or a landing. As part of the Airport's 2005 Master Plan Update, the design aircraft at B19 was identified as the Pilatus PC-12, which was estimated to make between 520 to 600 operations at the Airport each year. According to FAA's Aircraft Characteristics Database, the PC-12 has a wingspan of 53.3 feet, a tail height of 14 feet, and an approach speed of 87 knots. At the time, the characteristics of the PC-12 required that the Airport be designed to A-II standards for all future improvements, consistent with FAA AC 150/5300-13A.

According to discussions with Skydive Coastal Maine, their business operates a 1956 Cessna 182A for all skydive operations, which typically makes a total of 500 flights (1,000 operations) per year on average at B19. The 1956 Cessna 182A has an approach speed of 70-80 knots (Approach Category A), with a wingspan of 39.17 feet (including 3-foot wing extensions) and a tail height of 9 feet (Airplane Design Group I). Further, because the maximum certified takeoff weight of the Cessna 182A is under 12,500 pounds, it is categorized as a "small aircraft". Based on available operational data and discussions with Airport Management and Airport tenants, it appears that the 1956 Cessna 182A is the most demanding aircraft that makes regular use of the airport. Based on this information, it seems that a change from designation as an A-II facility to an A-I facility is warranted at B19 at this time. Additional data that supports a change from an A-II to an A-I facility includes that all based aircraft at B19 are classified as A-I aircraft, and TFMSC operation counts provided by the FAA indicate that over 77 percent of operations recorded by the National Airspace System were performed by category A-I aircraft. Therefore, for the purposes of this Master Plan, the 1956 Cessna 182A will be utilized as the design aircraft for the planning period of 2020-2039.

# CHAPTER 5 – FACILITY REQUIREMENTS

The purpose of this chapter is to determine the improvements required to address capacity shortfalls identified in Chapter 4, *Forecasts of Aviation Demand and Capacity*; security requirements, non-compliant designs, and outdated facility conditions, while considering the needs of airport businesses and the surrounding community. This chapter utilizes FAA Advisory Circular 150/5300-13A, *Airport Design* (AC 150/5300-13A), and other FAA design documents, to determine airfield design requirements and 14 CFR Part 77, *Objects Affecting Navigable Airspace* (Part 77), to identify protected airspace penetrations.

## 5.1 PERMITTING REQUIREMENTS

According to Maine Revised Statutes, Title 38, Chapter 3, §481-490, the State of Maine, in consultation with appropriate state agencies, may control the location of developments to ensure that such developments will have a "minimal adverse impact on the natural environment within the development sites" and "protect the health, safety and general welfare of the people." A "development" includes, among many others, any commercial or industrial development that is a structure as defined in the section. A "structure" means, "buildings, parking lots, roads, paved areas, wharves or areas to be stripped or graded and not to be revegetated that cause a total project to occupy a ground area in excess of 3 acres. Stripped or graded areas that are not revegetated within a calendar year are included in calculating the 3-acre threshold."

Under this section, no development may be constructed without obtaining approval from the Maine Department of Environmental Protection (MaineDEP), and all construction activities must abide by the conditions of the Site Location of Development (SLOD) permit. During the permitting process for the 2020 Runway 06-24 reconstruction, MaineDEP confirmed that any upcoming construction projects resulting in additional impervious surface area would likely trigger the threshold requirements for a SLOD permit. Prior to the implementation of capital improvements, the Airport is advised to coordinate with MaineDEP regarding the need for a SLOD and other applicable permits.

## 5.2 AIRSIDE CAPACITY AND REQUIREMENTS

Airside facilities are those facilities that are accessible to aircraft, and include runways, taxiways, aprons, navigational aids, and airfield lighting systems. Through the planning period, the following facilities will be designed according to the standards of the design aircraft, the Cessna 182A, or a family of aircraft with similar characteristics, which has an approach speed of 70-80 knots, a wingspan of 39.17 feet, and a tail height of 9 feet. The dimensions of the Cessna 182A determine the classification of B19 as Airport Reference Code (ARC) A-I[1], as prescribed by FAA AC 150/5300-13A.

### 5.2.1 RUNWAY CAPACITY

Airfield capacity is defined as the number of airport operations that a particular runway and taxiway configuration is able to accommodate in a given period. This number is typically expressed as annual capacity (or annual service volume, ASV) and hourly capacity (or throughput). FAA AC 150/6050-5, *Airport Capacity and Delay*, utilizes computer models developed by the FAA to evaluate airport capacity and reduce aircraft delay. These models use an airport's ASV to approximate the capacity of the runway, while accounting for differences in runway configuration, fluctuations in aircraft fleet mix, touch and go activity levels, and weather conditions, among other factors.

The FAA models estimate the Airport's ASV capacity to be up to 230,000 operations per year. The Airport's annual operations volume in 2019 was approximately 7,200, and forecasted annual operations are expected to remain around 9,437 through the planning period. Therefore, runway capacity is not an existing problem, nor does it appear that it will be a problem during the planning period. Further, according to FAA requirements, the Airport's runway capacity will be considered adequate until operations reach 60% of its ASV (138,000 annual operations).

**Finding: Runway capacity is currently meeting the needs of the Airport and is anticipated to do so for the duration of the planning period.**

[1] The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

### 5.2.2 RUNWAY REQUIREMENTS

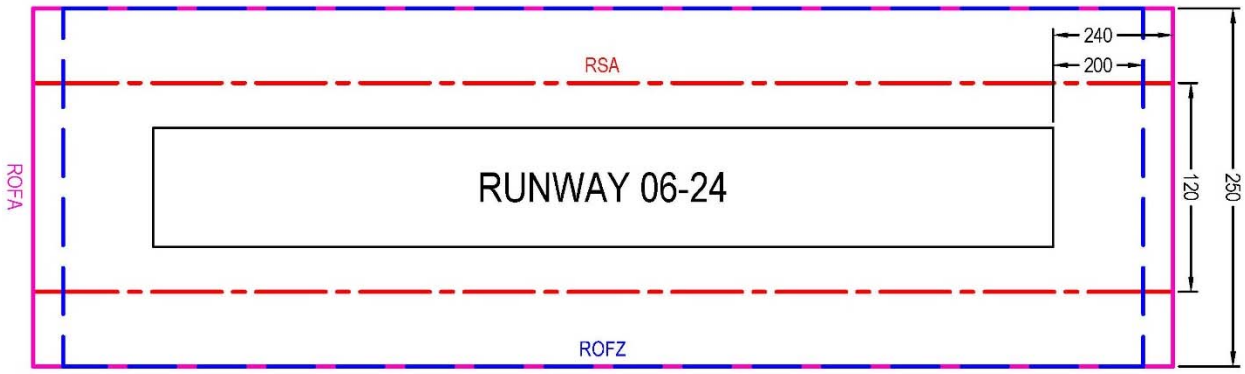
Runway dimensional requirements at B19 are based on the Airport Reference Code of A-I (small aircraft). An outline of B19's compliance with FAA standards can be found in Table 5-1 below:

**Table 5-1: Runway 6-24 Dimensional Requirements**

| Facility | FAA Design Criteria (A-I Small) | Existing RW 06-24 | RW 06-24 Compliance |
|---|---|---|---|
| Runway centerline to holdline | 125' | 125' | Compliant |
| Runway centerline to parallel taxilane centerline | 150' | 215' | Compliant |
| Runway centerline to edge of aircraft parking | 125' | 130' | Compliant |
| Runway Protection Zone:<br>Length<br>Inner width<br>Outer width | <br>1,000'<br>250'<br>450' | <br>1,000'<br>250'<br>450' | Compliant |
| Runway pavement width | 60' | 75' | Compliant |
| Runway safety area width | 120' | 150' | Compliant |
| Runway safety area length beyond runway end | 240' | 300' | Compliant |
| Runway object-free area width | 250' | 250' | Compliant |
| Runway object-free area length beyond runway end | 240' | 240' | Compliant |
| Runway obstacle-free zone width | 250' | 250' | Compliant |
| Runway obstacle-free zone length beyond runway end | 200' | 200' | Compliant |

*Source: AC 150/5300-13A*

**Figure 5-1: Runway 06-24 Protection Areas**




N.T.S.

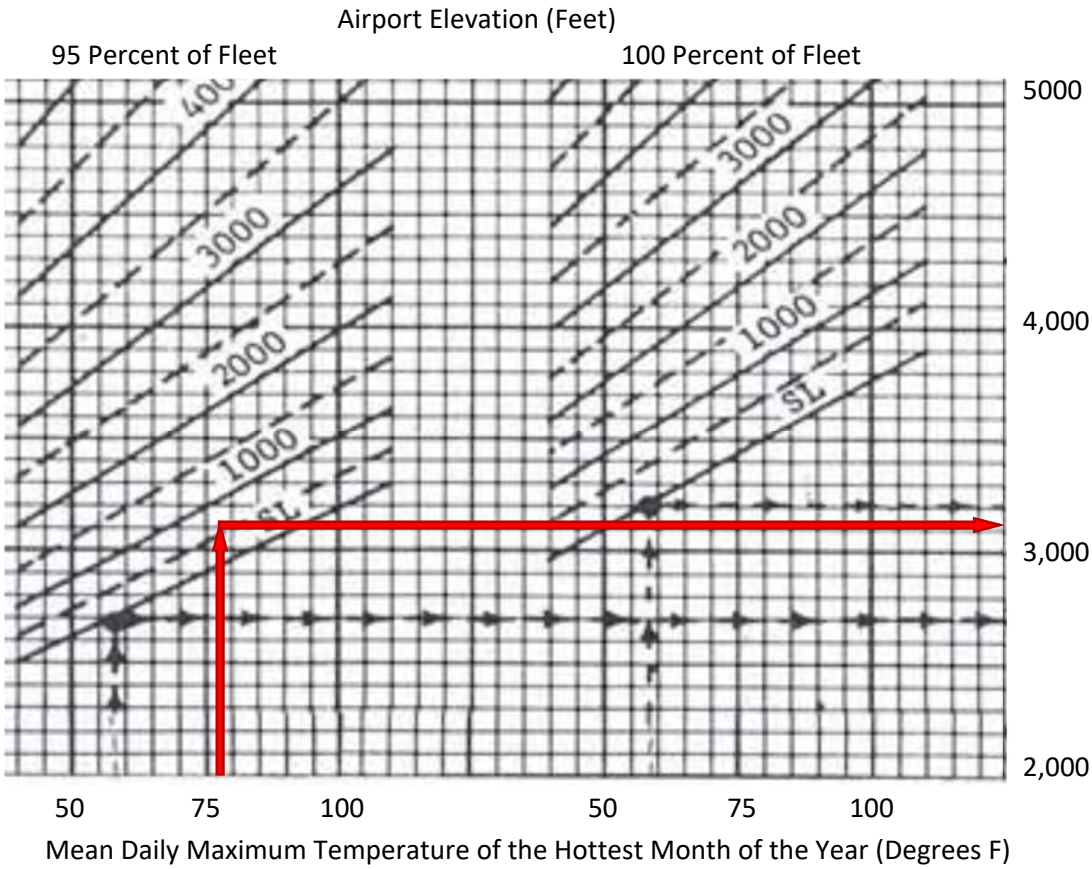
#### *5.2.2.1 Runway Length Requirements*

FAA's runway length design recommendations are contained in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, which utilizes characteristics of an airports' design aircraft and other airport factors to calculate runway length. The factors that determine recommended runway length at B19 are as follows:

- The Cessna 182A is categorized as a small airplane because it has a maximum certified takeoff weight under 12,500 pounds;
- The Cessna 182A has an approach speed between 70 and 80 knots (category A);
- Because B19 is not located in a major metropolitan area or on the fringe of a major metropolitan area, the percentage of fleet at B19 was determined to be 95 percent;
- The mean daily maximum temperature of the hottest month of the year (July) in Biddeford is 79 degrees; and
- The airport elevation is 157 feet above mean sea level.

Using the table provided on Page 7 of AC 150/5325-4B *(Small Airplanes with Fewer than 10 Passenger Seats*), it was concluded that 3,100 feet of runway length is recommended to accommodate the Cessna 182A at B19. See Figure 5-2 below:

**Figure 5-2: Runway Length Calculation for Cessna 182A**




*Source: AC 150/5325-4B, Figure 2.1 Small Airplanes with Fewer than 10 Passenger Seats*

A summary of available runway lengths at B19 is contained in Table 5-2 below:

**Table 5-2: Available Runway Lengths at B19**

| Runway End | Pavement Length (feet) | Threshold Displacement (feet) | Maximum Takeoff Length (feet) | Maximum Landing Length (feet) |
|---|---|---|---|---|
| 06 | 3,001 | None | 3,001 | 3,001 |
| 24 | 3,001 | None | 3,001 | 3,001 |

*Source: Gale Analysis*

**Findings per AC 150/5325-4B: The Airport's existing runway length is 99 feet shorter than the recommendations for small airplanes with fewer than 10 passenger seats. It is important to note that discussions with FAA for the development of this Master Plan indicated that failing to construct additional runway length is not considered a safety concern.**

**Recommendation per AC 150/5325-4B: As funding permits, the Airport should make considerations for a 99-foot runway extension to satisfy the recommendations of AC 150/5325-4B, for a total runway length of 3,100 feet.**

**Findings per AC 150/5300-13A: The recommended length for runways with instrument approach procedures is 3,200 feet per *Table 3-4, Standards for Instrument Approach Procedures*. Though not required to satisfy the Airport's existing non-precision approach, a runway length of 3,200 feet is required to support approaches with vertical guidance[2].**

**Recommendation per AC 150/5300-13A: As funding permits, the Airport should make considerations for a runway extension to 3,200 feet on its Airport Layout Plan for potential long-term development to serve its existing fleet by meeting the minimum runway length recommendations for an approach with vertical guidance in the future.**

#### *5.2.2.2 Runway Approach Requirements*

The following section reviews the adequacy of the airport's approach types and outlines the airport's protected airspace. Currently, the airport has RNAV (GPS), VOR, and Circling approaches to Runway 06. Runway 06-24 is supported by the following navigational/visual/communication aids:

- Runway lighting (MIRLS – Medium Intensity Runway Light System)
- Runway End Identifier Lights (on Runway 06)
- Precision Approach Path Indicator (PAPI) (on Runway 06)
- Airport Rotating Beacon

[2] FAA noted during the development of this Master Plan that vertically guided approaches have been established on runways shorter than 3,200 feet.

FAA airport design guidance defines the following Standards for Instrument Approach Procedures:

**Table 5-3: Standards for Instrument Approach Procedures**

| *Visibility Minimums* | *< ¾ statute mile* | *¾ to < 1 statue mile* | *≥ 1 statute mile non-precision* | *Circling* |
|---|---|---|---|---|
| *Height Above Touchdown Zone* | < 250' | ≥ 250' | **≥ 250'** | ≥ 350' |
| *TERPS Chapter 3, Section 3* | 34:1 clear | 20:1 clear | **20:1 clear, or penetrations lighted for night minimums** | |
| *Precision Obstacle Free Zone* | Required | | **Recommended** | |
| *Minimum Runway Length* | 4,200' (paved) | | **3,200' (paved)*** | |
| *Runway Markings* | Precision | Non-Precision | **Non-Precision** | Visual (Basic) |
| *Holding Position Sign & Markings* | Precision | Non-Precision | **Non-Precision** | Visual (Basic) |
| *Runway Edge Lights* | HIRL/MIRL | HIRL/MIRL | **MIRL/LIRL** | MIRL/LIRL (for night minimums only) |
| *Parallel Taxiway* | Required | Required | **Recommended** | Recommended |
| *Approach Lights* | MALSR, SSALR, or ALSF | Recommended | **Recommended** | Not Required |
| *Airport Layout Plan* | Required | Required | **Required** | Recommended |

*Runway 06 standards identified in **bold**.*
*Source: FAA AC 150/5300-13A, Table 3-4*
**However, runways as short as 2,400 ft could support an instrument approach provided the lowest HATh is based on clearing any 200-ft obstacle within the final approach segment.*

#### *5.2.2.3 FAR Part 77*

The airspace surrounding public use airports is governed by regulations found within 14 Code of Federal Regulations (CFR) Part 77. This regulation is known by its more common title as **14 CFR, Federal Aviation Regulation (FAR) Part 77- Objects Affecting Navigable Airspace** (Part 77), which was promulgated by the FAA, and includes areas around airports (sometimes called Imaginary or Protected Surfaces) that must be kept clear of penetrating objects, called "obstructions". By accepting FAA funding, an airport agrees to make all reasonable efforts to keep its Part 77 protected surfaces clear of obstructions. Part 77 also includes guidance for analysis and marking of penetrating objects in specific cases. Objects are defined by Part 77 as:

*"any object of natural growth, terrain, or permanent or temporary construction or alteration, including equipment and materials used therein, and apparatus of a permanent or temporary character; and*

*alteration of any permanent or temporary existing structure by a change in its height (including appurtenances), or lateral dimensions, including equipment or materials used therein."*

Part 77 specifies the dimensions of imaginary surfaces for each individual airport based on the type and size of aircraft using the facility, the runway surface treatment, as well as the type of navigation and approach aids available to pilots. The following five imaginary surfaces are identified and defined under Part 77: Primary Surface, Approach Surface, Transitional Surface, Horizontal Surface, and Conical Surface.

Figure 5-3 depicts the relationship of these surfaces to a typical runway. Dimensions for each of these surfaces are stipulated in Part 77. Depending upon the application of criteria outlined in the regulation, surface dimensions may vary from runway to runway. The surfaces are defined as follows:

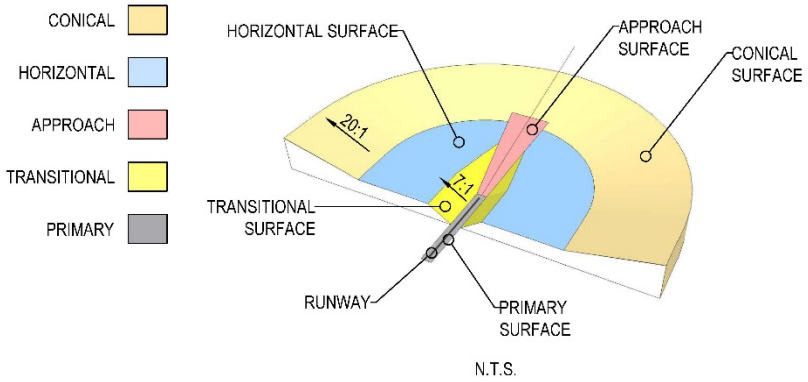



**Figure 5-3 Part 77 Surfaces**

- Primary Surface- A rectangular shaped surface longitudinally centered on the runway centerline with the same elevation as the nearest corresponding point on the runway centerline. The primary surface dimensions will vary depending on the runway approach type and the type of runway surface.
- Approach Surface- A trapezoidal shaped surface centered on the runway centerline and extending outward and upward from each end of the primary surface at a prescribed slope angle. Approach surface dimensions and slope angle will vary according to the runway approach type.
- Transitional Surface- This surface is an inclined plane running parallel to the runway centerline beginning at the edges of the primary and approach surfaces. They then extend upward and outward at a slope of seven feet horizontally for every one foot vertically (7:1) from the sides of the primary and approach surfaces to the horizontal surfaces (150' above the Airport elevation).
- Horizontal Surface- This surface is an oval shaped, horizontal plane established by Part 77 to be 150 feet above the Airport elevation. It is established by swinging arcs from the intersection of the extended runway centerline and primary surface at each end of the runway then closing each area with tangent lines. In areas where the primary, approach, and transitional surfaces may overlap, the surface with the lowest elevation is the controlling surface.

- Conical Surface- This surface extends upward and outward from the edge of the horizontal surface at a slope of twenty feet horizontally for every one foot vertically (20:1) for 4,000 horizontal feet from the edge of the horizontal surface.

The Part 77 surface dimensions and their compliance status for Runway 06-24 at the Airport are shown below in Table 5-4 and on ALP Sheet 7, Part 77 Approach Plan. Clear, as identified below, means that the surface is unobstructed by penetrating objects or that penetrating objects are properly mitigated through FAA approved lighting or other means.

**Table 5-4: Non-Precision Instrument Runway Part 77 Compliance**

| *Protected Surfaces* | | *Dimensions (Non-precision RW 06)* | *Dimensions (Visual RW 24)* | *Compliance* |
|---|---|---|---|---|
| *Primary Surface* | Width | 500 feet | 500 feet | Clear |
| | Length beyond R/W End | 200 feet | 200 feet | |
| *Approach* | | | | Obstructions |
| | Width at Inner end | 500 feet | 500 feet | |
| | Width at Outer end | 2,000 feet | 1,500 feet | |
| | Length | 5,000 feet | 5,000 feet | |
| | Slope | 20:1 | 20:1 | |
| *Transitional surface slope* | | 7:1 | 7:1 | Obstructions |
| *Horizontal surface radius* | | 10,000 feet | 10,000 feet | Unknown |
| *Conical surface* | Slope | 20:1 | 20:1 | Unknown |
| | From Edge of Horizontal Surface | 4,000 feet | 4,000 feet | |

*Source: Federal Regulation Title 14, Part 77, Safe Efficient Use and Preservation of the Navigable Airspace*

According to the FAA Flight Procedures database, obstructions to the 20:1 approach surface to Runway 06 are imposing nighttime restrictions at the Airport. Based on a preliminary investigation using drone photographs and estimated elevations, it appears that the identified obstructions were removed as part of the 2017 Runway 06 tree clearing project and were not updated in the Flight Procedures database at the time. A letter from Airport Management to FAA Flight Procedures dated October 4, 2017 indicates that a survey of the approach was conducted by a licensed surveyor following obstruction removal and that the 20:1 approach to Runway 06 was clear at that time. Consultation with Flight Procedures regarding this issue took place during the development of this Master Plan, and subsequently, a flight

check was scheduled for late fall of 2021 (the earliest available time slot). Based on the results of that survey, Flight Procedures will issue one of the following determinations:

- Satisfactory – This will occur if no obstructions to the 20:1 approach surface are identified at the time of the survey and will result in the re-authorization of nighttime operations by December 2, 2021.
- Satisfactory with changes – This will occur if a small change (e.g., removal of 1 tree) is required at the time of the survey. After the Airport has removed the identified obstruction and confirmed its removal with Flight Procedures, nighttime operations can be restored.
- Unsatisfactory – This will occur if obstructions are identified at the time of the survey and will result in the NA at night restriction remaining in place. Restoration of nighttime operations after an unsatisfactory survey will require removal of identified obstructions and re-scheduling a flight check with Flight Procedures.

The Airport completed an obstruction analysis and Vegetation Management Plan (VMP) in 2007 to identify vegetative obstructions to the Airport's Part 77 surfaces and propose methods for removal and management. The VMP identified obstructions to B19's primary surface, approach surfaces, and transitional surface but did not include obstruction data for the horizonal or conical surfaces. The VMP recommended a combination of tree clearing and lighting to mitigate identified obstructions, including removing all penetrations to the primary and approach surfaces and lighting obstructions to the transitional surfaces. Primary and approach surface obstructions have been removed in accordance with the VMP, as identified above, but obstructions to the Airport's transitional surfaces have not been addressed to date.

The 2007 VMP also recommended management activities to be conducted periodically to maintain previously cleared areas, including:

- Regular mowing of turf areas surrounding the aprons, terminal facilities, and the perimeter of the Runway from May through October.
- Hiring a contractor to brush hog the remainder of the airfield and upland areas every 2-3 years.
- Conducting a biennial survey of wetland areas and performing selective clearing as needed.
- Conducting a field survey of avigation easement areas every 3-5 years and performing selective clearing as needed.

**Recommendation: It is recommended that the Airport consult a professional surveyor to identify any obstructions to the Runway 06 approach surface that might have grown since the time of the 2017 obstruction removal project in advance of the fall 2021 flight check. The Airport should promptly remove any identified obstructions before the flight check takes place.**

**Following certification that the Runway 06-24 approach surfaces are clear, it is recommended that the Airport conduct periodic vegetation management activities in accordance with the VMP to ensure that their protected surfaces remain clear. The Airport should coordinate with FAA and MaineDOT**

**regarding the priority of transitional surface obstruction lighting and obstruction identification and analysis within the horizontal and conical surfaces[3].**

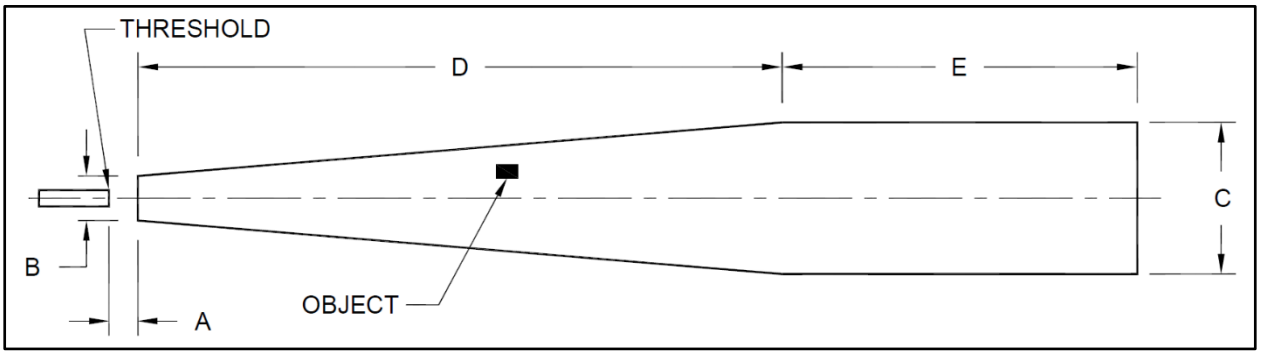
#### *5.2.2.4 Approach/Departure Standards*

AC 150/5300-13A, Table 3-2 Approach/Departure Standards Table, as updated in Engineering Brief No. 99A, contains dimensional standards for approach and departure surfaces according to aircraft categories, approach categories, and instrument minimums. Approach/Departure Standards recommend minimum obstacle clearances considered by the FAA to supply a satisfactory level of vertical protection to aircraft approaching the Airport. These are requirements for enhancing aircraft safety. Table 5-5 shows the Approach/Departure standards for Runway 06-24:

**Table 5-5 Approach/Departure Standards Table**

| | | *Dimensional Standards* | | | | |
|---|---|---|---|---|---|---|
| *Runway Type* | | *Start of Surface (A)* | *Inner Width (B)* | *Outer Width (C)* | Length (D & E) | *Slope* |
| *06* | Line 4 – Approach end of runway expected to accommodate instrument approaches having visibility greater than or equal to ¾ statute mile. | 200’ from runway end | 400’ | 3,400’ | (D)10,000’<br>(E) 0’ | 20:1 |
| *24* | Line 2 – Approach end of runways expected to serve small airplanes with approach speeds of 50 knots or more. (Visual runways only, day/night). | Threshold | 250’ | 700’ | (D) 2,250’<br>(E) 2,750’ | 20:1 |

[3] Following the 2017 Runway 06 clearing and the 2021 Runway 24 clearing projects, both approach surfaces are assumed to be clear. The other Part 77 surfaces (transitional, horizontal, conical) were not analyzed due to budgetary constraints.




*Source: AC 150/5300-13A, Table 3-2 Approach/Departure Standards Table & Figure 3-2 Threshold Siting Based on Approach Slope*

**Recommendation: Maintain the Runway 06-24 approach surfaces so that they remain clear of obstructions by conducting periodic vegetation management in accordance with the methods identified in the VMP.**

#### *5.2.2.5 Runway Pavement Conditions*

According to MaineDOT's 2018 Pavement Condition Index, prior to its reconstruction in 2020, Runway 06-24 was in poor condition, having been last maintained in 1992 with an overlay. Runway 06-24 was reconstructed in place to full depth in the summer of 2020, including compliant Runway Safety Areas.

**Recommendation: Perform maintenance activities (i.e., preservative treatments, crack sealing, etc.) as necessary to preserve the life of newly-constructed pavement.**

### 5.2.3 TAXIWAY CAPACITY

Taxiway capacity calculations are typically computed only at airports where aircraft operational demand levels are very high and have taxiways that cross active runways where a capacity-limiting condition would exist. Since these situations aren't applicable at the Airport, taxiway capacities are considered adequate through the planning period. B19 currently has two stub taxiways – one leads from Runway 06-24 to the Main Apron and the other leads from the Main Apron to the West Apron. B19 does not currently have a parallel taxiway.

According to AC 150/5300-13A, a parallel taxiway is only required for instrument approach procedures with visibility minimums below one mile; however, it is recommended in AC 150/5300-13A for all other conditions. Discussions with FAA for the development of this Master Plan indicated that constructing a full-length parallel taxiway was not justified based on the peak hour operations forecast, which currently estimates 7 operations during the peak hour, with an estimated 9 peak hour operations by 2039. FAA confirmed that a partial parallel taxiway could be a viable solution for accessing a new hangar complex or other facilities, depending upon the location of new facilities on the airfield.

During the development of this Master Plan, the Airport Commission emphasized that a parallel taxiway or a taxiway turnaround/runup area would provide a great benefit and enhance safety for its existing fleet by giving pilots an area to turn around to position for takeoff. A parallel taxiway would also allow

for the removal of the existing stub taxiway, eliminating direct runway-to-apron access. Additionally, the access gate from the airport's parking lot is currently in direct line with the stub taxiway, which could lead to a vehicle inadvertently entering the runway environment. Removal of the stub taxiway would prevent this occurrence as well.

**Recommendation: Though FAA has confirmed that there is no near-term justification for construction of a parallel taxiway at this time, the Airport should evaluate the impacts of constructing a partial parallel taxiway to allow aircraft a safe place to turn around to position for takeoff, eliminate direct apron-to-runway access, and remove the direct line from the vehicle access gate to the runway. It is recommended that a taxiway alternative be included on the Ultimate Airport Layout Plan with the understanding that actual demand must materialize before the project can be implemented.**

#### *5.2.3.1 Taxiway and Taxilane Pavement Conditions*

Table 5-6 below outlines the dimensions, type of pavement, and condition of each taxiway or taxilane.

**Table 5-6: Taxiway and Taxilane Pavements**

| *Taxiway/Taxilane* | *Dimension* | *Type of Pavement* | *Condition* |
|---|---|---|---|
| *Stub Taxiway: Runway to Apron* | 93' x 50' (Approx.) | Flexible | Good[4] |
| *Stub Taxiway: Main Apron to West Apron* | 85' x 45' (Approx.) | Flexible | Poor (PCI 41) |
| *Hangar Row 1 Taxilane* | 690' x 22' (Approx.) | Flexible | Very Poor (PCI 39) |
| *Hangar Row 2 Taxilane* | 670' x 18' (Approx.) | Flexible | Fair (PCI 69) |

*Source: B19 MaineDOT 2018 Pavement Condition Report*

### 5.2.4 APRON CAPACITY

The Airport has two aprons: The Main Apron (approx. 217' x 250') and the West Apron (approx. 238' x 223') , which together can accommodate 26 aircraft. In 2019, the Airport reported 38 based aircraft, of which 34 are stored in hangars. The Airport's based aircraft fleet is projected to increase to 45 aircraft by the end of the planning period in 2039. Assuming that 10 percent of based aircraft will require tie-downs at the end of the planning period, 5 tie-downs will be needed to accommodate them.

Additionally, transient aircraft make use of the parking aprons. Airport operations are anticipated to reach 9,437 by 2039 with 1,418, or 15 percent, being performed by transient aircraft. In order to identify the number of required parking spaces for potential transient aircraft, the formula listed below was used. The formula multiplies the number of operations per peak month (1,887) by the percent of itinerant aircraft operations (15 percent), dividing by the number of days in the month (31), multiplying that number by 100 percent, and dividing by 2, assuming that only half of itinerant operations will require apron space:

[4] Reconstructed as part of 2020 Runway 06-24 Reconstruction

*([{1,887x 15%}/31] x 100)/2*
*= 5 transient parking spaces*

The calculation concluded that 5 transient parking spaces would be needed to accommodate the transient fleet during the planning period. Based upon the calculation, it is reasonable to conclude that the Airport will require 10 tie-down spaces by the end of the planning period. Since, the Airport currently has a total of 26 tie-down spaces between its two aprons, it is assumed that apron space will be adequate through the planning period.

The Main Apron was last reconstructed in 1977, and the West Apron was last reconstructed in 1987. According to MaineDOT's 2018 Pavement Condition Report for B19, the Main Apron and West Apron are both in poor condition with PCI ratings of 42 and 41 respectively.

**Recommendations: Since apron pavements have long exceeded their useful life of 20 years and are in poor condition, the Airport should consider reconstructing the Aprons as funding allows. Timing for the Main Apron reconstruction should be carefully considered due to upcoming 2028 expiration of the Airport's underground fuel storage tank, which is currently located under the Main Apron (see section *5.3.4 Fuel Facility* for details). Removal of some tie-down spaces from the West Apron may be required to accommodate construction of hangars. Apron reconstruction presents a target of opportunity to reconfigure the terminal area to accommodate construction of future facilities, which should be considered during the development and evaluation of alternatives.**

### 5.2.5 HANGAR BUILDINGS

There are currently box 30 hangar buildings on site at B19 with a combined capacity for 34 aircraft. These existing buildings vary in age and are in generally fair condition; however, they are not meeting the Airport's existing demand. Airport management currently has a list of 12 individuals waiting to hangar their aircraft at B19 when additional units become available. Private developers have expressed interest in funding the construction of additional hangar units on airport property as soon as possible. Included in these interested parties is a flight school owner, who hopes to open a branch operation at Biddeford as soon as areas are designated and approved for hangar construction.

**Recommendation: The Airport should designate areas on airport property for the construction of additional hangar units in preparation for the private development of hangars on airport property. Further, it is recommended that the Airport create a "developer's tool kit" outlining federal, state, and local requirements necessary to build additional hangars at the Airport.**

### 5.2.6 NAVIGATIONAL AND APPROACH AIDS

Navigational and approach aids provide pilots with information to assist in locating the Airport and guidance for safely approaching the runway, especially during inclement weather conditions. Navigational and approach aids at B19 include a rotating beacon, two windcones, a precision approach path indicator (PAPI), runway lights, runway end identifier lights (REILS), and taxiway lights. The Airport does not have an Automated Weather Observing System (AWOS) and currently relies on weather information from nearby weather stations. Pilots have reported weather data from other facilities being inaccurate for Biddeford, causing them to turn around due to poor visibility to land at a different facility.

It should be noted that, although AWOS systems are AIP eligible, they are not eligible for discretionary funding, which would require the Airport to save its non-primary entitlements for a number of years before an AWOS system could be implemented. To move this project forward, the City could elect to invest additional local funding for its construction.

A weather camera system could be utilized as an interim or alternative solution to installing an AWOS system. Weather cameras provide pilots with nearly real-time weather condition reporting by updating images from various vantage points on the airfield approximately every ten minutes. This allows pilots to compare images of current conditions against images of ideal weather conditions to determine current visibility.[5]

**Recommendation: Identify a suitable location[6] for the construction of an AWOS at B19 or consider the installation weather cameras as an alternative or interim solution.**

#### *5.2.6.1 Rotating Beacon*

The Airport's rotating beacon, located behind the maintenance hangar, was installed in 2014 and is currently in good condition.

**Recommendation: Provide periodic routine maintenance.**

#### *5.2.6.2 Windcones*

There are two windcones on the airfield – a lighted windcone and segmented circle located southwest of the Main Apron, and a supplemental windcone located approximately 100 feet to the west of the Runway 24 end. Both windcones were installed as part of the 2020 Runway 06-24 reconstruction project and are in new condition.

**Recommendation: Provide periodic routine maintenance.**

#### *5.2.6.3 Precision Approach Path Indicator (PAPI)*

A two-light PAPI was installed on the Runway 06 end as part of the 2020 Runway reconstruction project. The PAPI is FAA-owned and is in new condition.

**Recommendation: Coordinate with FAA as necessary for periodic routine maintenance.**

---

5 https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/fs/alaskan/weather_cams/

6 According to FAA Order 6560.20C, Siting Criteria for Automated Weather Observing Systems, the AWOS wind sensor must be mounted at 30 to 33 feet above the average ground height within a radius of 500 feet, all obstructions must be at least 15 feet lower than the height of the sensor within the 500-foot radius and be at least 10 feet lower than the height of the sensor from 500 to 1,000 feet.

#### *5.2.6.4 Runway End Identifier Lights (REILS)*

The Airport's REILS were installed on the Runway 06 end as part of the 2020 Runway reconstruction project and are in new condition.

**Recommendation: Provide periodic routine maintenance.**

#### *5.2.6.5 Runway Lights*

The Airport's medium intensity runway lights (MIRLs) were installed on the Runway 06 end as part of the 2020 Runway reconstruction project and are in new condition.

**Recommendation: Provide periodic routine maintenance.**

#### *5.2.6.6 Taxiway Lights*

Taxiway lights were installed along the stub taxiway between Runway 06-24 and the Main Apron as part of the 2020 Runway reconstruction project and are in new condition.

**Recommendation: Provide periodic routine maintenance.**

## 5.3 LANDSIDE CAPACITY AND REQUIREMENTS

Airport facilities that are not required for the movement of aircraft are referred to as landside facilities. These facilities usually consist of terminal and maintenance buildings, hangars, and automobile parking areas. This section will provide a review of the capacity and functionality of the Airport's landside facilities.

### 5.3.1 TERMINAL BUILDING

The Airport's terminal building consists of an approximately 1,550 square foot facility containing a pilot lounge, Airport Manager's office, and restrooms, among other facilities. Attached to the terminal building is the Airport's maintenance hangar. According to discussions with airport personnel, this facility was constructed in approximately 1985 and fails to comply with the Americans with Disabilities Act requirements including ramps to the main entrance, width of hallways, and bathrooms. The steel on the outside of the building is beginning to corrode and leaks in the roof are present.

**Recommendation: The Airport should renovate the terminal building to repair corrosion and leaks, and to comply with accessibility requirements in the short-term.**

### 5.3.2 ELECTRICAL VAULTS

There are two electrical vaults on the airfield – one FAA-owned vault, which powers the FAA-owned equipment (PAPIs and REILs), and one Airport-owned vault, which powers the remaining airport facilities, including but not limited to the terminal building, hangar buildings, runway and taxiway lights, and the fuel facility. Both of these vaults were upgraded in 2020 as part of the Runway 06-24 reconstruction project.

**Recommendation: Provide periodic routine maintenance to the Airport-owned vault, and coordinate with FAA as necessary for periodic maintenance of the FAA-owned vault.**

### 5.3.3 AUTOMOBILE PARKING

The Airport's vehicle parking lot, located adjacent to the terminal building, is marked for 14 vehicles. The parking lot is in fair condition and is generally meeting the current needs of the Airport.

**Recommendation: Provide periodic routine maintenance.**

### 5.3.4 FUEL FACILITY

The Airport's 100-LL fuel facility consists of a 10,000-gallon, double-walled underground storage tank, as well as a QTpod service system. The tank is equipped with a leak indicator, which sounds an alarm if moisture is detected between the tank walls. Installed in 1998, the fuel system is in good condition. According to the Underground Oil Storage Tank Annual Inspection Report conducted by the Maine Department of Environmental Protection (Maine DEP) in October 2020, the Airport's underground storage tank (UST) will expire on January 15, 2028. In accordance with 38 M.R.S. §564(5), a tank and its associated piping must be taken out of operation and properly abandoned upon the expiration date of the tank warranty unless the tank, its associated piping and other facility components meet certain requirements,[7] including but not limited to tightness testing and secondary containment system. An extension cannot be pursued until six months before the expiration of the existing tank, or July 15, 2027.

Once the tank reaches expiration, it must be taken out of service and subsequently removed by a certified tank installer within 60 days. Under existing regulations, a replacement tank may be installed in the location of the expired tank. Though Maine DEP does not have any specific regulations for distance between an underground tank and a building, they do require that the tank be installed in a location that does not hinder the safe removal of the tank in the future. Additionally, National Fire Protection Code 30A specifies that fuel dispensing systems installed outside at motor fuel dispensing stations must be located 10 feet or more from property lines, 10 or more feet from buildings having combustible exterior wall surfaces or buildings having noncombustible exterior wall surfaces that are not a part of a 1 hour fire-resistive assembly, and such that the nozzle, when the hose is fully extended, will not reach within 5 feet of building openings. Coordination and consultation with Maine DEP, The City of Biddeford's Code Enforcement Office, and the Maine Fire Marshall should be conducted in advance of tank replacement.

The Airport does not currently offer jet fuel, and the Commission feels that the lack of jet fuel is limiting the Airport's ability to serve potential customers. The Commission would like to consider constructing a facility over the planning period.

**Recommendation: The Airport should explore alternative locations for constructing an aboveground fuel facility. The existing 100-LL fuel tank should be replaced or relocated in advance of the UST expiration date, prior to the reconstruction of the Main Apron. Reconstruction of the Main Apron is currently on the Airport's CIP for FY-2023. An aboveground fuel facility should be sited in a location that will allow for the addition of Jet-A fuel as demand warrants in the future.**

[7] Maine Department of Environmental Protection, Chapter 691: Rules for Underground Oil Storage Facilities

## 5.4 SUPPORT FACILITY CAPACITY AND REQUIREMENTS

Support facilities are thosethat assist the airport in maintaining efficient operations. Support facilities at B19 include snow removal equipment (SRE) and security fencing, which must be maintained and upgraded as needed to sustain efficient day-to-day operations.

### 5.4.1 FENCING AND GATES

Fencing at B19 consists of approximately 1,500 LF of 8-foot-high chain link fencing, including two motorized slide gates and one vehicle pedestrian gate, running from the terminal area to the hangar complex. This fencing was constructed in 2014 and is in good condition.

According to discussions with the Airport Commission and Airport personnel, wildlife incursions by deer and other mammals is an ongoing issue at the Airport. A Wildlife Hazard Site Visit was conducted on May 13, 2021, for the purposes of documenting direct observations and evidence of wildlife present on or around the Airport. The Wildlife Hazard Report (WHR)[8] confirmed presence of several bird and mammal species on the airfield and noted that of all species detected at the Airport, the two species of highest concern included white-tailed deer and domestic dogs. According to the WHR, the most effective method for preventing these species (and other large-bodied mammals) from entering the airfield is through construction and maintenance of perimeter fencing.

In addition to known wildlife concerns, there is a consistent history of trespassing taking place on airport property. This creates a safety hazard to pilots and individuals accessing the airfield without permission, as well as a security risk to public and private property.

**Recommendation: Construct perimeter fencing as necessary.**

### 5.4.2 SNOW REMOVAL EQUIPMENT

The Airport's existing SRE was purchased in 2004 and consists of a John Deere loader with 3-yard snow bucket, 14-foot snow blade, snow blower, and snow basket and is currently in good condition. Snow removal of priority areas at B19 is completed by airport personnel following each weather event.

Advisory Circular 150/5200-30D defines the Priority 1 clearance areas as those that directly contribute to safety and re-establishment of aircraft operations at a minimum acceptable level of service. For B19, this includes Runway 06-24, the stub taxiway leading from Runway 06-24 to the Main Apron, and the Main Apron. Together, these areas account for approximately 280,000 square feet of pavement.

Per Advisory Circular 150/5220-20A, Table 2-2, a noncommercial service airport with fewer than 10,000 annual operations, and greater than 30 inches of annual snowfall, is eligible for one high-speed rotary plow supported by two snow plows. The Airport is eligible for two carrier vehicles – one for a rotary plow and one for a displacement plow.

**Recommendation: Though the Airport's equipment is in working condition, it has exceeded its 10-year useful life. The Airport should maintain existing equipment and replace as funding allows, and consider purchasing a second carrier vehicle as necessary and as funding permits.**

[8] A copy of the Wildlife Hazard Report is included in Appendix A

### 5.4.3 SNOW REMOVAL EQUIPMENT STORAGE BUILDING

Snow removal equipment buildings are intended to protect AIP-funded snow removal equipment and materials. The Airport does not currently have a snow removal equipment building and stores its equipment in the hangar building adjacent to the West Apron. Funding snow and ice control buildings is limited to space in the building necessary for eligible Snow Removal Equipment as well as storing chemicals used in treatment of paved areas. FAA AC 150/5220-18A, Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials, provides recommendations for equipment storage based on the number and type of equipment comprising the fleet. According to the AIP Handbook (FAA Order 5100.38D), all space other than what is required to store eligible equipment must be paid for by the sponsor.

For airports that are not 14 CFR part 139 certificated airports and are only eligible for one snow removal carrier vehicle, it is FAA policy that a 1,600 square foot SRE building is eligible. In the instance where two vehicles are eligible, a 2000 square foot SRE building is eligible [9]

**Recommendation: Construct a snow removal equipment building as funding allows.**

### 5.4.4 SKYDIVING LANDING ZONE

The Airport's skydiving operation, Skydive Coastal Maine (SCM), currently utilizes the vacant area adjacent to the existing hangar complex as its drop zone. The location is clearly identified by the coordinates marked in red in Figure 5-4 below:

**Figure 5-4: SCM Skydiving Landing Zone**


SCM takes the safety of its customers and fellow airport users very seriously. Safety protocols include escorting all customers to and from the administration building before and after their dives. All

[9] FAA Order 5100.38D, AIP Handbook, Table O-3, Item c.(9)

customers meet the instructors inside of the administration building in advance of their jump, and no customer is permitted to enter the airfield or cross movement areas without an escort.

**Recommendation: Identify alternative locations for the skydiving landing zone as additional facilities are constructed.**

# CHAPTER 6 – DEVELOPMENT AND EVALUATION OF ALTERNATIVES

Chapter 5 identified various facility requirements necessary to meet the Airport's needs through the planning period. This chapter explores alternative ways to implement facility requirements identified in Chapter 5 while considering the operational, environmental, security, and financial impacts presented in previous chapters.

## 6.1 METHODOLOGY

This chapter presents alternative development scenarios for airside, landside, and support facilities for consideration. Included in each alternative is a no-build scenario to identify the operational, environmental, security, and financial impacts of leaving the Airport in its current configuration and as a baseline upon which to compare relevant alternatives. These improvements include an extension to Runway 06-24, parallel taxiway construction, hangar construction, AWOS construction, fuel farm relocation and construction, perimeter fencing construction, SRE building construction, and apron reconfiguration. Recommended alternatives selected by the Airport Commission for each facility evaluation are then identified and incorporated as part of the Ultimate Airport Layout Plan.

## 6.2 ENVIRONMENTAL

Permitting costs associated with each development scenario described will vary drastically depending on the type of project(s) pursued, size of impact, location, and resources affected. Therefore, permitting costs need to be addressed on an individual project basis as the Airport develops. This includes coordination with federal, state, and local agencies responsible for oversight of natural and cultural resources (U.S. Fish and Wildlife Service, Maine Department of Environmental Protection, Maine Department of Inland Fisheries and Wildlife, U.S. Army Corps of Engineers, and Maine Historic Preservation Commission, etc.) to better understand each project's requirements, and in some cases achieve a reduction in permitting requirements, particularly for projects that are safety related.

Any alternative improvement that has an impact on natural (wetlands, rare species, etc.) or cultural resources (archaeological, historic, architecture, etc.) will likely require an Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA). Typically, following the completion and approval of an AMPU and ALP, an EA is completed for most, if not all, improvements shown on the ALP.

## 6.3 RUNWAY EXTENSION ALTERNATIVES

Runway 06-24 is currently 3,001 feet long by 75 feet wide. According to AC 150-5325-4B, *Runway Length Requirements for Airport Design*, the recommended runway length at B19 for airplanes with fewer than 10 passenger seats is 3,100 feet, and AC 150/5300-13A, *Airport Design*, the required minimum runway length for non-precision instrument approach procedures with vertical guidance is 3,200 feet. This section provides a no-action alternative to explore the impact of leaving the Airport in its current condition, as well as one alternative exploring how the airport can achieve a runway length of 3,200 feet.

### 6.3.1 NO ACTION RUNWAY EXTENSION IMPACTS

This section explores the impacts of maintaining Runway 06-24 at its current runway length of 3,001 feet. The purpose of this section is to identify deficiencies and benefits associated with maintaining the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- The Airport's takeoff distance available (TODA) and landing distance available (LDA) remain limited to 3,001 feet.
- The Airport continues to lack the runway length recommended in FAA AC 150/5300-13A for non-precision approaches.
- The Airport continues to lack the runway length recommended in FAA AC 150/5300-13A to support Instrument Flight Rule (IFR) operations for vertically guided approaches. According to AC 150-5300/13A, Chapter 2, Section 205.b.(3), runways with vertically guided approaches "must be at least 3,200 feet in length." Though the AC recommends 3,200 feet of runway length for vertically guided approaches, LPV approaches have been published at airports with less than 3,200 feet of runway length.
- The Airport may be limited to non-precision approach procedures with lateral guidance only due to its limited runway length.
- The Airport's runway length remains 99 feet shorter than prescribed for small airplanes with fewer than 10 passenger seats, per AC 150/5325-4B.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.

### 6.3.2 ALTERNATIVE 1 – CONSTRUCT RUNWAY 06 END EXTENSION AND RSA TO ACHIEVE 3,200 FEET

This section explores the impacts of constructing an additional 199 feet of runway length on the Runway 06 end, with compliant Runway Safety Area, to achieve a total runway length of 3,200 feet. For a graphic representation of this project, refer to Figure 6-1.1.

Operational impacts:

- The Airport's takeoff distance available (TODA) increases from 3,001 feet to 3,200 feet for each runway end.
- Will require shifting the existing Runway 06 end Safety Area by 139 feet to achieve required RSA of 240 feet beyond runway end.
- The Airport's landing distance available (LDA) increases from 3,001 feet on the Runway 24 end to 3,200 feet.
- The Airport's landing distance available (LDA) increases from 3,001 feet on the 06 end to 3,200 feet, though tree clearing within the Runway 06 approach may be required and would need to be confirmed via an obstruction analysis, which is outside the scope of this Master Plan.
- It is recommended that an obstruction analysis be conducted to determine if there are any impediments (i.e., trees) that would be required to be removed or if any additional easements are necessary.
- The Airport will comply with runway length recommendations contained in AC 150/5300-13A and AC 150/5325-4B.
- The Airport may meet the runway length requirements for an upgraded approach procedure with vertical guidance (e.g., LPV).

Environmental Impacts:

- Approximately 18,200 square feet of wetland impacts.
- Approximately 14,900 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

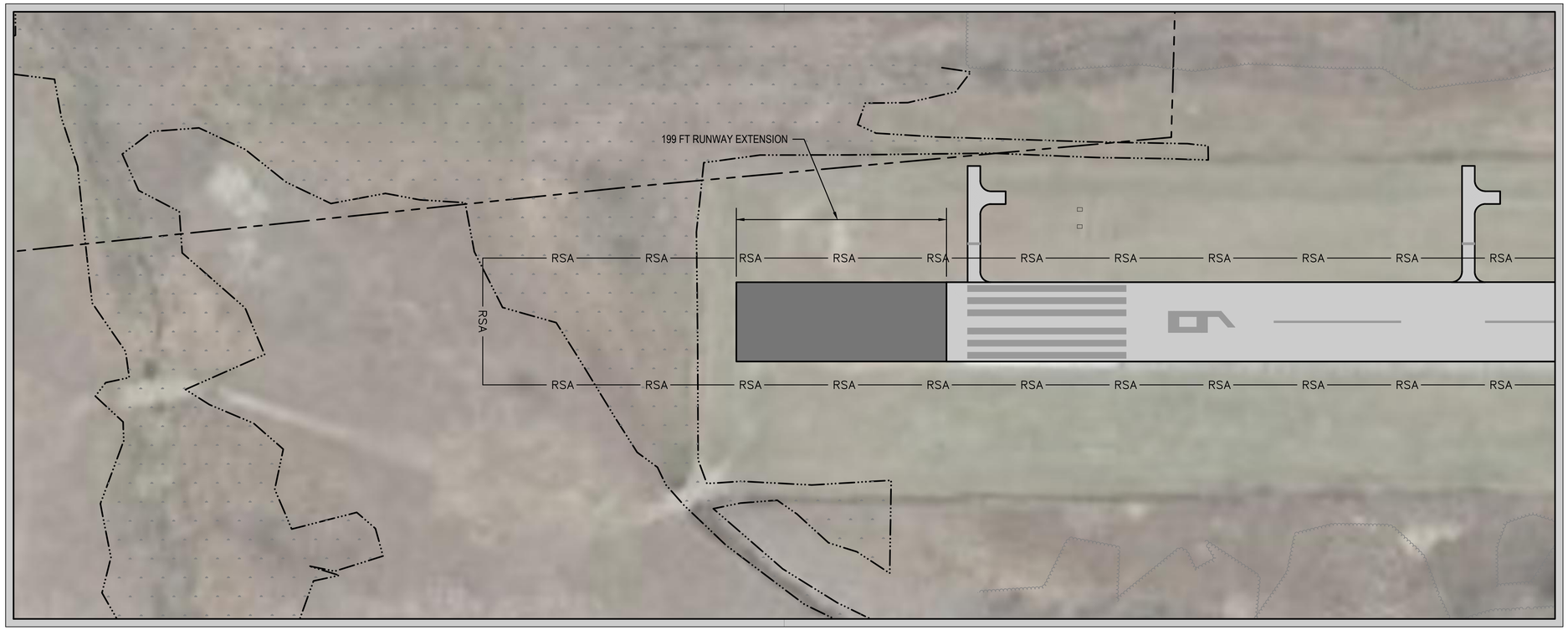
- Estimated cost: $515,000

**Table 6-1: Runway Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Runway 06 Extension* |
|---|---|---|
| *Operational Impacts* | • 06 TODA 3,001 feet<br>• 24 TODA 3,001 feet<br>• 06 LDA 3,001 feet<br>• 24 LDA 3,001 feet<br>• Though not an FAA requirement, this alternative does not meet runway length recommendations of AC 150/5300-13A for non-precision or vertically guided approaches<br>• Does not meet runway length recommendations for design aircraft per AC 150/5325-4B | • 06 TODA 3,200 feet<br>• 24 TODA 3,200 feet<br>• 06 LDA 3,200 feet (tree clearing likely necessary)<br>• 24 LDA 3,200 feet<br>• Meets recommendations of AC 150/5300-13A and AC 150/5325-4B<br>• RSA shift required (139 feet) |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • Approx. 18,200 SF of wetland impacts<br>• Approx. 14,900 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • None | • Obstruction survey to determine additional easements and tree clearing |
| *Cost* | $0.00 | $515,000[1] |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 1 – Construct Runway 06 Extension and RSA to Achieve 3,200 Feet.**

[1] Construction of extension only. Does not include costs to obtain additional easements or conduct tree clearing in the Runway 06 approach.




## RUNWAY - ALTERNATIVE 1

SCALE: 1" = 60'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| RUNWAY SAFETY AREA (RSA) | RSA | |
| PAVEMENT | | |
| WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.
2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.
3) THIS ALTERNATIVE INVOLVES EXTENDING THE RUNWAY 6 END TO 3,200 FT AND MOVING THE RSA ACCORDINGLY.

NORTH

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-RUNWAY EXT |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 60' |

GRAPHIC SCALE
0 30 60 120

SHEET TITLE
RUNWAY EXTENSION ALTERNATIVES

DRAWING NO.
FIG 6-1.1

OF

## 6.4 TAXIWAY ALTERNATIVES

The Airport Commission would like to make considerations for a partial parallel taxiway to enhance safety, especially during low visibility, by providing landing aircraft with a safe place to exit the runway, removing direct apron-to-runway access, improving access from the hangar complex to the Runway 24 end, and reducing traffic across the Main Apron. AC 150/5300-13A, *Airport Design*, recommends a parallel taxiway for all approach procedures and requires a parallel taxiway for approaches with visibility minimums below one mile. This section presents a no-action alternative to explore the impacts of leaving the Airport in its current condition, as well as an alternative that explores constructing a partial parallel taxiway at midfield.

### 6.4.1 NO ACTION TAXIWAY IMPACTS

This section explores the impacts of failing to construct a partial parallel taxiway area at the Airport. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- Existing stub taxiway continues to provide direct access from the Main Apron to Runway 06-24, posing a runway incursion safety risk.
- Access gate remains in direct line with stub taxiway to Runway 06-24, which could lead to an vehicle inadvertently entering the runway environment.
- Does not provide an efficient route from the hangar complex to Runway 06-24, requiring all hangar tenants to cross the Main Apron in order to reach their hangars.
- Without a parallel taxiway, the Airport may be limited to visibility minimums greater than one mile.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.

### 6.4.2 ALTERNATIVE 1 – CONSTRUCT PARTIAL PARALLEL TAXIWAY AT MIDFIELD

This section explores the impacts of constructing a partial parallel taxiway running from the west side of the West Apron to the east side of the existing hangar complex. This alternative will eliminate the existing non-compliant stub taxiway from Runway 06-24 to the Main Apron. For a graphic representation of this project, refer to Figure 6-2.1.

Operational impacts:

- Direct runway-to-apron access is eliminated.
- Access gate is no longer in direct line with Runway 06-24 stub taxiway.
- Enhances safety by requiring two, 90-degree turns to access Runway 06-24.
- Provides an efficient route from the hangar complex to Runway 06-24, diverting hangar tenants away from the Main Apron in order to reach their hangars.
- Opens up the potential for the Airport to pursue an approach with visibility minimums lower than one mile in the future.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- Approximately 26,200[2] square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or considerations:

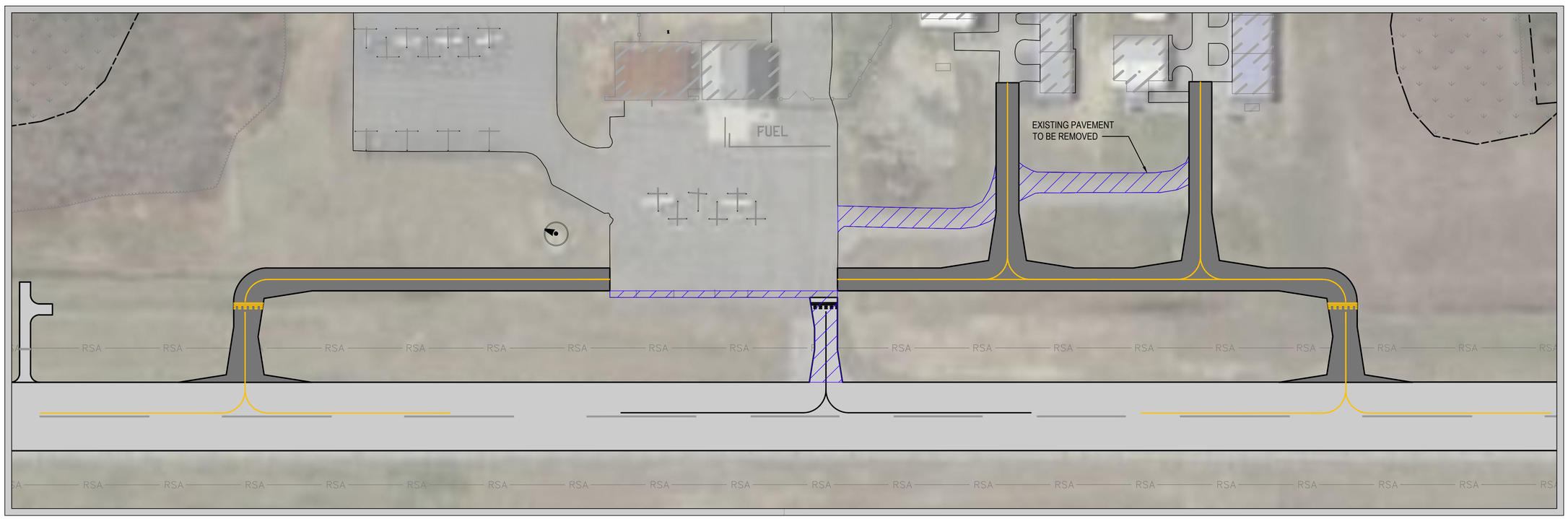
- Requires relocation of existing windcone.
- Estimated cost: $1.9M - $2.1M

[2] Includes newly constructed pavement, minus pavement to be removed.

**Table 6-2: Taxiway Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Partial Parallel Taxiway* |
|---|---|---|
| *Operational Impacts* | • Direct apron-to-runway access<br>• Access gate in direct line with Runway 06-24<br>• Hangar tenants continue to cross main apron to access hangars<br>• Does not meet taxiway recommendations for a reduction in visibility minimums | • Direct apron-to-runway access eliminated<br>• Access gate no longer in direct line with Runway 06-24<br>• Hangar tenants no longer required to cross Main Apron to access hangars<br>• Meets taxiway recommendations for a potential reduction to visibility minimums |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • No anticipated wetland impacts<br>• Approx. 26,200 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • None | • Relocation of windcone required |
| *Cost* | $0.00 | $1.9M - $2.1M |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 1 – Construct Partial Parallel Taxiway at Midfield.**




## TAXIWAY - ALTERNATIVE 1

SCALE: 1" = 60'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

GALE

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-TAXIWAY |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 60' |

GRAPHIC SCALE
0 30 60 120

SHEET TITLE
TAXIWAY ALTERNATIVES

DRAWING NO.
FIG 6-2.1

OF

## 6.5 HANGAR BUILDING ALTERNATIVES

The Airport's hangar buildings are currently at capacity, with a list of 12 individuals waiting to hangar their aircraft at Biddeford as additional units become available. Additionally, there are two business owners – one flight school owner and one helicopter sightseeing company owner – wishing to expand their business to Biddeford. This section presents a no-action alternative to explore the impacts of leaving the Airport in its current condition, as well as two alternatives for the construction of additional hangar units.

### 6.5.1 NO ACTION HANGAR IMPACTS

This section explores the impacts of failing to construct additional hangar facilities to address capacity needs. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- The Airport continues to lack the adequate infrastructure to fulfill existing demand for hangar units.
- The Airport continues to lack adequate space to accommodate additional airfield businesses.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.
- Revenue remains limited to that generated from existing hangar units.

### 6.5.2 ALTERNATIVE 1 – CONSTRUCT HANGARS ADJACENT TO EXISTING HANGAR COMPLEX

This project is for the construction of 5 box hangar units and 13 T-hangar units in the area of the existing hangar complex, including taxilane reconfiguration. For a graphic representation of this project, refer to Figure 6-3.1.

Operational Impacts:

- This alternative constructs 18 additional hangar units.

Environmental Impacts:

- Approximately 19,900 square feet of wetland impacts.
- Approximately 14,500[3] square feet of additional impervious surface.
- No vegetation clearing required to prepare the project area.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

- Requires geotechnical investigation of project area to confirm suitable soils.
- Construction of hangar buildings provides additional revenue for the Airport.
- Construction of hangar buildings increases the number of based aircraft at the Airport, resulting in potential increases in fuel sales and community economic contributions.
- It is assumed that hangar buildings will be constructed by private developers and that the Airport will incur no costs associated with building construction.

[3] Includes newly constructed pavement, minus pavement to be removed.

### 6.5.3 ALTERNATIVE 2 – RESERVE WEST APRON FOR FUTURE T-HANGAR OR TIE-DOWN DEVELOPMENT

This project is for the reservation of the West Apron for future T-Hangar or tie-down development. For a graphic representation of this project, refer to Figure 6-3.1.

Operational Impacts:

- This alternative allows the airport to construct additional hangar units or reconfigured tie-down spaces as demand warrants.
- This alternative has the potential to require the removal of existing tie-down spaces if hangar units are constructed in the area.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- No additional impervious surface as a result of this alternative.
- No vegetation clearing required for this alternative.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

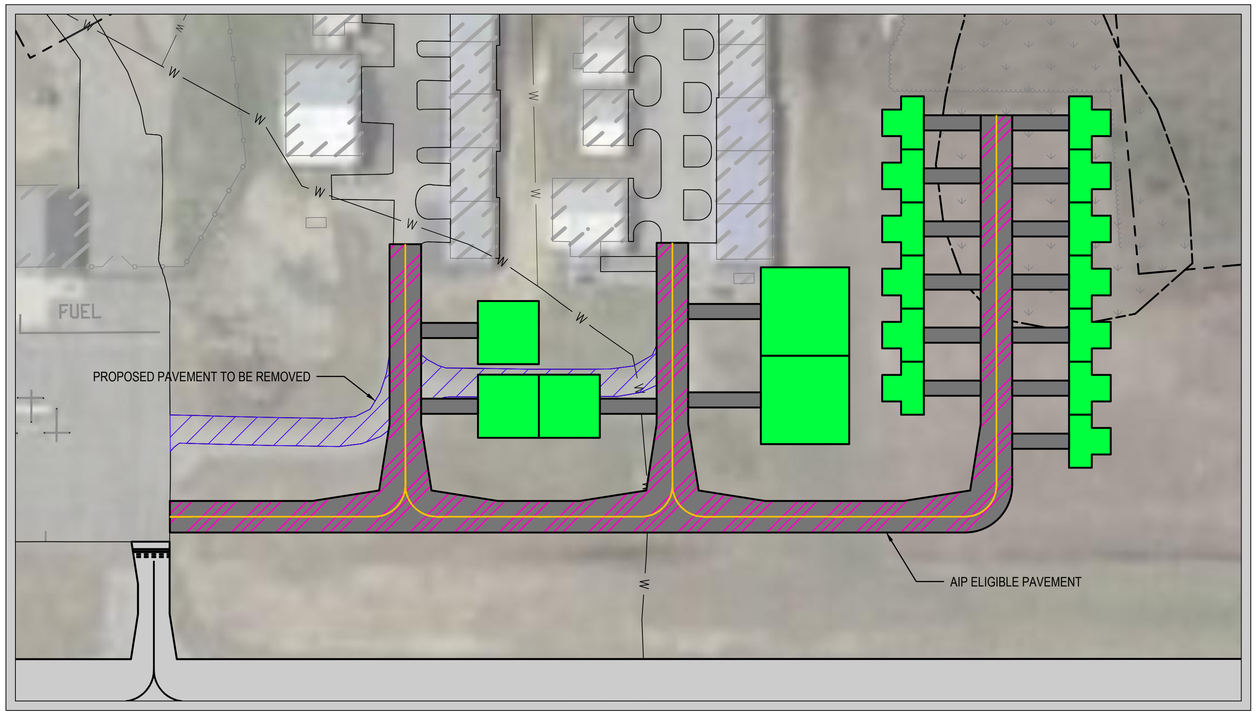
Other impacts or Considerations:

- Construction of hangar units provides additional revenue for the Airport.
- It is assumed that hangar buildings will be constructed by private developers and that the Airport will incur no costs associated with building construction.

**Table 6-3: Hangar Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1 Adjacent to Existing Hangar Complex* | *Alternative 2 Reservation of West Apron* |
|---|---|---|---|
| *Operational Impacts* | • Does not meet hangar demand<br>• Does not accommodate additional businesses | • 18 additional hangar units | • Allows the airport to construct hangar units or tie-down spaces<br>• Removal of tie-downs required if hangars are constructed |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • Approx. 19,900 SF of wetland impacts<br>• No tree clearing<br>• Approx. 14,500 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE | • No anticipated wetland impacts<br>• No tree clearing<br>• No additional impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • No additional revenue from hangar leases | • Geotechnical investigation<br>• Additional rental revenue<br>• Potential increased fuel sales<br>• Community economic contributions | • Additional rental revenue<br>• Potential increased fuel sales |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 1 – Construct Hangars Adjacent to Existing Hangar Complex and Alternative 2 – Reservation of West Apron for Future T-Hangar or Tie-Down Development.**




HANGAR - ALTERNATIVE 1

SCALE: 1" = 60'


HANGAR - ALTERNATIVE 2

SCALE: 1" = 40'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| DELINEATED WETLAND[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |
| WATER LINE | W | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

3) ALTERNATIVE 1 LARGE HANGAR SIZES BASED ON CONCEPTUAL DRAWINGS SENT TO THE AIRPORT BY AN INTERESTED BUILDER. (70' x 70')

NORTH

GALE

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNCIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-HANGAR |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | AS SHOWN |

GRAPHIC SCALE

SHEET TITLE

HANGAR ALTERNATIVES

DRAWING NO.

FIG 6-3.1

OF

## 6.6 AUTOMATED WEATHER OBSERVING SYSTEMS (AWOS) ALTERNATIVES

The Airport currently does not have an Automated Weather Observing System (AWOS) on site and instead relies on weather data from Portland and/or Sanford. This section provides a no-action alternative to explore the impact of leaving the Airport in its current condition, as well as two alternatives, one showing the impacts of constructing an AWOS on airport property and the other exploring the installation of a weather camera system.

### 6.6.1 NO ACTION AWOS IMPACTS

This section explores the impacts of failing to construct an Automated Weather Observing System (AWOS) or weather monitoring cameras to provide local weather information to pilots flying into Biddeford. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- The Airport continues to utilize weather data from nearby Airports.
- Pilots run the risk of arriving at Biddeford during low visibility due to inaccurate weather reporting, requiring them to turn around and land at a different facility.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.

### 6.6.2 ALTERNATIVE 1 – CONSTRUCT AWOS ADJACENT TO WEST APRON

This section explores the impacts of constructing an AWOS in the vacant area adjacent to the West Apron. For a graphic representation of this project, refer to Figure 6-4.1. According to FAA Order 6560.20C, Siting Criteria for Automated Weather Observing Systems, preferred siting of the cloud height, visibility and wind sensors for airports with only visual and/or non-precision runways is as follows:

- Adjacent to the primary runway 1,000 to 3,000 feet down runway from the threshold.
- Minimum distance perpendicular from the runway centerline must be 500 feet but must not exceed 1,000 feet (assumes flat terrain with adjustments by 7 feet for every foot of elevation difference).
- Alternate locations may be accepted if the preferred siting proves to be unnecessarily restrictive.

Additional preferred siting for wind sensors, as provided in Order 6560.20C, is as follows:

- Sensor must be mounted at 30 to 33 feet above the average ground height within a radius of 500 feet.
- Within the immediate 500-foot radius, all obstructions (vegetation, buildings, etc.) must be at least 15 feet lower than the height of the sensor.
- Within the 500- to 1,000-foot radius, all obstructions (vegetation, buildings, etc.) must be at least 10 feet lower than the height of the sensor.
- If difficult to achieve, a less desirable location may have to be selected; however, the sensor must demonstrate that accurate and reliable information is being provided. If the wind information is not accurate and reliable then resolution, including relocating or turning off the sensors, may be required.

AIP Project Requirements for AWOS III or Better:

- Notification to and concurrence from Service Center Non-Federal Program Implementation Manager (PIM) required.
- Discrete frequency may be required (i.e., may not be allowed to transmit over existing UNICOM frequency).

Table 6-4 below provides a comparison of the certified data provided by AWOS II vs. AWOS III systems:

**Table 6-4: Comparison of AWOS II vs. AWOS III Weather Data**

| *System* | *AWOS II* | *AWOS III* |
|---|---|---|
| *Weather Data* | • Wind Speed<br>• Wind direction<br>• Wind gust<br>• Variable wind direction<br>• Temperature<br>• Dew point<br>• Altimeter setting<br>• Density altitude<br>• Visibility<br>• Variable visibility | • Wind Speed<br>• Wind direction<br>• Wind gust<br>• Variable wind direction<br>• Temperature<br>• Dew point<br>• Altimeter setting<br>• Density altitude<br>• Visibility<br>• Variable visibility<br>• **Precipitation accumulation**<br>• **Cloud height**<br>• **Sky condition** |

*Source: FAA List of Certified Non-Federal AWOS Systems and Manufacturers as of August 26, 2020*

Operational impacts:

- The Airport is able to provide accurate weather data, including local wind speed, wind direction, wind gusts, variable wind direction, temperature, dew point, altimeter setting, and density altitude, to pilots flying into Biddeford.
- An AWOS has the potential to provide the Airport with a decrease in its IFR minimum ceiling requirement.

Environmental Impacts:

- Substantial tree clearing may be necessary to comply with sensor siting recommendations. Approximately 10.7 AC of trees are located on airport property within the 500-foot radius and the 500-1,000-foot radius.[4]
- Temporary wetland impacts due to tree clearing may be necessary. Approximately 2.9 AC of vegetation referenced above is located within wetlands on Airport property.
- Approximately 100 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.

[4] If this alternative is selected, coordination with FAA to determine the extent of vegetation clearing will be necessary.

- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or considerations:

- Estimated cost: $600,000
- AIP funding limited to non-primary entitlements.
- Due to land restrictions, an AWOS must be sited in a location considered be less desirable than what is recommended by siting requirements. This is allowed; however, it must be demonstrated that the sensors are capturing accurate and reliable data. If this cannot be demonstrated, resolution (including relocating or turning off the sensors) may be required.

### 6.6.3 ALTERNATIVE 2 – INSTALL WEATHER MONITORING CAMERAS

This section explores the impacts of installing weather monitoring cameras at the Airport in place of an AWOS system.

Operational impacts:

- The Airport is able to provide pilots with nearly real-time photos of weather conditions on the airfield for comparison against ideal weather condition photos, allowing pilots to make determinations about current visibility.
- Does not provide local wind speed, wind direction, wind gusts, variable wind direction, temperature, dew point, altimeter setting, or density altitude.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- No additional impervious surface.
- No permits required.

Other impacts or considerations:

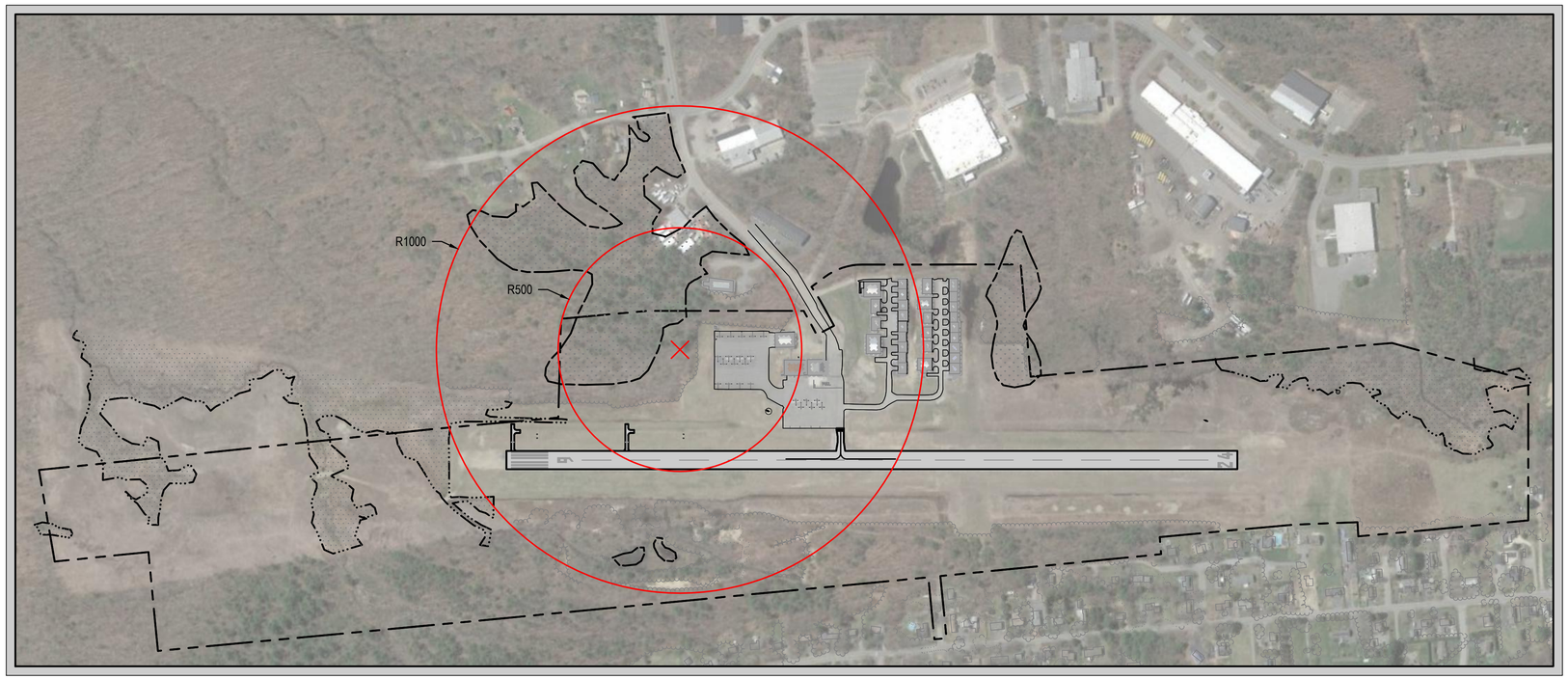
- Estimated cost: Approximately $20,000[5]
- Installation can take as little as a few weeks, if the Airport has already prepared a place (e.g., pole) to install the cameras.
- Not AIP eligible; however, will not tie-up nonprimary entitlement funding.

[5] Estimate from FAA Weather Camera Office meeting July 15, 2021

**Table 6-5: AWOS Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Construct AWOS* | *Alternative 2*<br>*Install Weather Cameras* |
|---|---|---|---|
| *Operational Impacts* | • Continued use of weather data from other airports<br>• Risk of turnarounds due to inaccurate weather data | • Accurate local weather data available to pilots<br>• Potential reduction in IFR ceiling minimum | • Real-time photos of weather conditions<br>• Local weather details (e.g., wind speed, wind direction, visibility, etc.) not provided<br>• Does not allow for reduction in ceiling minimums |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • Coordination with FAA to determine extent of vegetation clearing required:<br>o 10.7 AC vegetation within critical areas on Airport property<br>o 2.9 AC of vegetation located in wetlands<br>• Approx. 100 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE | • No anticipated wetland impacts<br>• No tree clearing required<br>• No impervious surface<br>• No permits required |
| *Other Impacts* | • None | • AIP funding limited to non-primary entitlements<br>• Siting according to FAA Order 6560.20C not possible<br>• Must demonstrate accurate and reliable data or relocation/turning off the sensor may be required | • Not AIP eligible<br>• Will not tie up NPE<br>• Lead time for installation as little as a few weeks |
| *Cost* | $0.00 | $600,000 | $20,000 |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 2 – Install Weather Monitoring Cameras.**




## AWOS - ALTERNATIVE 1

SCALE: 1" = 300'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| DELINEATED WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| PROPOSED AWOS LOCATION | | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

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| PROJECT NO. | 777092 |
| CADD FILE | ALT-AWOS |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 300' |

GRAPHIC SCALE
0 150 300 600

SHEET TITLE
AWOS ALTERNATIVES

DRAWING NO.
FIG 6-4.1

OF

## 6.7 FUEL FARM ALTERNATIVES

The Airport's existing 100-LL fuel facility consists of an underground storage tank (UST), which is currently located beneath the Main Apron and is scheduled to expire in January of 2028. At the time of expiration, the tank must be taken out of service and removed in accordance with Maine State Laws for Underground Oil Storage Facilities. This section provides a no-action alternative to explore the impacts of leaving the Airport in its current condition by removing the UST upon expiration without replacing the system. This section also explores the impacts of two alternatives – the first alternative is to re-install a UST in the same location under the Main Apron, and the second is to construct an aboveground 100-LL facility in the terminal area.

### 6.7.1 NO ACTION FUEL FARM IMPACTS

This section explores the impacts of failing to install a fuel system in advance of the 2028 UST expiration. This alternative assumes that the Airport will remove the expired tank per MaineDEP guidelines. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational Impacts and Considerations:

- The Airport's existing 100-LL fuel facility consists of an underground storage tank located under the Main Apron. This tank must be taken out of service and removed upon expiration of the warranty, which will occur in January of 2028.
- Reconstruction of the Main Apron is currently on the Airport's Capital Improvement Program (CIP) for fiscal year 2026.
- If the Airport does not plan to remove the existing tank in advance of Main Apron reconstruction, it will be necessary to remove newly constructed pavement in order to comply with MaineDEP UST removal requirements.

Environmental Impacts:

- The Airport will comply with the requirements of MaineDEP to remove the UST upon expiration.
- No additional impervious surface.

Other impacts or considerations:

- Failing to replace the existing tank or construct a new fuel facility in advance of the UST expiration will result in the Airport losing the ability to provide fuel, including a loss in revenue from fuel sales.
- The Airport will lose the ability to provide its customers with a critical service.
- Removal of a UST is not AIP-eligible.

- Estimated cost: $18,000[6]

### 6.7.2 ALTERNATIVE 1 – REPLACE EXISTING FUEL TANK

This section explores the impacts of re-installing a new 10,000-gallon UST for 100-LL fuel in the same location as the existing UST. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational Impacts and Considerations:

- If the Airport does not plan to remove the existing tank in advance of Main Apron reconstruction, it will be necessary to remove newly constructed pavement in order to comply with MaineDEP UST removal requirements.
- Under current regulations, if the Airport elects to re-install the UST in its existing location, it will face the same issue of needing to remove Main Apron pavements to accommodate future tank removal each time the tank reaches warranty expiration.
- This alternative assumes replacement of the fuel tank only and that the Airport will repurpose its current dispensing equipment.
- Fueling continues to take place in a high-traffic area on the airfield – in the past, this has led to a line of aircraft across the stub taxiway and onto Runway 06-24, preventing other aircraft from safely exiting the runway environment.

Environmental Impacts:

- The Airport must comply with MaineDEP regulations, including installing the tank in such a location that it will not impede its future removal.
- A certified tank installer will be required to complete the removal and re-installation of the Airport's UST.
- The Airport must comply with National Fire Protection Codes.
- No additional impervious surface.

Other impacts or considerations:

- The Airport will lose revenue from fuel sales during tank replacement, and pilots will be unable to fuel.
- Installation of a replacement UST is not AIP-eligible.
- Estimated Cost: $350,000 - $400,000

[6] Cost for tank removal only. This alternative assumes UST removal will take place in conjunction with Main Apron reconstruction and additional costs for reconstructing pavements will be avoided.

### 6.7.3 ALTERNATIVE 2 – CONSTRUCT ABOVEGROUND FUEL FACILITY IN TERMINAL AREA

This section explores the impacts of constructing a fuel facility consisting of one (1) 10,000-gallon aboveground fuel tank for 100-LL, concrete fuel pad, access taxilanes, fueling apron, and associated dispensing and electrical components in the vacant area between the Main Apron and the existing hangar complex. For a graphic representation of this project, refer to Figure 6-5.1.

Operational Impacts and Considerations:

- Relocating the fuel facility to a location other than beneath the Main Apron in advance of the Main Apron construction eliminates the need to remove apron pavement each time the tank expires in the future.
- Concrete pad should be constructed in a location that will allow for the addition of a Jet-A fuel tank as demand warrants.
- This alternative requires reconfiguration of existing hangar taxilanes.
- Project can be designed such that fuel tanks are located outside of the fence, thereby avoiding the need for fuel trucks to enter aircraft movement areas.
- Fueling is moved away from a high-traffic area, preventing the issue of aircraft lining up across the stub taxiway onto Runway 06-24 waiting for fuel and allowing aircraft to safely exit the runway environment.

Environmental Impacts:

- Approximately 2,800 square feet of ledge removal will be required. An investigation of the ledge area in this location must be conducted in advance of the project to determine the extent of ledge removal.
- No anticipated wetland impacts as a result of this alternative.
- No tree clearing required for this alternative.
- Approximately 11,000 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

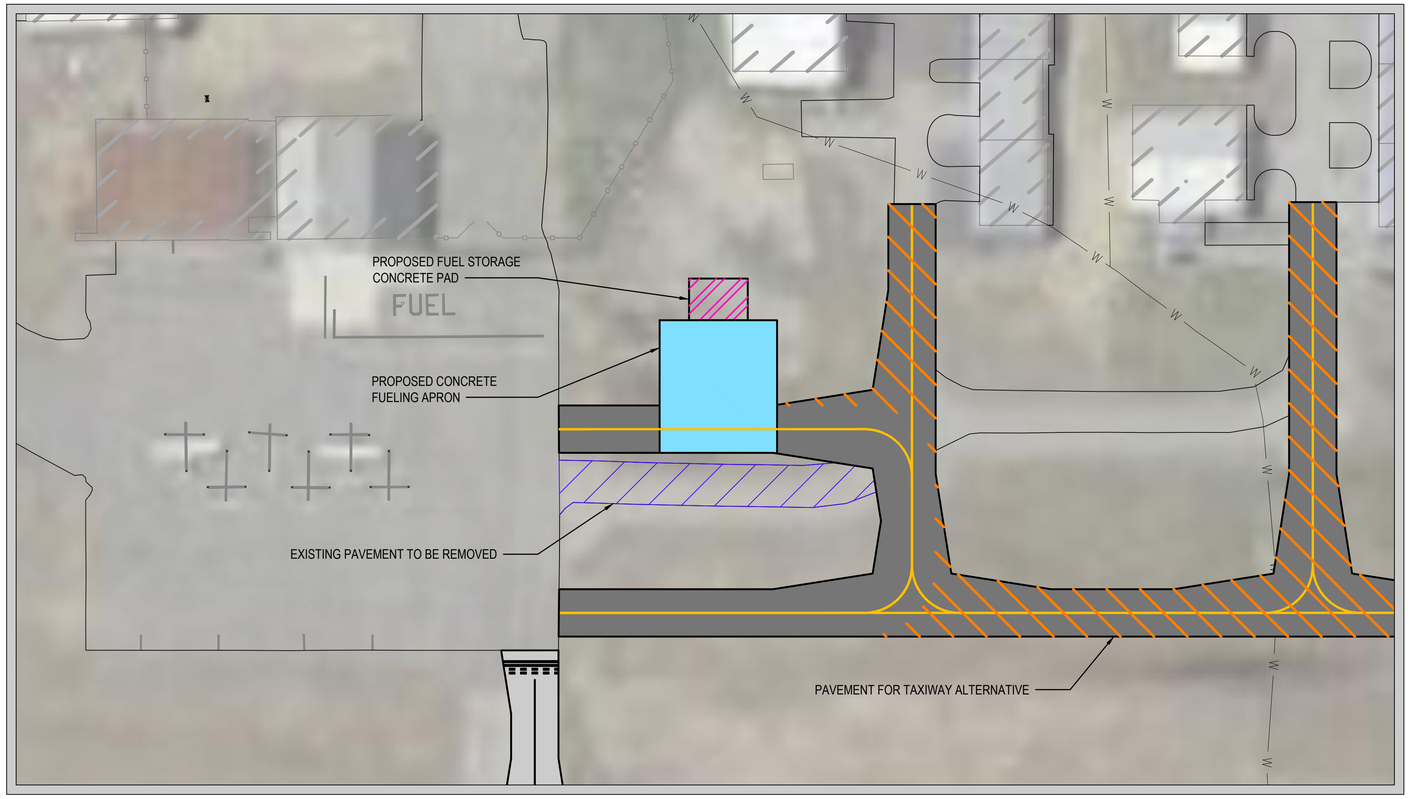
Other impacts or considerations:

- Constructing a new fuel facility in advance of the UST expiration will prevent losses in revenue that would otherwise occur during 100-LL tank removal and re-installation.
- Airport users will not experience a lapse in service that would otherwise occur during tank removal and re-installation.
- Construction of a 100-LL fuel facility is not AIP-eligible.
- Estimated cost: $825,000

**Table 6-6: Fuel Farm Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Replace Existing Tank* | *Alternative 2*<br>*Terminal Area Fuel* |
|---|---|---|---|
| *Operational Impacts* | • Existing UST expires January 2028<br>• Removal of new apron pavement required if UST not removed prior to 2026 | • Existing UST expires January 2028<br>• Removal of new apron pavement required if UST not removed prior to 2026<br>• Installation of new UST presents continued issue of apron pavement removal upon expiration<br>• Fueling continues in high traffic area and does not mitigate potential backups onto Runway 06-24 | • Relocates fuel in advance of UST expiration<br>• No removal of new apron pavement required<br>• Sized and sited to accommodate future Jet-A<br>• Can be designed with tank outside the fence – no fuel trucks in movement areas<br>• Fueling moved from high traffic area preventing backups onto Runway 06-24 |
| *Environmental Impacts* | • Airport complies with MaineDEP requirements for tank removal<br>• No additional impervious surface | • UST installation per MaineDEP regulations<br>• UST located as not to impede future removal<br>• UST requires certified tank installer<br>• Must comply with NFP Codes<br>• No additional impervious surface | • No anticipated wetland impacts<br>• No tree clearing required<br>• Approx. 2,800 SF of ledge removal required<br>• Approx. 11,000 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • Airport no longer has fuel<br>• Removal of UST is not AIP Eligible<br>• Removal to be completed in conjunction with Main Apron reconstruction to minimize costs | • Loss of revenue during UST replacement<br>• Pilots not able to fuel during UST replacement<br>• UST installation is not AIP eligible | • Prevents loss of revenue during UST replacement<br>• Pilots able to fuel during UST replacement<br>• 100-LL installation is not AIP eligible<br>• Investigation required to determine extent of ledge removal |
| *Cost* | $18,000 | $350,000 to $400,000 | $825,000 |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 2 – Construct Aboveground Fuel Facility in Terminal Area.**




## FUEL STORAGE - ALTERNATIVE 2

SCALE: 1" = 40'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| FUEL STORAGE PAD | | |
| CONCRETE FUELING APRON | | |
| PAVEMENT | | |
| WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |
| WATER LINE | W | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

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PROJECT
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AIP NO. 3-23-0009-14-2020

OWNER
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BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-FUEL |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 40' |

GRAPHIC SCALE
0 20 40 80

SHEET TITLE
FUEL STORAGE ALTERNATIVES

DRAWING NO.
FIG 6-5.1

OF

## 6.8 PERIMETER FENCE ALTERNATIVES

The Airport has a history of wildlife incursions and trespassing incidents on the airfield, which present significant safety and security concerns, and therefore perimeter fencing at the Airport is recommended. The following sections present two construction alternatives and a no-action alternative to install fencing along the perimeter of the airfield.

### 6.8.1 NO ACTION FENCE IMPACTS

This section explores the impacts of failing to construct perimeter fencing to address incursion issues, as highlighted in Chapter 5, Facility Requirements. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- The Airport does not enhance security or reduce the risk of wildlife strikes due to wildlife on the ground.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.
- The Airport does not address trespassing issues which represents a security threat.
- Does not increase maintenance responsibility or costs to keep fence line clear.

### 6.8.2 ALTERNATIVE 1 – CONSTRUCT FENCING BEHIND THE GRANITE STREET NEIGHBORHOOD

This project is for the construction of approximately 4,900 LF of perimeter fencing along the Airport's property line that abuts the Granite Street neighborhood, east of Airport property. For a graphic representation of this project, refer to Figure 6-6.1.

Operational impacts:

- The Airport enhances security and increases airfield safety by deterring trespassing from the adjacent neighborhood.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- No additional impervious surface will be added as a result of this project.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or considerations:

- The Airport should consider the maintenance efforts and costs associated with keeping fence line clear, especially in wooded areas.
- Estimated cost: $ 350,000

### 6.8.3 ALTERNATIVE 2 –CONSTRUCT FULL PERIMETER FENCING AROUND AIRPORT PROPERTY

This project is for the construction of approximately 15,250 LF of perimeter fencing around the airfield. For a graphic representation of this project, refer to Figure 6-6.1.

Operational impacts:

- The Airport enhances security and increases airfield safety by reducing the risk of trespassing, runway incursions, and wildlife strikes due to wildlife on the ground.

Environmental Impacts:

- Approximately 14,500 square feet of wetland impacts.
- No additional impervious surface will be added as a result of this project.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

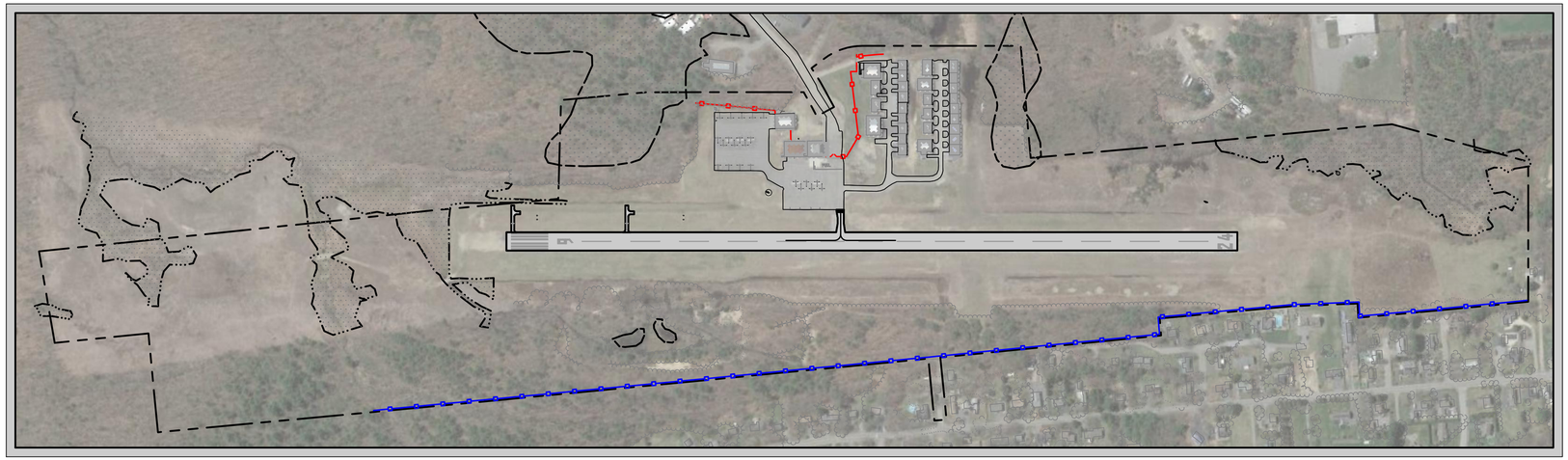
Other impacts or considerations:

- The Airport should consider the maintenance efforts and costs associated with keeping fence line clear, especially in wooded areas.
- Coordination with the City of Biddeford regarding fencing on City-owned property required.
- Estimated cost: $850,000

**Table 6-7: Fence Alternatives Comparison**

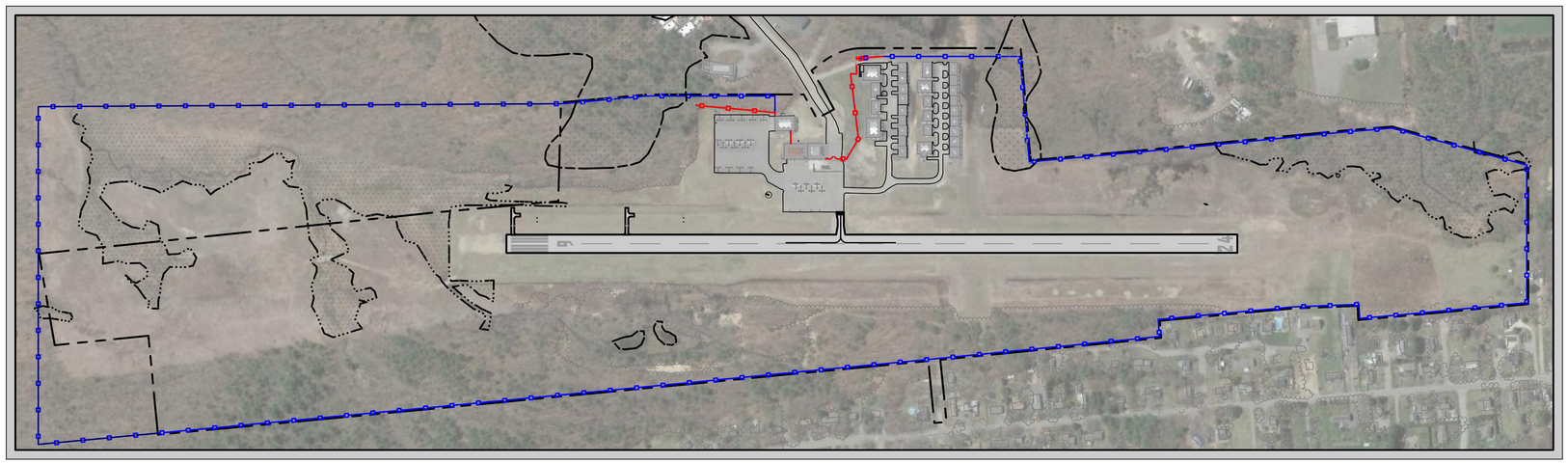
| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Granite Street Fencing* | *Alternative 2*<br>*Full Perimeter Fencing* |
|---|---|---|---|
| *Operational Impacts* | • Risk of trespassing, runway incursions and wildlife strikes not reduced | • Safety and security enhanced by minimizing trespassing<br>• Airfield not fully enclosed, so no reduction in risk of wildlife incursions | • Safety and security enhanced by minimizing trespassing<br>• Risk of wildlife strikes on the ground reduced due to airfield being fully enclosed |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • No wetland impacts<br>• No additional impervious surface<br>• Permitting: EA, NRPA, USACE | • Approximately 14,500 SF of wetland impacts<br>• No additional impervious surface<br>• Permitting: EA, NRPA, USACE |
| *Other Impacts* | • No additional maintenance efforts or costs associated with keeping fence line clear | • Maintenance efforts and costs to keep fence line clear significantly increased | • Maintenance efforts to keep fence line clear significantly increased<br>• Coordination with City for fencing on City-owned land |
| *Cost* | $0.00 | $350,000 | $850,000 |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 2 – Construct Full Perimeter Fencing Around Airport Property.**



## FENCE - ALTERNATIVE 1

SCALE: 1" = 300'



## FENCE - ALTERNATIVE 2

SCALE: 1" = 300'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| DELINEATED WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| 8' CHAIN LINK FENCE | | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

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PROJECT

AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER

BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-FENCE |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 300' |

GRAPHIC SCALE

0 150 300 600

SHEET TITLE

FENCE ALTERNATIVES

DRAWING NO.

FIG 6-6.1

OF

## 6.9 SRE BUILDING ALTERNATIVES

The Airport does not currently have a snow removal equipment (SRE) building and instead stores its SRE in the hangar building adjacent to the West Apron. This section provides a no-action alternative to explore the impacts of failing to construct an SRE storage building, as well as three alternatives showing potential locations for and impacts of constructing an SRE building.

### 6.9.1 NO ACTION SRE BUILDING IMPACTS

This section explores the impacts of failing to construct a snow removal equipment building to store the Airport's FAA-funded equipment. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- The Airport continues to lack the adequate infrastructure to house SRE, requiring valuable hangar space to be used for equipment storage.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- No construction will take place as part of this scenario, and therefore, no financial resources will be required.

### 6.9.2 ALTERNATIVE 1 – CONSTRUCT SRE BUILDING IN EXISTING HANGAR COMPLEX ROW 2

This section explores the impacts of constructing a 1,600 square-foot snow removal equipment building and access driveway in the existing hangar complex, in the second row of hangars. For a graphic representation of this project, refer to Figure 6-7.1.

Operational Impacts:

- Provides adequate protection for FAA-funded equipment.
- Opens up hangar space currently being used for equipment storage.
- Occupies land that could be used for future hangar development.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- Approximately 1,900 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

- Estimated cost: $1,100,000

### 6.9.3 ALTERNATIVE 2 – CONSTRUCT SRE BUILDING BEHIND EAA HANGAR

This section explores the impacts of constructing a 1,600 square-foot snow removal equipment building behind the EAA hangar. For a graphic representation of this project, refer to Figure 6-7.1.

Operational Impacts:

- Provides adequate protection for FAA-funded equipment.
- Opens up hangar space currently being used for equipment storage.
- Avoids occupying land that could be used for future hangar development.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- Approximately 2,600 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

- Estimated cost: $1,100,000
- The size of the long-term parking area will be reduced as a result of this alternative.

### 6.9.4 ALTERNATIVE 3 – CONSTRUCT SRE BUILDING IN HANGAR COMPLEX ROW 4

This section explores the impacts of constructing a 1,600 square-foot snow removal equipment building and access driveway in the existing hangar complex, in the fourth row of hangars. For a graphic representation of this project, refer to Figure 6-7.1.

Operational Impacts:

- Provides adequate protection for FAA-funded equipment.
- Opens up hangar space currently being used for equipment storage.
- Occupies land that could be used for future hangar development.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- Approximately 1,900 square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

- Estimated cost: $1,100,000

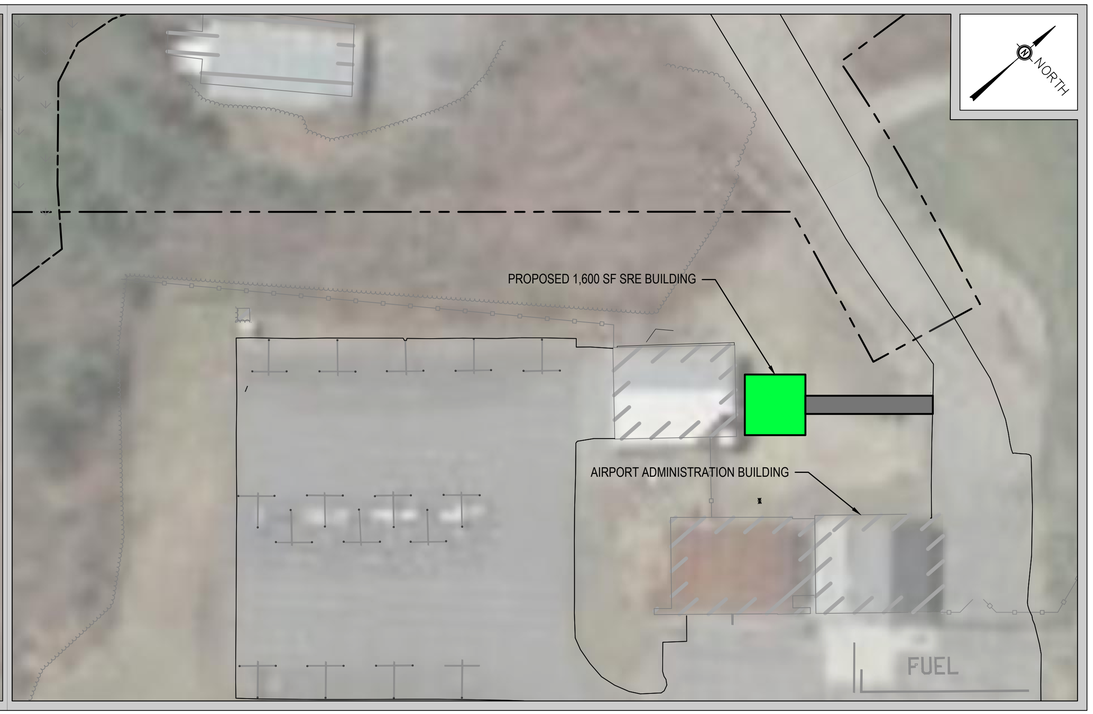
**Table 6-8: SRE Building Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*In Hangar Row 2* | *Alternative 2*<br>*Behind EAA Hangar* | *Alternative 3*<br>*In Hangar Row 4* |
|---|---|---|---|---|
| *Operational Impacts* | • Continued use of hangar space to house SRE<br>• Loss of hangar lease revenue | • Protection for FAA-funded equipment<br>• Opens up hangar space for aircraft<br>• Occupies potential hangar areas | • Protection for FAA-funded equipment<br>• Opens up hangar space for aircraft<br>• Does not occupy potential hangar areas | • Protection for FAA-funded equipment<br>• Opens up hangar space for aircraft<br>• Occupies potential hangar areas |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • No wetland impacts<br>• Approx. 1,900 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE | • No wetland impacts<br>• Approx. 2,600SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE | • No wetland impacts<br>• Approx. 1,900 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • None | • None | • Reduces the size of the long-term parking lot | • None |
| *Cost* | $0.00 | $1,100,000 | $1,100,000 | $1,100,000 |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 2 – Construct SRE Building Behind EAA Hangar.**

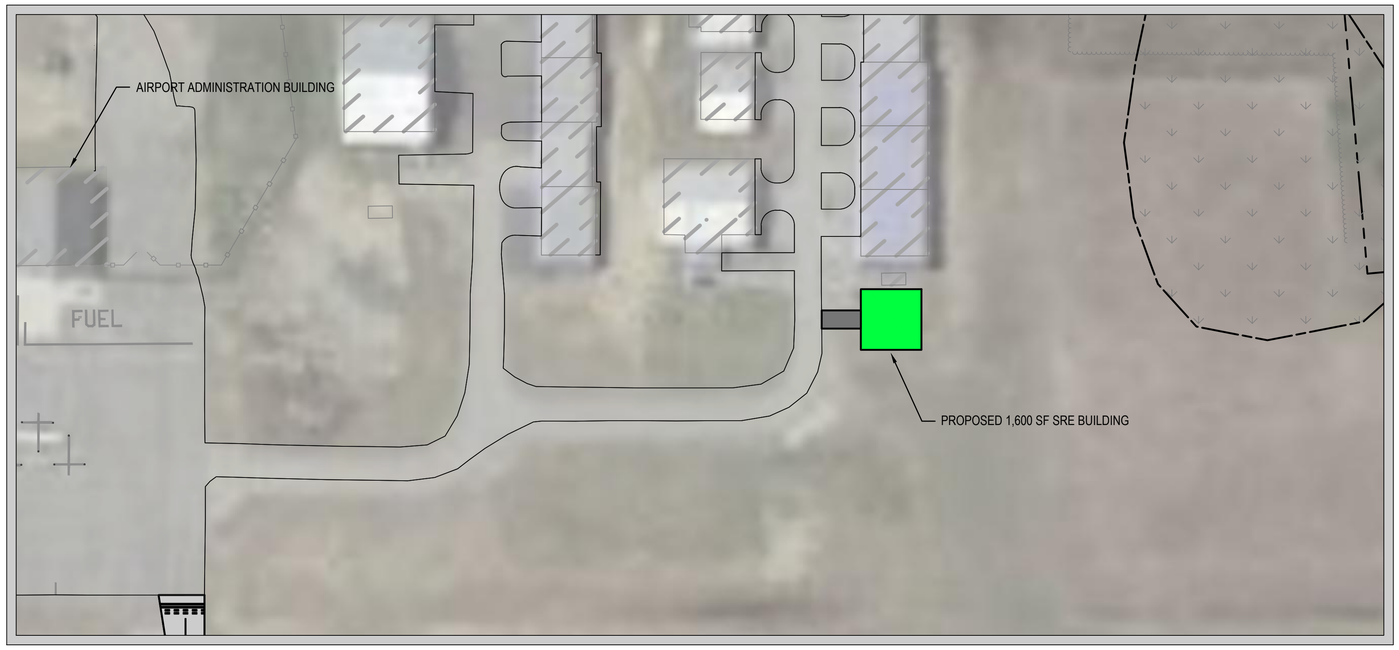

## SRE BUILDING - ALTERNATIVE 1

SCALE: 1" = 100'




## SRE BUILDING - ALTERNATIVE 2

SCALE: 1" = 100'




## SRE BUILDING - ALTERNATIVE 3

SCALE: 1" = 100'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| DELINEATED WETLAND[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |

## NOTES:

1) WETLANDS DELINEATED IN 2015, AND RECONFIRMED IN 2019.

2) WETLANDS LISTED IN THE U.S. FISH AND WILDLIFE SERVICE NATIONAL WETLANDS INVENTORY. NWI WETLANDS ARE NOT DELINEATED.

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-SRE BUILDING |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 100' |

GRAPHIC SCALE
0 50 100 200

SHEET TITLE

SRE BUILDING ALTERNATIVES

DRAWING NO.
FIG 6-7.1

OF

## 6.10 APRON RECONFIGURATION ALTERNATIVES

The Airport currently has two apron areas – the Main Apron (terminal apron), which can accommodate ten aircraft, and the West Apron, which can accommodate 16 aircraft. The configuration of this area, particularly the Main Apron, is limiting the airport's ability to construct needed terminal area facilities. Additionally, it does not meet FAA design standards for tie-down spacing and taxiway separation. This section provides a no-action alternative to explore the impacts of failing to address the apron area, as well as one alternative to reconfigure the aprons to open up the terminal area for future facilities and comply with FAA design standards while maximizing the number of available apron spaces.

### 6.10.1 NO ACTION APRON ALTERNATIVE

This section explores the impacts of failing to reconfigure the Airport's apron area. The purpose of this section is to identify deficiencies and benefits associated with leaving the Airport in its existing condition to provide a baseline alternative upon which to compare subsequent alternatives. For a graphic representation of this project, refer to Figure 2-1, Existing Conditions.

Operational impacts:

- Available tie-down spaces as a result of no action: 26
- Existing apron does not meet FAA taxiway separation or tie-down spacing standards.

Environmental Impacts:

- Because no construction will take place as part of this scenario, no environmental resources will be impacted, and therefore no permitting efforts will be required.

Other impacts or considerations:

- The terminal area is not opened up for other potential uses such as fuel.
- Tie-down spaces are not configured to accommodate hangar development on the West Apron.
- No construction will take place as part of this scenario, and therefore, no financial resources will be required.

### 6.10.2 ALTERNATIVE 1 – EXPAND WEST APRON AND REDUCE TERMINAL APRON

This section explores the impacts of reconfiguring the apron area to open up additional space in the terminal area to accommodate future facilities and comply with current FAA design standards for tie-down spacing and taxilane separation. For a graphic representation of this project, refer to Figure 6-8.1.

Operational Impacts:

- Available tie-down spaces as a result of Alternative 1: 22
- Complies with FAA design standards for tie-down spacing and taxiway separation.
- This alternative requires relocation of a windcone.

Environmental Impacts:

- No anticipated wetland impacts as a result of this alternative.
- Approximately 39,200 SF square feet of additional impervious surface.
- MaineDEP Site Location of Development Permit likely necessary.
- Permitting needs (Environmental Assessment, Maine Natural Resource Protection Act Permit, U.S. Army Corps of Engineers Permit).

Other impacts or Considerations:

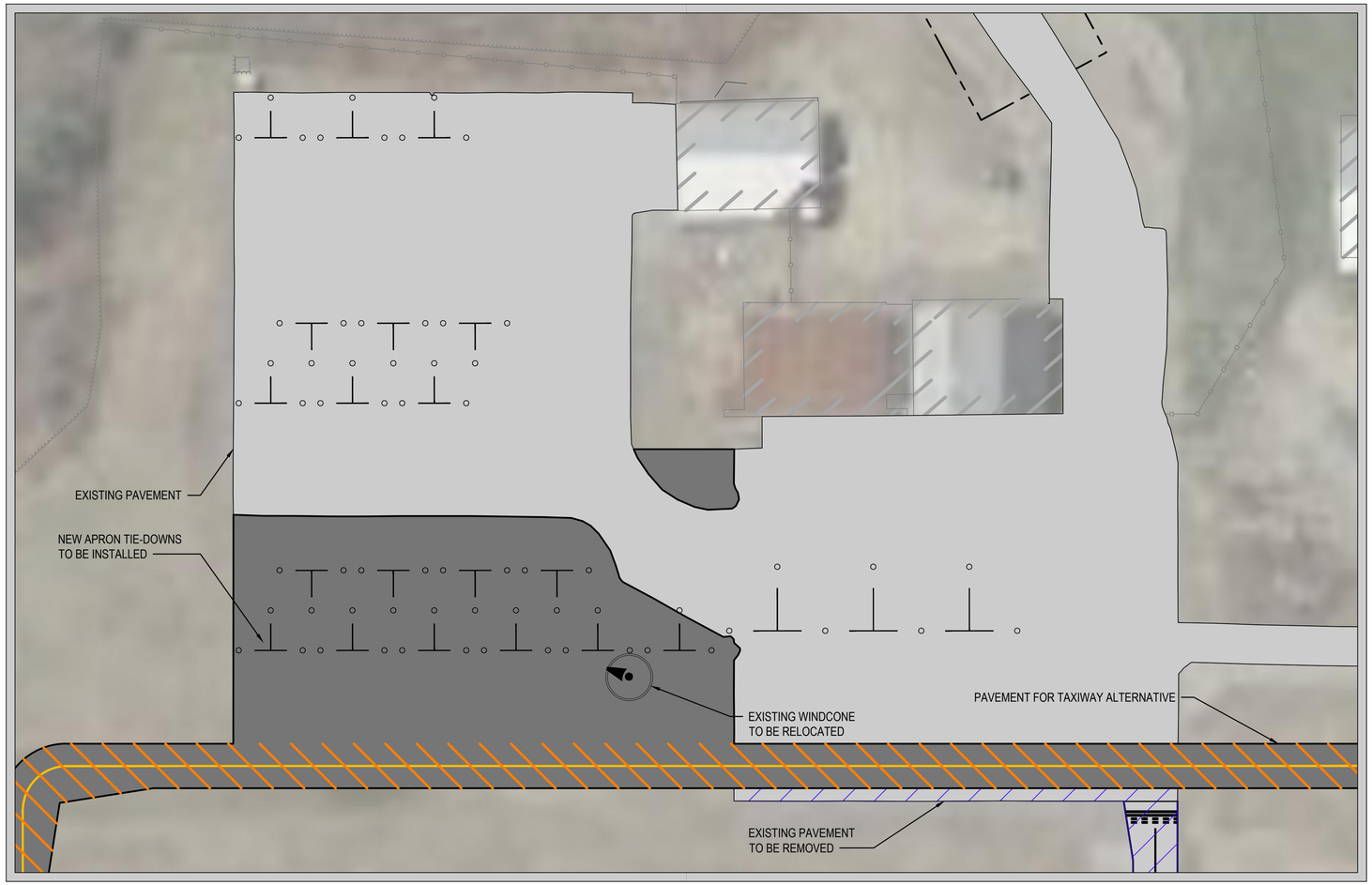
- Opens up space in the terminal area for construction of additional facilities such as fuel.
- Reconfigures tie-down spaces to accommodate potential hangar development on the West Apron.
- Uses a target of opportunity to reconfigure the terminal area, as aprons are already planned for reconstruction in fiscal years 2023 and 2026.
- Estimated cost: $1,500,000[7]

[7] Includes reconstruction of all apron pavements, plus expansion.

**Table 6-9: Apron Alternatives Comparison**

| *Alternative* | *No Action Alternative* | *Alternative 1*<br>*Apron Reconfiguration* |
|---|---|---|
| *Operational Impacts* | • Available tie-downs: 26<br>• Does not comply with FAA tie-down and taxiway separation standards | • Available tie-downs: 22<br>• Complies with FAA tie-down and taxiway separation standards<br>• Relocation of windcone required |
| *Environmental Impacts* | • No environmental impacts<br>• No permits | • No wetland impacts<br>• Approx. 39,200 SF of impervious surface<br>• Permitting: SLOD, EA, NRPA, USACE |
| *Other Impacts* | • Terminal area remains limited<br>• Does not accommodate hangar development on the West Apron | • Opens up terminal area for additional development<br>• Accommodates hangar development on the West Apron<br>• Target of opportunity for apron reconfiguration during planned reconstruction |
| *Cost* | $0.00 | $1,500,000 |

**Recommended Alternative: The Airport Commission voted in favor of Alternative 1 – Expand West Apron and Reduce Terminal Apron.**




## APRON - ALTERNATIVE 1

SCALE: 1" = 40'

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| BUILDINGS/HANGARS | | |
| PAVEMENT | | |
| WETLANDS[1] | | |
| NWI WETLANDS[2] | | |
| TREELINE | | |
| 8' CHAIN LINK FENCE | | |

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PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNCIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | ALT-APRON |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | AUGUST 2021 |
| DRAWING SCALE | 1" = 40' |

GRAPHIC SCALE
0 20 40 80

SHEET TITLE
APRON ALTERNATIVES

DRAWING NO.
FIG 6-8.1

OF

# CHAPTER 7 – SCHEDULE OF IMPROVEMENTS

This Chapter provides a summary of facility improvements and estimated costs according to selected preferred alternative development scenarios identified in Chapter 6, Development and Evaluation of Alternatives. Also included are the reconstruction and/or replacement of facilities as they exceed their design life. These projects have been compiled into an overall schedule of improvements, which is organized by short-term (2022-2026), mid-term (2027-2031), and long-term (2032-2041) projects, in order to assist the airport in the development of its five-year Capital Improvement Program (CIP) according to FAA and MaineDOT requirements.

## 7.1 CONSIDERATIONS FOR INFLATION

The total cost of implementing a particular project is based upon current (2021) estimates of construction costs, the costs of engineering and design work, and minor construction items and contingencies. These preliminary estimates are based, in most cases, on unit prices common to airport and highway construction in Maine in 2021. The costs cited are estimates only and should not be construed as final or conclusive. It is important to consider that inflation will likely affect future CIP project costs. Project cost estimates should be updated at the time a project is ready to be implemented using current data in order to reflect accurate labor rates and material costs.

## 7.2 ENVIRONMENTAL PLANNING PROJECT COSTS

Costs associated with obtaining environmental permits are estimated using assumed scopes of work and from experience with similar types of projects and cannot be accurately estimated until a project scope of work is developed. Developing the scope of work is a process that takes place approximately one year prior to the start of a project in preparation for funding applications. The costs of these types of projects may vary greatly due to changes in the actual scope of the project and therefore have not been included in the estimates provided in this chapter.

## 7.3 FORECASTED VS. ACTUAL DEMAND

It is important to note that the recommended improvement schedule presented below is predicated in part on the forecasted demand outlined in Chapter 4, and that projects may not be eligible for funding until actual demand for facility improvements is present. It is common for Airport CIPs to be adjusted on a yearly basis to accommodate actual demand by either advancing projects when demand materializes earlier than originally anticipated or delaying projects when anticipated demand does not occur as expected.

## 7.4 PERIODIC ROUTINE MAINTENANCE

In addition to the capital improvements outlined in the following sections of this chapter, the Airport should monitor conditions of all facilities to schedule maintenance as needed. Maintenance activities include, but are not necessarily limited to, pavement maintenance activities (e.g., crack sealing and slurry sealing) and vegetation management (e.g., mowing, brush hogging, and tree removal in accordance with the Vegetation Management Plan). These activities are necessary to maintain a safe and functional airfield and are further described in the following paragraphs.

It is recommended that the Airport monitor pavement conditions and results of Pavement Management Reports, which are provided periodically by MaineDOT. The most recent Pavement Condition Report (PCR) at B19 was completed in 2018 and recommends repairs based on pavement condition index (PCI) ratings, which include the following:

- PCI above 70 (Satisfactory): preventative maintenance
- PCI between 60 and 70 (Fair): major rehabilitation
- PCI below 60 (Poor to Failed): reconstruction

According to the PCR, pavement generally deteriorates at a rate of between 1 and 3 PCI per year, and maintenance activities should be programmed as necessary to extend the useful life of airfield pavements.

Vegetation growth should be monitored and managed as follows, in accordance with the Airport's 2007 Vegetation Management Plan (VMP):

- Upland infield areas and grassed areas surrounding aprons: routine mowing from May to October
- Remaining upland airfield areas: brush hogging at least every two years as needed
- Airfield wetlands: selective hand pruning at least every two years as needed
- Off-airport easements: field survey every three to five years and selective clearing as needed

Additional details regarding the timing and methods for vegetation management are contained in the Airport's 2007 VMP and should be followed accordingly.

## 7.5 SHORT-TERM IMPROVEMENTS

The following projects are proposed for short-term development over the next 5-year period (2022-2026). The following descriptions are for planning purposes only and may require refinements and review prior to starting work on a particular project.

### 7.5.1 RECONSTRUCT WEST APRON

This project is for the reconstruction of the Airport's West Apron (i.e., GA Apron), including construction of a taxilane from the apron to Runway 06-24, midway between the existing stub taxiway and the Runway 06 end to accommodate future construction of a parallel taxiway . The West Apron with a PCI of 41 (poor) exceeded its useful life in 2007. This project includes:

- Full depth reconstruction including removal of existing pavement and base materials, subgrade preparation.
- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.
- Erosion control.
- Application of markings.

Apron reconstruction is eligible for AIP funding provided that it will be used for aircraft parking. The project cannot include pavement for auto parking, other non-aeronautical uses, or exclusive use areas (must be public use).

**Estimated project cost: $900,000** (FAA Share $810,000; State Share $45,000; Local Share $45,000)

### 7.5.2 CONSTRUCTION OF ABOVEGROUND FUEL FACILITY

This project is for the construction of an aboveground fuel facility in the terminal area, consisting of one 10,000-gallon storage tank, fueling apron, and associated taxilanes. Installation of the aboveground facility should take place in advance of the decommissioning of the existing underground storage tank, which will expire in January of 2028. Project timing in conjunction with the reconstruction of the Main Apron (i.e., Terminal Apron) should be considered to avoid an interruption to the Airport's fuel revenue.

Per the FAA AIP Handbook, because the Airport already has a 100-LL fuel facility on site, this project is not eligible for AIP funding, as AIP funding can only be used to fund the initial construction of fuel facilities and cannot fund maintenance or repair.

**Estimated project cost: $600,000** (FAA Share $0.00; State Share $0.00; Local Share $600,000)

### 7.5.3 RECONSTRUCT MAIN APRON

This project is for the reconstruction of the Airport's Main Apron. The Main Apron (i.e., Terminal Apron) with a PCI of 42 (poor) exceeded its useful life in 1997. This project includes the removal and decommissioning of the underground fuel storage tank, which is scheduled to expire in 2028 and must be removed per MaineDEP regulations. This project will also include:

- Full depth reconstruction including removal of existing pavement and base materials, subgrade preparation.
- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.
- Erosion control.
- Application of markings.

Apron reconstruction is eligible for AIP funding provided that it will be used for aircraft parking. The project cannot include pavement for auto parking, other non-aeronautical uses, or exclusive use areas (must be public use).

**Estimated project cost: $800,000** (FAA Share $720,000; State Share $40,000; Local Share $40,000)

### 7.5.4 CONSTRUCT HANGARS ADJACENT TO EXISTING HANGAR COMPLEX

This project is for the construction of hangar units as needed in the area adjacent to the existing hangar complex. Based on current demand and discussions with Airport Management, it is assumed that hangars will be constructed by private developers and that the Airport will incur no costs associated with their construction. Box hangars and/or T-hangars can be constructed based on the needs of the developers at the time. It should be noted that coordination with Skydive Coastal Maine may be required to relocate the existing skydiving landing area to a different location on the airfield, as the proposed area for hangar construction may conflict with their existing operation.

### 7.5.5 TERMINAL BUILDING IMPROVEMENTS

This project is for the renovation of the Airport's terminal building to repair issues with the leaking roof and bring the public areas of the building (including but not limited to the entrance, hallways, and restrooms) into compliance with Americans with Disabilities Act (ADA) requirements.

According to the AIP handbook, terminal building modifications to meet federal mandates (e.g., ADA standards) are eligible for AIP funding, provided that modifications are being made to public use areas, such as public entrances, hallways, and restrooms. Additionally, certain terminal building rehabilitation projects, such as the replacement of a significant portion of a terminal roof, are eligible for AIP funding. Terminal building improvements are not eligible for discretionary funding, so the Airport would be limited to nonprimary entitlements ($150,000 per year) for the terminal building improvements described above.

**Estimated project cost: $300,000** (FAA Share $270,000; State Share $15,000; Local Share $15,000)

## 7.6 MID-TERM IMPROVEMENTS

The following projects are proposed for mid-term development over the 5 to 10-year planning period (2027-2031). The following descriptions are for planning purposes only and may require refinements and review prior to starting work on a particular project.

### 7.6.1 CONSTRUCT SRE BUILDING

This project is for the construction of a snow removal equipment building (estimated at 1,600 square feet) in accordance with FAA regulations for buildings for storage and maintenance of airport snow and ice control equipment and materials, with access driveway in the area behind the EAA hangar. This project will avoid occupying space suitable for hangar construction, and instead will construct the building outside of the fence.

SRE building construction is eligible for federal funding assistance; however, costs for the construction of SRE building space for personnel quarters, training space, or other non-equipment storage functions are not eligible.

**Estimated project cost: $1,100,000** (FAA Share $990,000; State Share $55,000; Local Share $55,000)

### 7.6.2 ACQUISITION OF SNOW REMOVAL EQUIPMENT

This project is for the acquisition of a carrier vehicle and attachments to replace or supplement the Airport's existing equipment. The Airport is currently operating a 2004 John Deer loader, which is in good condition; however, it is recommended that acquisition of a replacement vehicle or a second carrier vehicle be programmed for later in the mid-term planning period. At the end of the mid-term period (2031), the existing loader will be 27 years old.

As outlined in Chapter 5, B19 is eligible to receive AIP funding for acquisition of SRE in accordance with FAA regulations for airport snow and ice control equipment

**Estimated project cost: $350,000** (FAA Share $315,000; State Share $17,500; Local Share $17,500)

### 7.6.3 INSTALL WEATHER MONITORING CAMERAS

This project is for the installation of weather monitoring cameras at the Airport to provide pilots with real-time photos of weather conditions on the airfield. The Airport should consult with the FAA Weather Camera Office and MaineDOT in advance of the project to discuss ideal locations for weather camera locations, timing of installation, and maintenance requirements.

The installation of weather monitoring cameras is not AIP eligible; however, MaineDOT is currently exploring the feasibility of a statewide program, so additional funding assistance may be available for this project in the future.

**Estimated project cost: $20,000** (FAA Share $0.00; State Share $0.00; Local Share $20,000)

### 7.6.4 RECONSTRUCT HANGAR TAXILANE – HANGAR ROW 1

This project is for the reconstruction and reconfiguration of the Hangar Row 1 Taxilane. The taxilane will be reconfigured to accommodate future construction of a parallel taxiway by connecting Hangar Row 1 to the Main Apron at the standard 150-foot centerline separation. According to the Airport's Pavement Condition Report, the Hangar Row 1 Taxilane has a PCI of 39 (very poor). Considering that this report was prepared in 2018, and it is estimated that pavements will deteriorate at a rate of between 1 to 3 points per year, it is reasonable to estimate that, conservatively, the taxilane will deteriorate as follows by the beginning of the mid-term planning period (2027):

- Hangar Row 1 Taxilane: PCI of 30 (very poor)

This project will include:

- Full depth reconstruction including removal of existing pavement and base materials, subgrade preparation.
- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.
- Erosion control.
- Application of markings.

Taxilane reconstruction projects are eligible for AIP funding assistance.

**Estimated project cost: $1,000,000** (FAA Share $900,000; State Share $100,000; Local Share $100,000)

### 7.6.5 RECONSTRUCT HANGAR TAXILANE – HANGAR ROW 2

This project is for the reconstruction and reconfiguration of the Hangar Row 2 Taxilane. The taxilane will be reconfigured to accommodate future construction of a parallel taxiway by connecting Hangar Row 2 to the new Hangar Row 1 Taxilane at the standard 150-foot centerline separation. According to the Airport's Pavement Condition Report, the Hangar Row 2 Taxilane has a PCI of 69 (fair). Considering that this report was prepared in 2018, and it is estimated that pavements will deteriorate at a rate of between 1 to 3 points per year, it is reasonable to estimate that, conservatively, the taxilane will deteriorate as follows by the beginning of the mid-term planning period (2027):

- Hangar Row 2 Taxilane: PCI of 60 (fair)

This project will include:

- Full depth reconstruction including removal of existing pavement and base materials, subgrade preparation.
- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.

- Erosion control.
- Application of markings.

Taxilane reconstruction projects are eligible for AIP funding assistance.

**Estimated project cost: $1,000,000** (FAA Share $900,000; State Share $100,000; Local Share $100,000)

### 7.6.6 CONSTRUCT FULL PERIMETER FENCING AROUND AIRPORT PROPERTY

This project is for the construction of approximately 15,250 LF of perimeter fencing and associated access gates to fully enclose airport property. This will prevent large, bodied mammals (e.g., deer and domestic dogs) and trespassers from accessing the airfield and will enhance safety and security.

Fencing projects are eligible for AIP funding assistance.

**Estimated project cost: $950,000** (FAA Share $855,000; State Share $47,500; Local Share $47,500)

## 7.7 LONG-TERM IMPROVEMENTS

The following projects are proposed for long-term development over the 10- to 20-year planning period (2022-2041). The following descriptions are for planning purposes only and may require refinements and review prior to starting work on a particular project.

### 7.7.1 COMPLETE PARTIAL PARALLEL TAXIWAY

This project is for the construction of the final portion of the partial parallel taxiway, connecting the hangar taxilanes with Runway 06-24, midway between the existing stub taxiway and the Runway 24 end. This project will enhance airfield safety by removing the non-compliant stub taxiway from Runway 06-24 to the Main Apron and eliminating direct runway-to-apron access and the direct line from vehicle gate to Runway 06-24. This project will include:

- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.
- Erosion control.
- Application of markings.

Taxiway construction projects are eligible for AIP funding assistance.

**Estimated project cost: $700,000** (FAA Share $630,000; State Share $35,000; Local Share $35,000)

### 7.7.2 CONSTRUCT RUNWAY 06 END EXTENSION AND RSA TO ACHIEVE 3,200 FEET

This project is for the construction of a 199-foot extension to the Runway 06 end, including a compliant Runway Safety Area (RSA), to achieve a total runway length of 3,200 feet. This project will include the following:

- Full-depth construction of an additional 199 feet of pavement on the Runway 06 end.
- Application of runway markings.
- Installation of runway lights.
- Construction of an additional 139 feet of RSA.

Runway construction projects are eligible for AIP funding assistance.

**Estimated project cost: $515,000** (FAA Share $463,500; State Share $25,750; Local Share $25,750)

### 7.7.3 APRON EXPANSION

This project is for the expansion of the Airport's aprons to accommodate additional tie-down spaces or hangar construction in the West Apron area as demand warrants. This project will also include:

- Full depth construction including removal of existing pavement and base materials, subgrade preparation.
- Placement of a gravel subbase, aggregate base layers, and bituminous concrete pavement.
- Erosion control.

- Application of markings.

Apron construction is eligible for AIP funding provided that it will be used for aircraft parking. The project cannot include pavement for auto parking, other non-aeronautical uses, or exclusive use areas (must be public use).

**Estimated project cost: $600,000** (FAA Share $540,000; State Share $30,000; Local Share $30,000)

# CHAPTER 8 – AIRPORT RECYCLING, REUSE, AND WASTE REDUCTION PLAN

This chapter reviews the Airport's current waste management practices in areas where the Airport has direct control of waste management, as outlined in FAA Guidance of Airport Recycling, Reuse, and Waste Reduction Memorandum, dated September 30, 2014. This chapter includes a description of how the Airport's current program fits into the local municipality's waste management program.

## 8.1 TYPES OF WASTE GENERATED AT AIRPORTS

Airports generate various types of solid waste depending on the size of the facility, number of operations, passengers, etc. Per the FAA Memorandum, guidance is provided to address material that can be legally disposed of in a landfill or equivalent state-permitted facility. The guidance applies to the following:

- *Municipal Solid Waste (MSW)* consists of everyday items that are used and discarded (aluminum and steel, glass bottles and containers, plastic bottles and containers, packaging, bags, paper products, and cardboard).
- *Construction and Demolition (C&D) Debris* is generally categorized as MSW. C&D debris is any non-hazardous solid waste that results from land clearing, excavation, or construction, demolition, renovation, or repair of structure, roads and utilities.
- *Compostables* are also categorized as MSW. They are sometimes referred to as green waste and food waste. Green waste consists of tree, shrub, and grass clippings, leaves, weeds, small branches, seeds, pods, and similar debris generated by landscape maintenance activities. Food waste is food that is not consumed or generated during food preparation activities and discarded.
- *Deplaned Waste* is MSW that is removed from passenger aircraft. These materials include bottles and cans, newspapers and mixed paper, plastic cups and utensils, food waste, food-soiled paper, magazines, unconsumed or surplus food, and paper towels.

Sources of waste per the FAA September 30, 2014 memo, is broken down by how much control the airport has on the generation and disposal of waste. The three levels of control are:

1) Areas where the airport has direct control of waste management (public space, office space, terminal building, airfield, etc.). These areas are under the control and custody of the airport, and they are able to introduce recycling, reuse, and waste reductions programs directly.
2) Areas where the airport has no direct control but can influence waste management (i.e. tenant facilities and deplaned waste). These areas are owned by the airport; however, they are leased out to tenants.
3) Areas over which the airport has no direct control or influence. These are areas the airport neither owns nor leases. Therefore, these areas are excluded from further discussion in this chapter.

## 8.2 RECYCLING, REUSE, AND WASTE MANAGEMENT AT B19

Currently, the Airport has the following practices in place to address recycling, reuse, and waste reduction:

- The Airport has both trash and zero-sort recycling receptacles located throughout the administration building, which are emptied regularly by Airport Management and collected by the City's public Works Department on a weekly basis.
- The Airport also has a dumpster on site for any items that are too large to fit into the City-provided waste and recycling receptacles. This dumpster is emptied on an as-needed basis.
- All Airport tenants are responsible for the removal and disposal of their own waste and recycling items.

The Airport participates in the City-wide waste management program, as outlined below.

### 8.2.1 CITY OF BIDDEFORD WASTE MANAGEMENT PROGRAM

The City of Biddeford Public Works Department is responsible for the City's solid waste management programs including, collection of household trash, management of the recycling center and transfer station, implementation of annual household hazardous waste collection, and maintenance and monitoring of a closed landfill and surrounding site.

In 2013, the Public Works Department implemented a city-wide zero sort curbside recycling program to collect recyclable materials including cardboard/paper (e.g., corrugated cardboard, boxboard, junk mail, office paper), plastic (e.g., rigid plastic bottles, jugs, tubs, and lids marked #1-7), metal (e.g., aluminum and steel cans, aluminum foil, bi-metal cans), and glass (e.g., empty food and beverage bottles and jars). Trash and recycling are collected once per week from City-provided containers.

Each resident is provided with a 65-gallon blue bin for recycling and a 35-gallon green bin for trash. Trash in excess of the 35-gallon container is collected in "pay as you throw" (PAYT) bags, which are available for purchase in 15-gallon and 30-gallon sizes. PAYT bags are collected at the same time as the regular trash pickup and cost $1.75 for a small bag and $2.25 for a large bag.

The recycling/transfer station is open Tuesday through Saturday each week for the collection and recycling items as described above, plus brush, yard clippings, leaves, tires, waste motor oil, latex paint, and disposal of household items, furniture, carpeting, televisions, and computer monitors, among others. Materials not accepted include items such as regular household trash, hazardous waste, propane tanks, sheet rock/gypsum board, equipment tires, gasoline, and tar, among others. The City allows residents to dispose of hazardous materials one day per year, free of charge, at the transfer station with some limitations on accepted items.

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

Federal Aviation Administration
New England Region

1200 District Avenue
Burlington, MA 01803

June 14, 2022

Peter Donaher
Airport Manager
Biddeford Municipal Airport
88 Landry Street
Biddeford, ME 04005

Dear Mr. Donaher:

We have completed our review of the Airport Layout Plan (ALP) for Biddeford Municipal Airport, Biddeford, Maine. This letter acknowledges FAA's approval and acceptance of the ALP which our agency signed on June 14, 2022 and acceptance of the airport master plan update upon which it is based.

This determination does not constitute FAA approval or disapproval of the physical development involved in the proposal. It is a determination with respect to the safe and efficient use of navigable airspace by aircraft and with respect to the safety of persons and property on the ground.

The FAA Reauthorization Act of 2018, section 163(d), has limited the FAA's review and approval authority for ALPs. The Act limits the FAA's authority to those portions of the ALP that:

- Materially impact the safe and efficient operation of aircraft at, to, or from the airport;
- Adversely affect the safety of people or property on the ground adjacent to the airport as a result of aircraft operations; or
- Adversely affect the value of prior Federal investments to a significant extent.

FAA's approval of this ALP is limited to existing facilities only (or those specific areas that FAA retains approval authority). The FAA has not made a determination on whether or not it retains review and approval authority for any proposed facilities depicted on the ALP associated with this letter (unless otherwise noted). Under Section 49 USC §47107(a)(16) (as revised per section 163(d) of Pub.L. 115-254), FAA must separately determine whether it retains approval authority for each individual proposed facility depicted on an ALP before construction occurs.

Although section 163(d) has limited the FAA's review and approval authority of proposed projects depicted on an ALP, airport sponsors must continue to maintain an up-to-date ALP in accordance with Federal law, 49 U.S.C. §47107(a)(16).

In approving the ALP, the FAA has considered matters such as the effects the proposal would have on existing or planned traffic patterns of neighboring airports, the effects it would have on the existing airspace structure and projected programs of the FAA, the effects it would have on the safety of persons and property on the ground, and the effects that existing or proposed manmade objects (on file with FAA) and known natural objects with the affected area would have on the airport proposal.

The FAA has only limited means to prevent the construction of structures near an airport. The airport sponsor has the primary responsibility to protect the airport environs through such means as local zoning ordinances, property acquisition, avigation easements, letters of agreement and other means.

Notwithstanding, development depicted on the ALP shall comply with the requirements of the National Environmental Policies Act of 1969 (P.L. 91-190).

Approval of the plan does not indicate that the United States will participate in the cost of any development proposed. AIP funding requires evidence of eligibility and justification at the time a funding request is ripe for consideration.

When construction of any proposed structure or development indicated on the plan is undertaken, such construction requires normal 45-day advance notification to FAA for review in accordance with applicable Federal Aviation Regulations (i.e., Parts 77, 157, 152, etc.). More notice is generally beneficial to ensure that all statutory, regulatory, technical and operational issues can be addressed in a timely manner.

We concur with the priorities of this master plan and ALP to support growth in based aircraft through provision of hangar development sites. While the runway extension is eligible and within the recommended lengths of our design guidance, there is no evidence that current and future users would receive any substantial benefit. That could affect the ability to obtain discretionary funds for the project. Our office would certainly re-evaluate this opinion if there is evidence to the contrary.

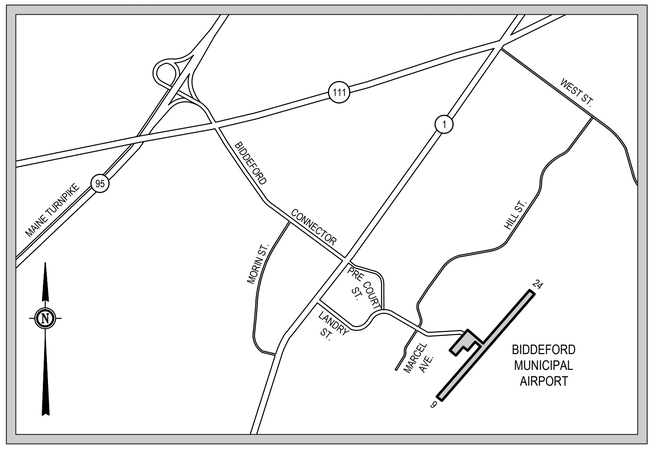
Our office will continue to work with you on your implementation plan. In particular, we recognize the desirability to develop the future refueling pavement prior to reconstructing the main apron. This may require consideration of other options or funding strategies.

The approved ALP drawing is submitted electronically for your records. If you have any questions, please contact me at my office (781) 238-7612, or my cellphone, 603-459-9436.

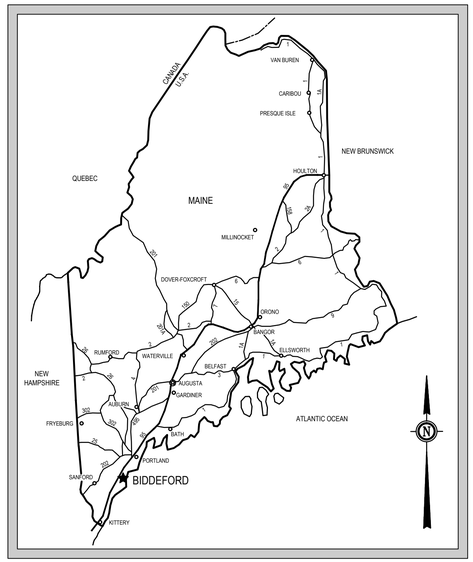
Sincerely,

Ralph Nicosia-Rusin
Airport Capacity Program Manager
FAA New England Region/Airports Division

# AIRPORT LAYOUT PLAN UPDATE




VICINITY MAP
N.T.S.




LOCATION MAP
40 0 40 80
SCALE: 1" = 40 MILES

## AIP NO. 3-23-0009-14-2020
## DATE: MAY 2022

AIRPORT COMMISSION'S APPROVAL

APPROVED DocuSigned by: Rick Laverriere, Biddeford Airport Commission
MR. RICK LAVERRIERE, CHAIRMAN
BIDDEFORD AIRPORT COMMISSION

DATE _____

INDEX TO DRAWINGS

| SHEET | SHEET TITLE | REVISION DATE |
|---|---|---|
| 1 OF 8 | TITLE SHEET | 5/16/22 |
| 2 OF 8 | AIRPORT DATA SHEET | 5/16/22 |
| 3 OF 8 | EXISTING FACILITIES | 5/16/22 |
| 4 OF 8 | ULTIMATE AIRPORT LAYOUT PLAN | 5/16/22 |
| 5 OF 8 | TERPS APPROACH PLAN AND PROFILE RUNWAY 6-24 | 5/16/22 |
| 6 OF 8 | INNER PORTION OF THE APPROACH PLAN AND PROFILE | 5/16/22 |
| 7 OF 8 | 14 CFR PART 77 SURFACES PLAN | 5/16/22 |
| 8 OF 8 | ZONING AND LAND USE PLAN | 5/16/22 |

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Boston Baltimore Orlando Hartford



PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 01-TITLE SHEET |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | NOT TO SCALE |

GRAPHIC SCALE

SHEET TITLE
TITLE SHEET

DRAWING NO.
1
1 OF 8

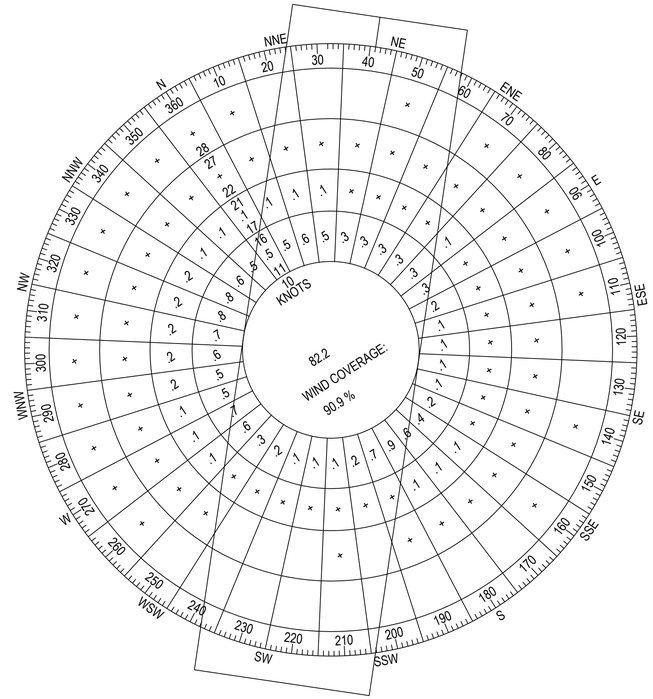
# AIRPORT DATA

| | | EXISTING | ULTIMATE |
|---|---|---|---|
| AIRPORT ELEVATION (NAVD 88, MSL) | | 157.0' | 157.0' |
| AIRPORT REFERENCE POINT (ARP) (CENTER OF RUNWAY 06-24) | LATITUDE: | N43° 27' 50.82" | N43° 27' 50.07" |
| | LONGITUDE: | W70° 28' 20.63" | W70° 28' 21.51" |
| AIRPORT REFERENCE CODE (ARC) | | A-I (SMALL AIRCRAFT) | A-I (SMALL AIRCRAFT) |
| DESIGN AIRCRAFT | | CESSNA 182A | CESSNA 182A |
| AIRPORT IDENTIFIER | | B19 | |
| MEAN MAX. TEMPERATURE OF HOTTEST MONTH | | 79° F | |
| MAGNETIC DECLINATION | | 14° 49' W (WMM-2020) | 14° 49' W (WMM-2020) |
| AIRPORT NAVAIDS | | BEACON, LIGHTED WINDCONE WITH SEGMENTED CIRCLE | BEACON, LIGHTED WINDCONE WITH SEGMENTED CIRCLE |
| MISC. NAVAIDS | | LIGHTED WINDCONE, SUPPLEMENTAL WINDCONE, ROTATING BEACON, PAPI (6), REIL (6) | LIGHTED WINDCONE, SUPPLEMENTAL WINDCONE, ROTATING BEACON, PAPI (6), REIL(6) |
| NPIAS SERVICE LEVEL | | GA | GA |
| FAA ASSET CATEGORY | | LOCAL | LOCAL |

# RUNWAY DATA

| | | EXISTING | | ULTIMATE | |
|---|---|---|---|---|---|
| | | RUNWAY 6 | RUNWAY 24 | RUNWAY 6 | RUNWAY 24 |
| RUNWAY PAVEMENT STRENGTH | | 25,000 LBS (SW) | | 25,000 LBS (SW) | |
| RUNWAY DESIGN CODE | | A-I-5000 | A-I-VIS | A-I-5000 | A-I-VIS |
| PAVEMENT CLASSIFICATION NUMBER (PCN) | | 99/F/A/Z/T | | 50/F/A/Z/T | |
| SURFACE TYPE & TREATMENT | | ASPHALT | | ASPHALT | |
| EFFECTIVE RUNWAY GRADIENT | | 0.30% | | 0.30% | |
| MAX. RUNWAY GRADE CHANGE | | 0.83% | | 0.83% | |
| WIND COVERAGE (12 KNOT CROSSWIND) | | 90.9% | | 90.9% | |
| RUNWAY DIMENSIONS (LENGTH X WIDTH) | | 3,001 LF X 75 FT | | 3,200 LF X 75 FT | |
| DISPLACED THRESHOLD | | NONE | NONE | NONE | NONE |
| USABLE RUNWAY LENGTH | | 3,001 LF | 3,001 LF | 3,200 LF | 3,200 LF |
| 14 CFR PART 77 APPROACH CATEGORY AND APPROACH TYPE | | 34:1 (NON-PRECISION) | 20:1 (VISUAL) | 34:1 (NON-PRECISION) | 20:1 (VISUAL) |
| VISIBILITY MINIMUMS | | 680'-1 MILE (A)<br>680'-1 MILE (B)<br>680'-1½ MILE (C) | VISUAL | 680'-1 MILE (A)<br>680'-1 MILE (B)<br>680'-1½ MILE (C) | VISUAL |
| TERPS APPROACH SURFACE | | 20:1 | 20:1 | 20:1 | 20:1 |
| RUNWAY SAFETY AREA | LENGTH BEYOND DEPARTURE END: | 240 LF | 240 LF | 240 LF | 240 LF |
| | WIDTH: | 120 FT | 120 FT | 120 FT | 120 FT |
| RUNWAY OBJECT FREE AREA | LENGTH BEYOND RW END: | 240 LF | 240 LF | 240 LF | 240 LF |
| | WIDTH: | 250 FT | 250 FT | 250 FT | 250 FT |
| RUNWAY OBSTACLE FREE ZONE | LENGTH BEYOND RW END: | 200 LF | 200 LF | 200 LF | 200 LF |
| | WIDTH: | 250 FT | 250 FT | 250 FT | 250 FT |
| RUNWAY PROTECTION ZONE | LENGTH BEYOND RW THRESHOLD | 1,000 LF | 1,000 LF | 1,000 LF | 1,000 LF |
| | INNER WIDTH: | 250 FT | 250 FT | 250 FT | 250 FT |
| | OUTER WIDTH | 450 FT | 450 FT | 450 FT | 450 FT |
| RUNWAY END COORDINATES | LATITUDE: | N43°27'39.59" | N43°28'02.04" | N43°27'38.10" | N43°28'02.04" |
| | LONGITUDE: | W70°28'33.91" | W70°28'07.34" | W70°28'35.67" | W70°28'07.34" |
| | ELEVATION: | 148.0' MSL | 156.93' MSL | 148.0' MSL | 156.93' MSL |
| DISP. THRESHOLD COORDINATES | LATITUDE: | N/A | N/A | N/A | N/A |
| | LONGITUDE: | N/A | N/A | N/A | N/A |
| | ELEVATION: | N/A | N/A | N/A | N/A |
| RUNWAY LIGHTING | | MIRLS | | MIRLS | |
| NAVIGATIONAL AIDS | | RNAV(GPS), PAPI, REIL | NONE | RNAV(GPS), PAPI, REIL | NONE |
| RUNWAY MARKINGS | | NON-PRECISION | BASIC | NON-PRECISION | BASIC |
| AERONAUTICAL SURVEY REQUIRED | | NVGS | NVGS | NVGS | NVGS |
| RUNWAY DEPARTURE OCS APPLICABILITY | | YES | YES | YES | YES |
| TOUCHDOWN ZONE ELEVATION | | 157.0' MSL | 157.0' MSL | 157.0' MSL | 157.0' MSL |

*ALL INFORMATION USED IN THIS DATA TABLE IS BASED ON THE NAD83 HORIZONTAL DATUM AND NAVD-88 VERTICAL DATUM.




## ALL WEATHER WIND ROSE

WIND DATA OBTAINED FROM PORTLAND INTERNATIONAL JETPORT ON SEPTEMBER 14, 2021.

# TAXIWAY DATA

| | EXISTING | ULTIMATE |
|---|---|---|
| TAXIWAY/TAXILANE WIDTH | 25 FT | 25 FT |
| TAXIWAY/TAXILANE SAFETY AREA WIDTH | 49 FT | 49 FT |
| TAXIWAY OBJECT FREE AREA | 89 FT | 89 FT |
| TAXILANE OBJECT FREE AREA | 79 FT | 79 FT |
| TAXIWAY CENTERLINE TO CENTERLINE SEPARATION | 70 FT | 70 FT |
| TAXIWAY CENTERLINE TO FIXED OR MOVABLE OBJECT | 44.5 FT | 44.5 FT |
| TAXILANE CENTERLINE TO CENTERLINE SEPARATION | 64 FT | 64 FT |
| TAXILANE CENTERLINE TO FIXED OR MOVABLE OBJECT | 39.5 FT | 39.5 FT |
| TAXIWAY LIGHTING | ENTRANCE LIGHTING | FULL LENGTH MITLs |

# DECLARED DISTANCES

| | EXISTING | | ULTIMATE | |
|---|---|---|---|---|
| | RUNWAY 6 | RUNWAY 24 | RUNWAY 6 | RUNWAY 24 |
| TAKEOFF RUN AVAILABLE (TORA) | 3,001 LF | 3,001 LF | 3,200 LF | 3,200 LF |
| TAKEOFF DISTANCE AVAILABLE (TODA) | 3,001 LF | 3,001 LF | 3,200 LF | 3,200 LF |
| ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) | 3,001 LF | 3,001 LF | 3,200 LF | 3,200 LF |
| LANDING DISTANCE AVAILABLE (LDA) | 3,001 LF | 3,001 LF | 3,200 LF | 3,200 LF |

# MODIFICATION TO STANDARDS APPROVAL TABLE

| APPROVAL DATE | AIRSPACE CASE NO. | STANDARD TO BE MODIFIED | DESCRIPTION |
|---|---|---|---|
| N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A |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Boston Baltimore Orlando Hartford




PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 02-DATA SHEET |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | NOT TO SCALE |

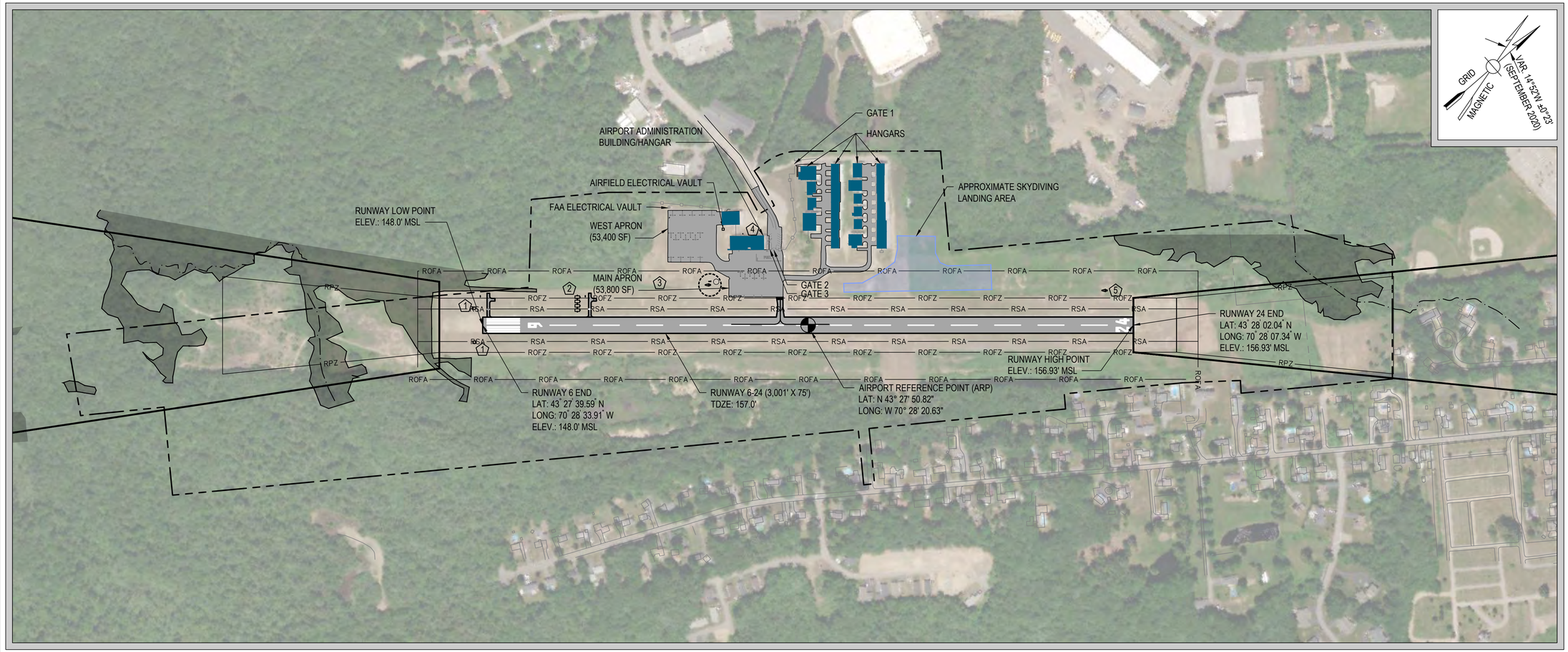
GRAPHIC SCALE

SHEET TITLE

AIRPORT DATA SHEET

DRAWING NO.

2




# EXISTING FACILITIES PLAN

1" = 250'

## NAVAIDS LIST

| ID | TYPE | OPERATOR |
|---|---|---|
| 1 | REILS 6 | FAA |
| 2 | PAPIS 6 | FAA |
| 3 | WINDCONE AND SEGMENTED CIRCLE | AIRPORT |
| 4 | ROTATING BEACON | AIRPORT |
| 5 | SUPPLEMENTAL WINDCONE | AIRPORT |

## GATES

| GATE NUMBER | LOCATION | TYPE |
|---|---|---|
| GATE 1 | BEHIND HANGARS | MOTORIZED SLIDE GATE |
| GATE 2 | ENTRANCE TO MAIN APRON | MOTORIZED SLIDE GATE |
| GATE 3 | ABUTTING ADMIN BUILDING | PEDESTRIAN GATE |

| | | RUNWAY 6 | RUNWAY 24 |
|---|---|---|---|
| RUNWAY SAFETY AREA | LENGTH BEYOND DEPARTURE END: | 240 LF | 240 LF |
| | WIDTH: | 120 FT | 120 FT |
| RUNWAY OBJECT FREE AREA | LENGTH BEYOND RW END: | 240 LF | 240 LF |
| | WIDTH: | 250 FT | 250 FT |
| RUNWAY OBSTACLE FREE ZONE | LENGTH BEYOND RW END: | 200 LF | 200 LF |
| | WIDTH: | 250 FT | 250 FT |
| RUNWAY PROTECTION ZONE | LENGTH BEYOND RW THRESHOLD | 1,000 LF | 1,000 LF |
| | INNER WIDTH: | 250 FT | 250 FT |
| | OUTER WIDTH | 450 FT | 450 FT |

## LEGEND

| ITEM | (E) EXISTING |
|---|---|
| AIRPORT PROPERTY LINE | |
| RUNWAY SAFETY AREA (RSA) | RSA |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA |
| RUNWAY PROTECTION ZONE (RPZ) | RPZ |
| RUNWAY OBSTACLE FREE ZONE (ROFZ) | ROFZ |
| WETLANDS | |
| BUILDINGS | |
| PAVEMENT | |
| RIVER | |
| 8' HIGH FENCE | |
| AIRPORT REFERENCE POINT | |
| TERPS 20:1 APPROACH SURFACE | |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*Engineers and Planners*

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Boston Baltimore Orlando Hartford




PROJECT
AIRPORT MASTER PLAN UPDATE
AIP NO. 3-23-0009-14-2020

OWNER
BIDDEFORD MUNICIPAL AIRPORT
BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 03-EXISTING FAC. |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | 1" = 250' |

GRAPHIC SCALE

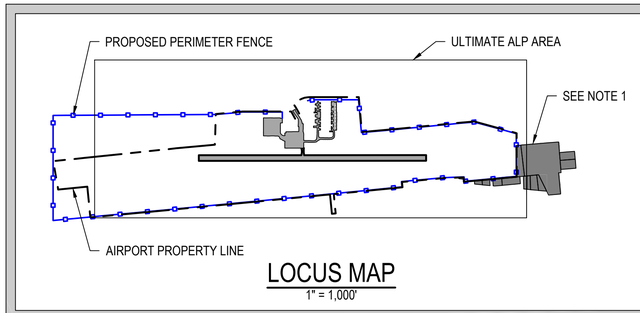
0 125 250 500

SHEET TITLE

EXISTING FACILITIES

DRAWING NO.

3




## LOCUS MAP
1" = 1,000'







## ULTIMATE AIRPORT LAYOUT PLAN
1" = 200'

## NAVAIDS LIST

| ID | TYPE | OPERATOR | STATUS |
|---|---|---|---|
| 1 | REILS 6 | FAA | TO BE RELOCATED[2] |
| 2 | PAPIS 6 | FAA | TO BE RELOCATED[2] |
| 3 | WINDCONE AND SEGMENTED CIRCLE | AIRPORT | TO BE RELOCATED |
| 4 | ROTATING BEACON | AIRPORT | EXISTING |
| 5 | SUPPLEMENTAL WINDCONE | AIRPORT | EXISTING |

## FAA APPROVAL

See FAA Approval Letter of June 14, 2022

APPROVED _____

DATE June 14, 2022

## SURVEY MONUMENTS

| IDENTIFIER | LATITUDE | LONGITUDE | ELEV. | DESCRIPTION |
|---|---|---|---|---|
| 1 | N 43° 27' 37.81" | W 70° 28' 33.46" | 142.2' | SACS |
| 2 | N 43° 27' 52.28" | W 70° 28' 25.38" | 163.46' | PACS |
| 3 | N 43° 28' 4.47" | W 70° 28' 6.88" | 158.2' | SACS |

## MAINEDOT APPROVAL

APPROVED DocuSigned by: 2409D668DAFF4D7... _____

DATE

## AIRPORT COMMISSION'S APPROVAL

APPROVED DocuSigned by: Rick Laverriere, Biddeford Airport Commission FFC38EC90434B45F... _____

MR. RICK LAVERRIERE, BIDDEFORD AIRPORT COMMISSION

DATE

## GATES

| GATE IDENTIFIER | LOCATION | TYPE |
|---|---|---|
| 1 | BEHIND HANGARS | MOTORIZED SLIDE GATE |
| 2 | ENTRANCE TO MAIN APRON | MOTORIZED SLIDE GATE |
| 3 | ABUTTING ADMIN BUILDING | PEDESTRIAN GATE |

## FACILITIES LIST
(E) EXISTING (F) FUTURE (R) TO BE REMOVED

| IDENTIFIER | TYPE | OPERATOR | STATUS | TOS ELEVATION (MSL) |
|---|---|---|---|---|
| 1 | ADMIN. BUILDING AND MAINTENANCE HANGAR | AIRPORT | (E) | |
| 2 | SRE BUILDING | AIRPORT | (F) | |
| 3 | STORAGE HANGAR | AIRPORT | (E) | |
| 4 | EAA HANGAR | EAA | (E) | |
| 5 | AIRFIELD ELECTRICAL VAULT | AIRPORT | (E) | |
| 6 | FAA ELECTRICAL VAULT | FAA | (E) | |
| 7 | HANGAR COMPLEX | AIRPORT | (E) | |
| 8 | HANGARS | AIRPORT | (F) | |

NOTES:
1. FOR EASEMENT INFORMATION, SEE EXHIBIT A DATED MAY, 2016 AND REVISED APRIL 12, 2018.
2. PAPI/REIL LOCATIONS TO BE DETERMINED AT THE TIME OF RUNWAY EXTENSION IN COORDINATION WITH FAA FLIGHT PROCEDURES, FAA ATO P & R GROUP, LOCAL FAA TECH OPS, THE AIRPORT OPERATOR, AND OTHER AGENCIES, AS APPROPRIATE.

| | | RUNWAY 6 | RUNWAY 24 |
|---|---|---|---|
| RUNWAY SAFETY AREA | LENGTH BEYOND DEPARTURE END: | 240 LF | 240 LF |
| | WIDTH: | 120 FT | 120 FT |
| RUNWAY OBJECT FREE AREA | LENGTH BEYOND RW END: | 240 LF | 240 LF |
| | WIDTH: | 250 FT | 250 FT |
| RUNWAY OBSTACLE FREE ZONE | LENGTH BEYOND RW END: | 200 LF | 200 LF |
| | WIDTH: | 250 FT | 250 FT |
| RUNWAY PROTECTION ZONE | LENGTH BEYOND RW THRESHOLD | 1,000 LF | 1,000 LF |
| | INNER WIDTH: | 250 FT | 250 FT |
| | OUTER WIDTH | 450 FT | 450 FT |

## LEGEND

| ITEM | (E) EXISTING | (F) FUTURE |
|---|---|---|
| AIRPORT PROPERTY LINE | | |
| RUNWAY SAFETY AREA (RSA) | RSA | RSA |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA | ROFA |
| RUNWAY PROTECTION ZONE (RPZ) | RPZ | RPZ |
| RUNWAY OBSTACLE FREE ZONE (ROFZ) | ROFZ | ROFZ |
| WETLANDS | | |
| BUILDINGS | | |
| PAVEMENT | | |
| RIVER | | |
| AIRPORT REFERENCE POINT (ARP) | | |
| 8' FENCING | | |
| AVIGATION EASEMENT | | |
| 14 CFR PART 77 20:1 APPROACH SURFACE | | |
| TERPS 20:1 APPROACH SURFACE | | |

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AIP NO. 3-23-0009-14-2020

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BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

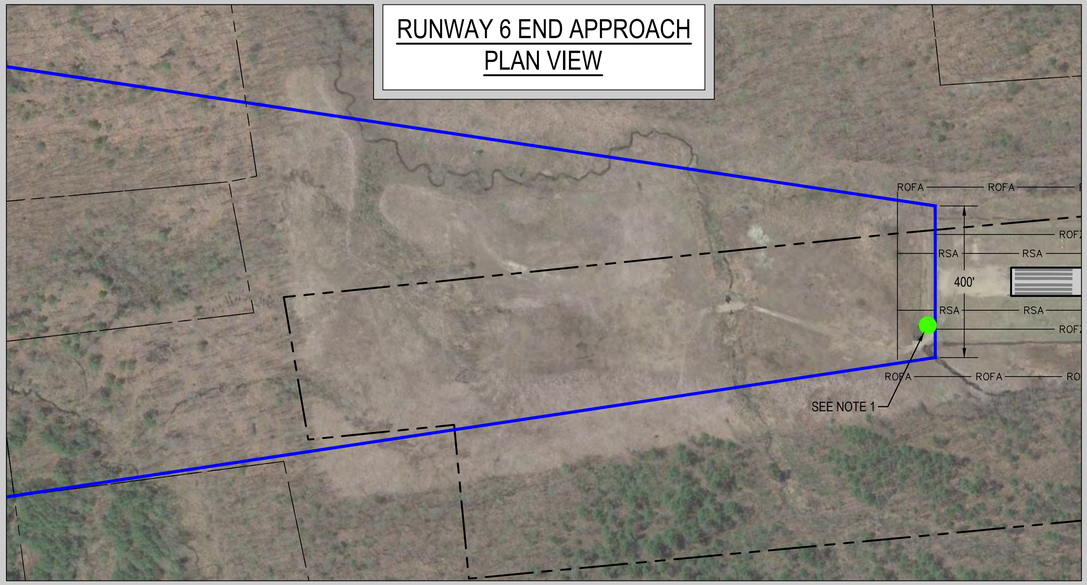
| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 04-ULTIMATE ALP |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | 1" = 200' |

GRAPHIC SCALE
0 100 200 400

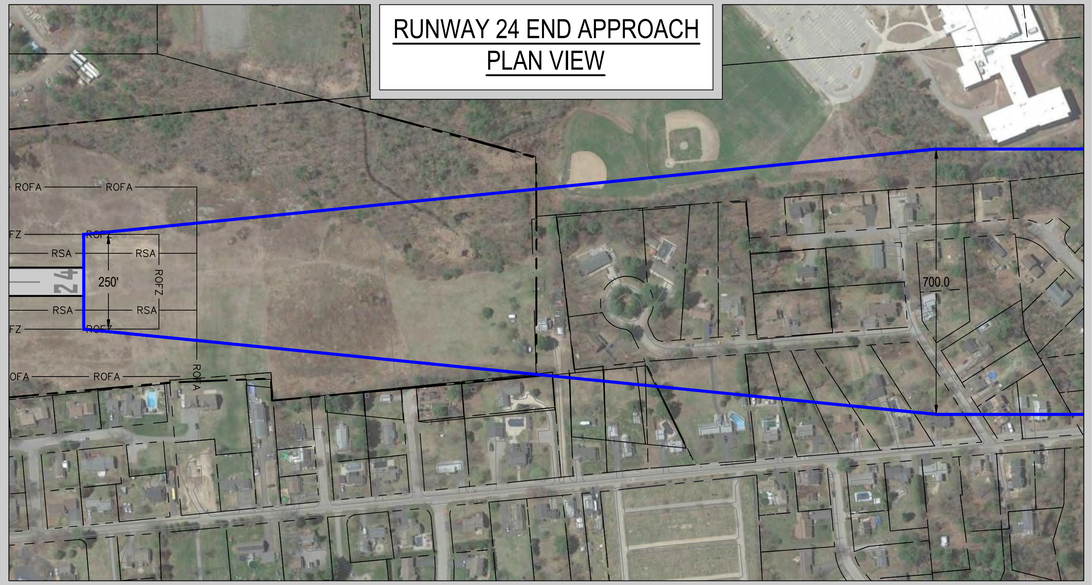
SHEET TITLE
ULTIMATE AIRPORT LAYOUT PLAN

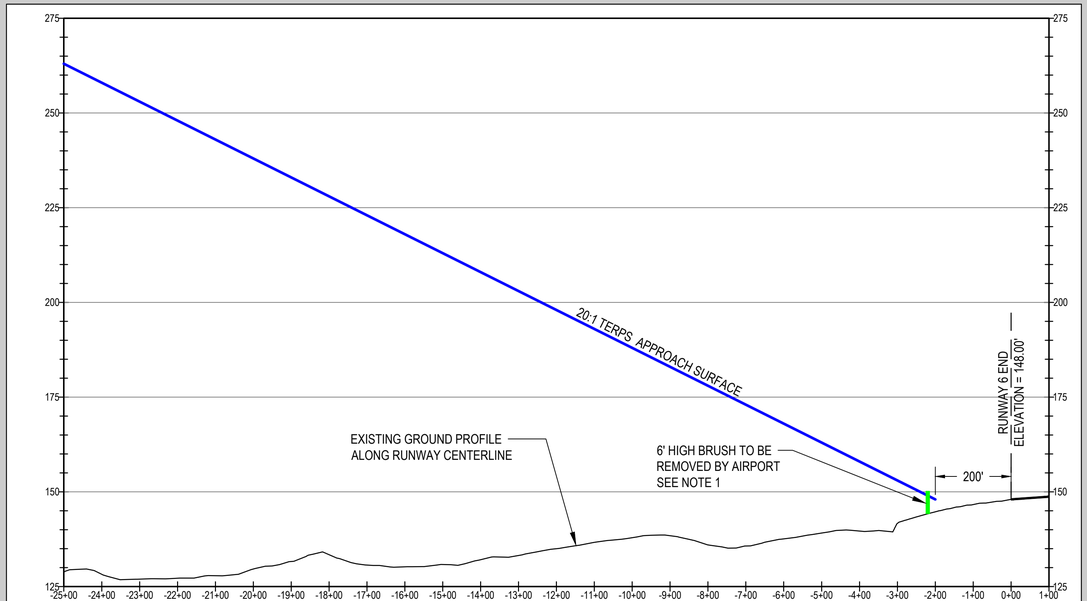
DRAWING NO.
4

## RUNWAY 6 END APPROACH PLAN VIEW

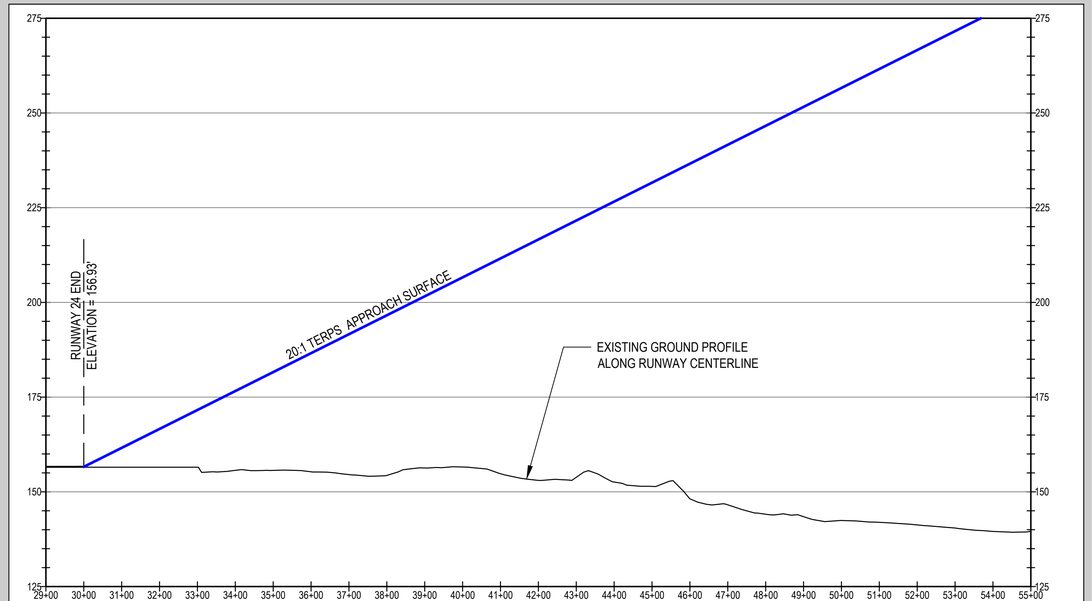



## RUNWAY 24 END APPROACH PLAN VIEW



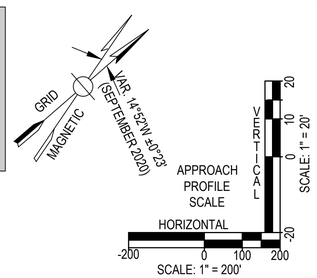

## RUNWAY 6 END PROFILE




## RUNWAY 24 END PROFILE

## LEGEND

| | | | |
|---|---|---|---|
| AIRPORT PROPERTY LINE | | TERPS 20:1 APPROACH SURFACE | |
| RUNWAY SAFETY AREA (RSA) | RSA | EXISTING PAVEMENT | |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA | OBSTRUCTION IDENTIFIED BY AVIATION TECHNOLOGIES, LLC | |
| RUNWAY OBSTACLE FREE ZONE (ROFZ) | ROFZ | | |




## TERPS TYPE 4

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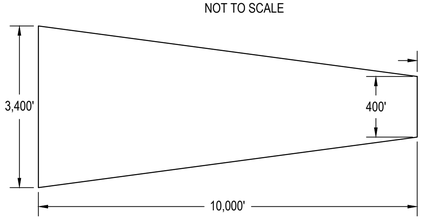
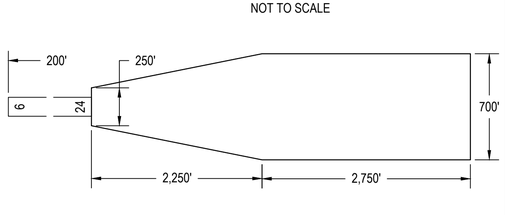



## TERPS TYPE 2

NOT TO SCALE




NOTES:
1. VEGETATIVE OBSTRUCTIONS IDENTIFIED BY AVIATION TECHNOLOGIES, LLC ON AUGUST 8, 2021.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AIP NO. 3-23-0009-14-2020

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BIDDEFORD, MAINE

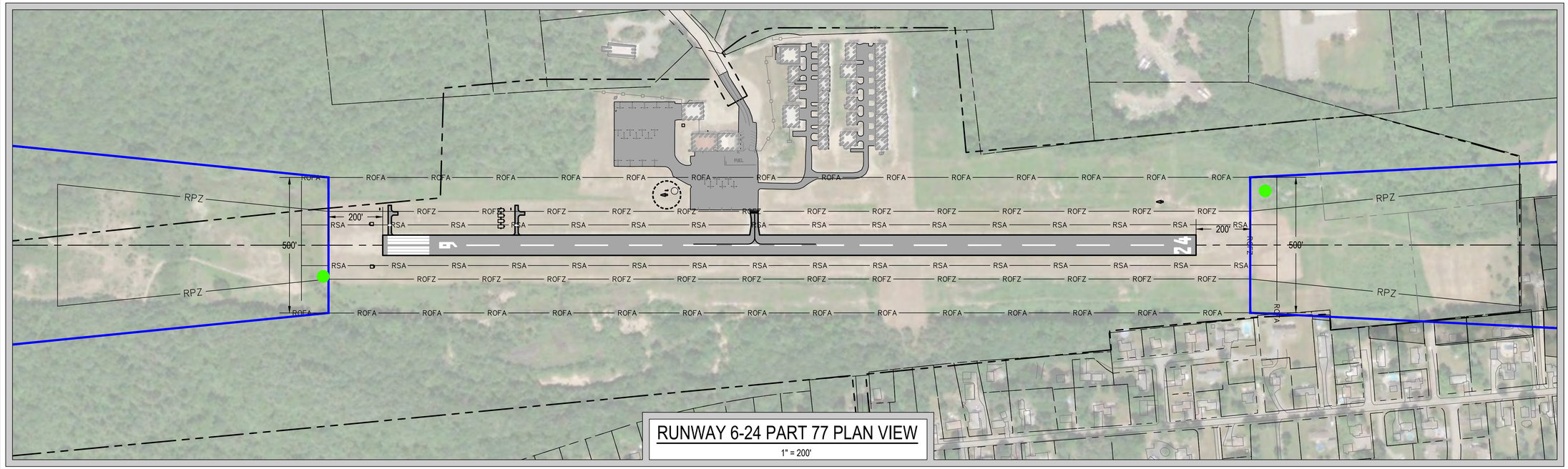
| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 05-TERPS PLAN |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | 1" = 200' |

GRAPHIC SCALE
0 100 200 400

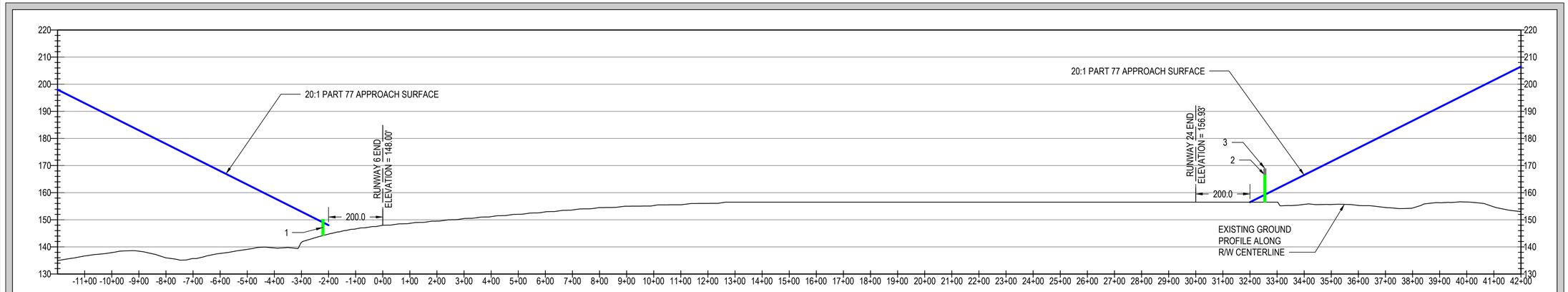
SHEET TITLE
TERPS APPROACH PLAN AND PROFILE RUNWAY 6-24

DRAWING NO.
5
5 OF 8




## RUNWAY 6-24 PART 77 PLAN VIEW

1" = 200'




## RUNWAY 6-24 PROFILE VIEW

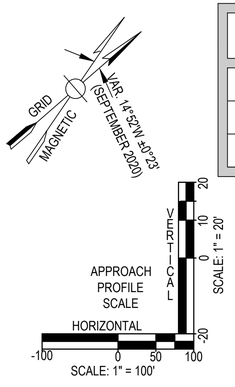
1" = 200'

## OBSTRUCTION DATA

| OBJECT ID | DESCRIPTION | GROUND ELEVATION (MSL) | PENETRATION (FT) | PART 77 SURFACE(S) | PROPOSED ACTION |
|---|---|---|---|---|---|
| 1 | BRUSH | 150.2' | 1.16' | APPROACH SURFACE | REMOVE |

## LEGEND

| | |
|---|---|
| AIRPORT PROPERTY LINE | |
| RUNWAY SAFETY AREA (RSA) | RSA |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA |
| RUNWAY OBSTACLE FREE ZONE (ROFZ) | ROFZ |
| 20:1 PART 77 APPROACH SURFACE | |
| EXISTING PAVEMENT | |
| EXTENDED RUNWAY CENTERLINE | |




## OBSTRUCTION DATA

| OBJECT ID | DESCRIPTION | GROUND ELEVATION (MSL) | PENETRATION (FT) | PART 77 SURFACE(S) | PROPOSED ACTION |
|---|---|---|---|---|---|
| 2 | TREE | 166.5' | 7.25' | APPROACH SURFACE | REMOVE |
| 3 | LEDGE | 168.91' | 9.66' | APPROACH SURFACE | OEAAA CASE NO. 2020-ANE-125-NRA |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AIP NO. 3-23-0009-14-2020

OWNER

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BIDDEFORD, MAINE

| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 06-INNER TERPS |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | 1" = 200' |

GRAPHIC SCALE

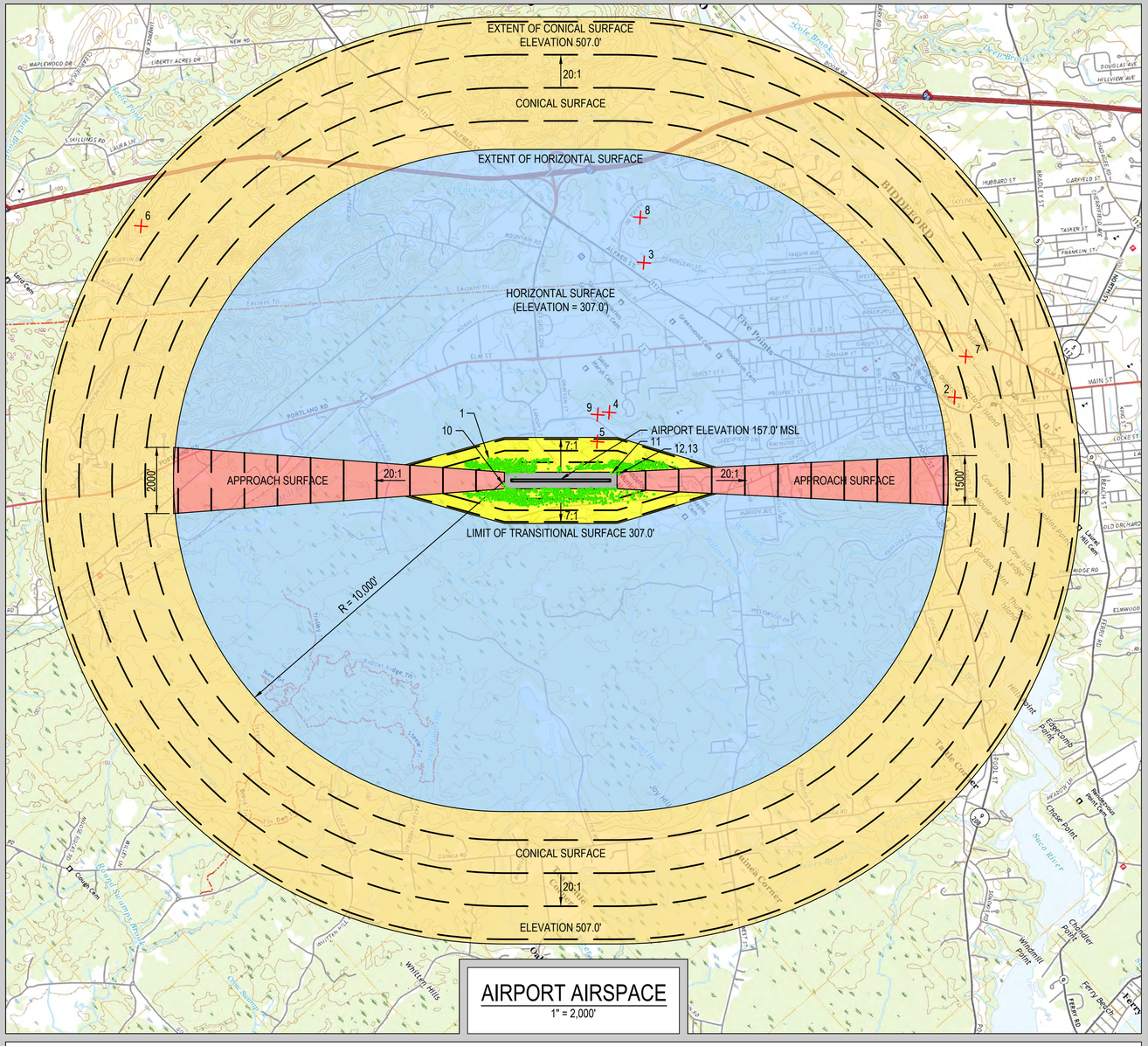
0 100 200 400

SHEET TITLE

INNER PORTION OF THE APPROACH PLAN AND PROFILE RUNWAY 6-24

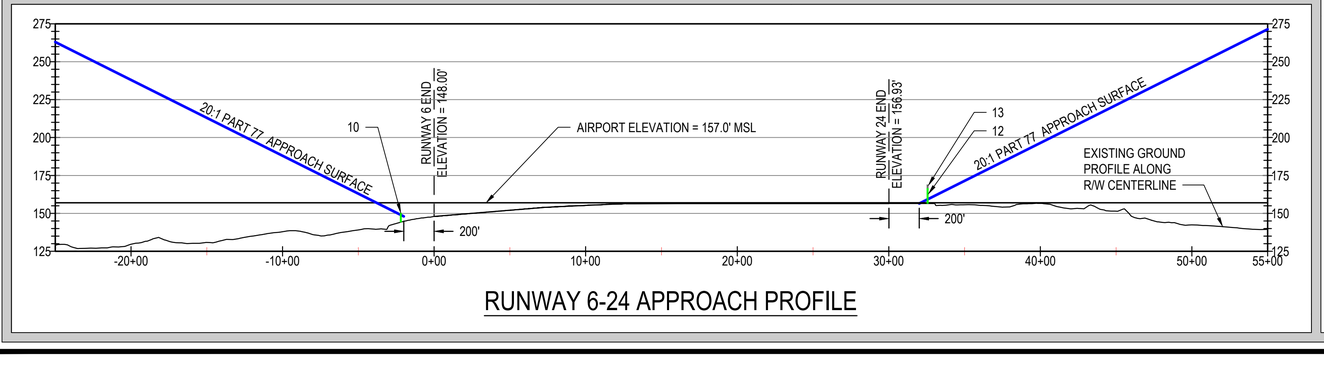
DRAWING NO.

6

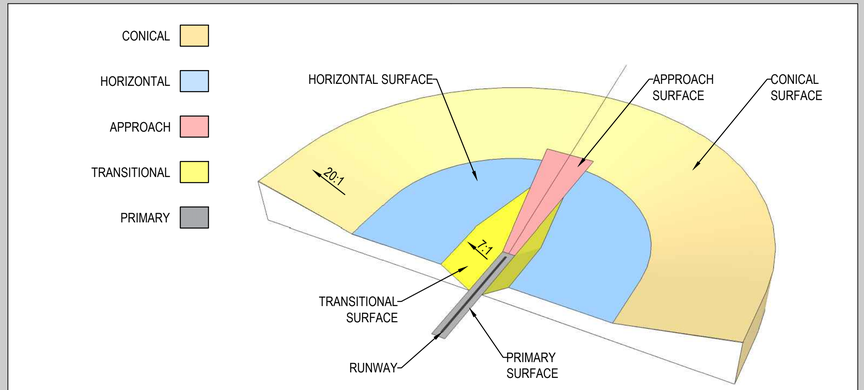



## AIRPORT AIRSPACE

1" = 2,000'




## RUNWAY 6-24 APPROACH PROFILE




## 14 CFR PART 77 SURFACES

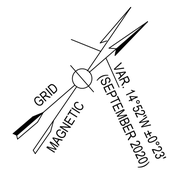
NTS

OBSTRUCTION DATA

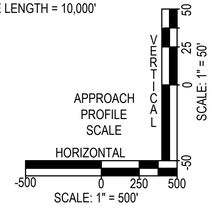
| OBJECT ID | DESCRIPTION | LATITUDE | LONGITUDE | ELEVATION (MSL) | PART 77 SURFACE(S) | PENETRATION (Y/N) |
|---|---|---|---|---|---|---|
| 1[2] | VEGETATION | N43° 27' 52.91" | W70° 28' 21.77" | | PRIMARY, TRANSITION | Y |
| 2 | STACK | N43° 29' 36.00" | W70° 27' 01.00" | 170.00 | CONICAL | N |
| 3 | TOWER | N43° 28' 52.00" | W70° 29' 05.99" | 296.00 | HORIZONTAL | N |
| 4 | TOWER | N43° 28' 15.02" | W70° 28' 28.80" | 307.00 | HORIZONTAL | Y |
| 5 | TOWER | N43° 28' 06.60" | W70° 28' 22.93" | 346.00 | TRANSITION | Y |
| 6 | TOWER | N43° 27' 05.46" | W70° 31' 31.76" | 362.00 | CONICAL | N |
| 7 | STACK | N43° 29' 46.47" | W70° 27' 10.70" | 307.00 | CONICAL | N |
| 8 | BUILDING | N43° 29' 00.00" | W70° 29' 21.00" | 163.00 | HORIZONTAL | N |
| 9 | TOWER | N43° 28' 11.96" | W70° 28' 31.19" | 304.00 | HORIZONTAL | N |
| 10 | VEGETATION | N43° 27' 37.20" | W70° 28' 34.68" | 150.20 | APPROACH | Y |
| 11 | ROCK LEDGE | N43° 28' 03.95" | W70° 28' 09.64" | 162.55 | PRIMARY | OEAAA CASE NO. 2020-ANE-123-NRA |
| 12 | TREE | N43° 28' 05.24" | W70° 28' 07.14" | 166.50 | APPROACH | Y |
| 13 | ROCK LEDGE | N43° 28' 05.53" | W70° 28' 06.91" | 168.91 | APPROACH | OEAAA CASE NO. 2020-ANE-125-NRA |

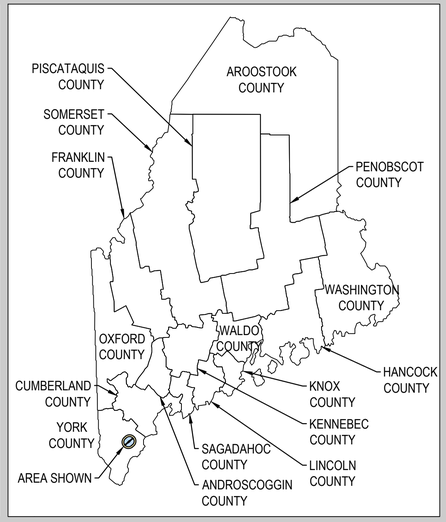
NOTES:

1. CITY OF BIDDEFORD LAND DEVELOPMENT REGULATIONS (PART III, ARTICLE VI, SECTION 4, ITEM A) APPROACH ZONE HEIGHT LIMIT. NO STRUCTURE SHALL HEREAFTER BE ERECTED OR VEGETATION BE ALLOWED TO GROW MORE THAN ONE FOOT IN HEIGHT FOR EACH 20 FEET OF HORIZONTAL DISTANCE FROM A POINT 200 FEET FROM THE ULTIMATE END OF A RUNWAY TO A POINT 10,200 FEET FROM THE ULTIMATE END OF A RUNWAY IN AN APPROACH ZONE.
2. VEGETATIVE OBSTRUCTION DATA FROM 2005 ALP.




PART 77 SURFACES:
- WIDTH OF PRIMARY SURFACE = 500'
- RADIUS OF HORIZONTAL SURFACE = 10,000'
- APPROACH SURFACE WIDTH AT END = 2,000'
- APPROACH SURFACE LENGTH = 10,000'

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| NO. | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

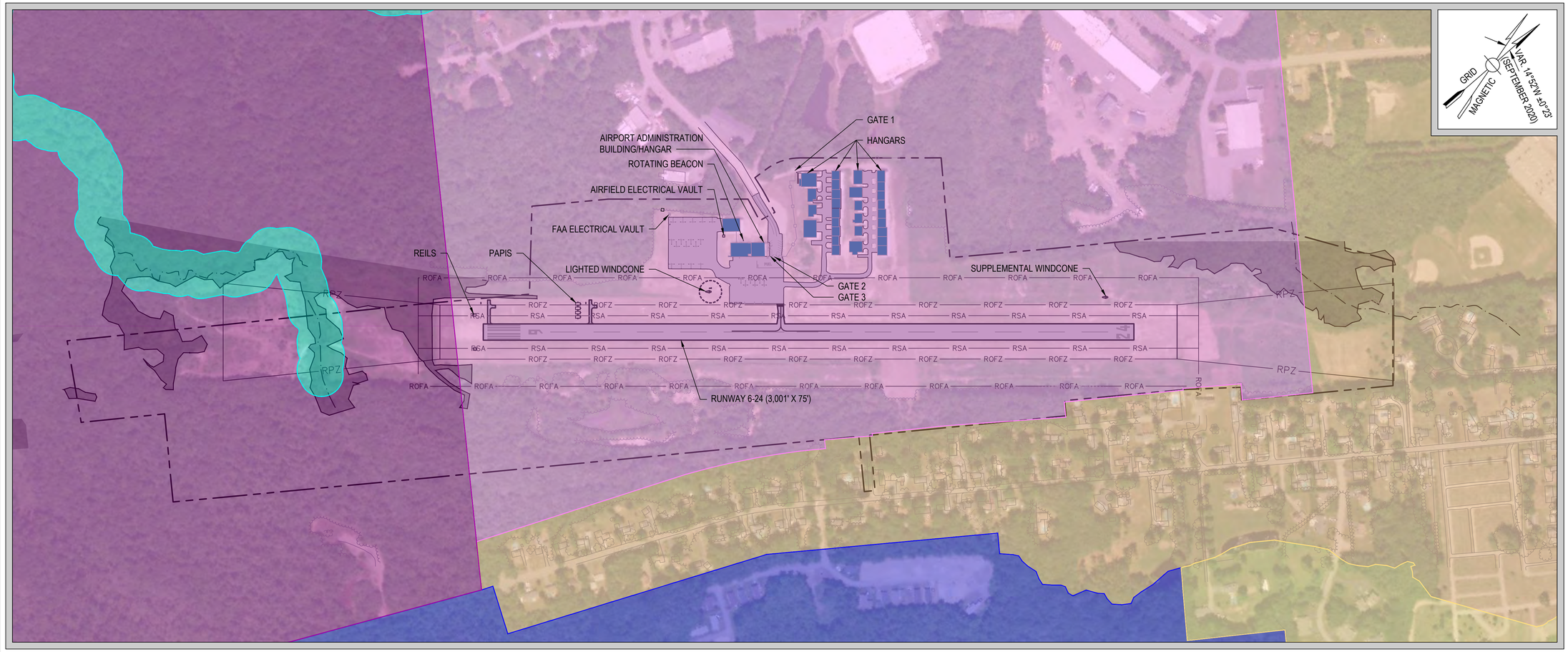
| | |
|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 07-AIRSPACE |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | AS SHOWN |

GRAPHIC SCALE

SHEET TITLE

14 CFR PART 77
SURFACES PLAN

DRAWING NO.
7




## LAND USE AND ZONING PLAN

1" = 250'

### GATES

| GATE NUMBER | LOCATION | TYPE |
|---|---|---|
| GATE 1 | BEHIND HANGARS | MOTORIZED SLIDE GATE |
| GATE 2 | ENTRANCE TO MAIN APRON | MOTORIZED SLIDE GATE |
| GATE 3 | ABUTTING ADMIN BUILDING | PEDESTRIAN GATE |

### LEGEND

| ITEM | (E) EXISTING | ITEM | (E) EXISTING |
|---|---|---|---|
| AIRPORT PROPERTY LINE | | AIRPORT INDUSTRIAL | |
| RUNWAY SAFETY AREA (RSA) | RSA | GENERAL INDUSTRIAL | |
| RUNWAY OBJECT FREE AREA (ROFA) | ROFA | SINGLE FAMILY RESIDENTIAL | |
| RUNWAY OBSTACLE FREE ZONE (ROFZ) | ROFZ | MOBILE HOME PARKS | |
| RUNWAY PROTECTION ZONE (RPZ) | RPZ | RURAL FARM | |
| 8' HIGH FENCE | | STREAM PROTECTION | |
| BUILDINGS | | PAVEMENT | |
| RIVER | | WETLANDS | |

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|---|---|
| PROJECT NO. | 777092 |
| CADD FILE | 08-LAND USE |
| DESIGNED BY | APL |
| DRAWN BY | APL |
| CHECKED BY | MPC |
| DATE | MAY 2022 |
| DRAWING SCALE | 1" = 250' |

GRAPHIC SCALE
0 125 250 500

SHEET TITLE
ZONING AND LAND USE PLAN

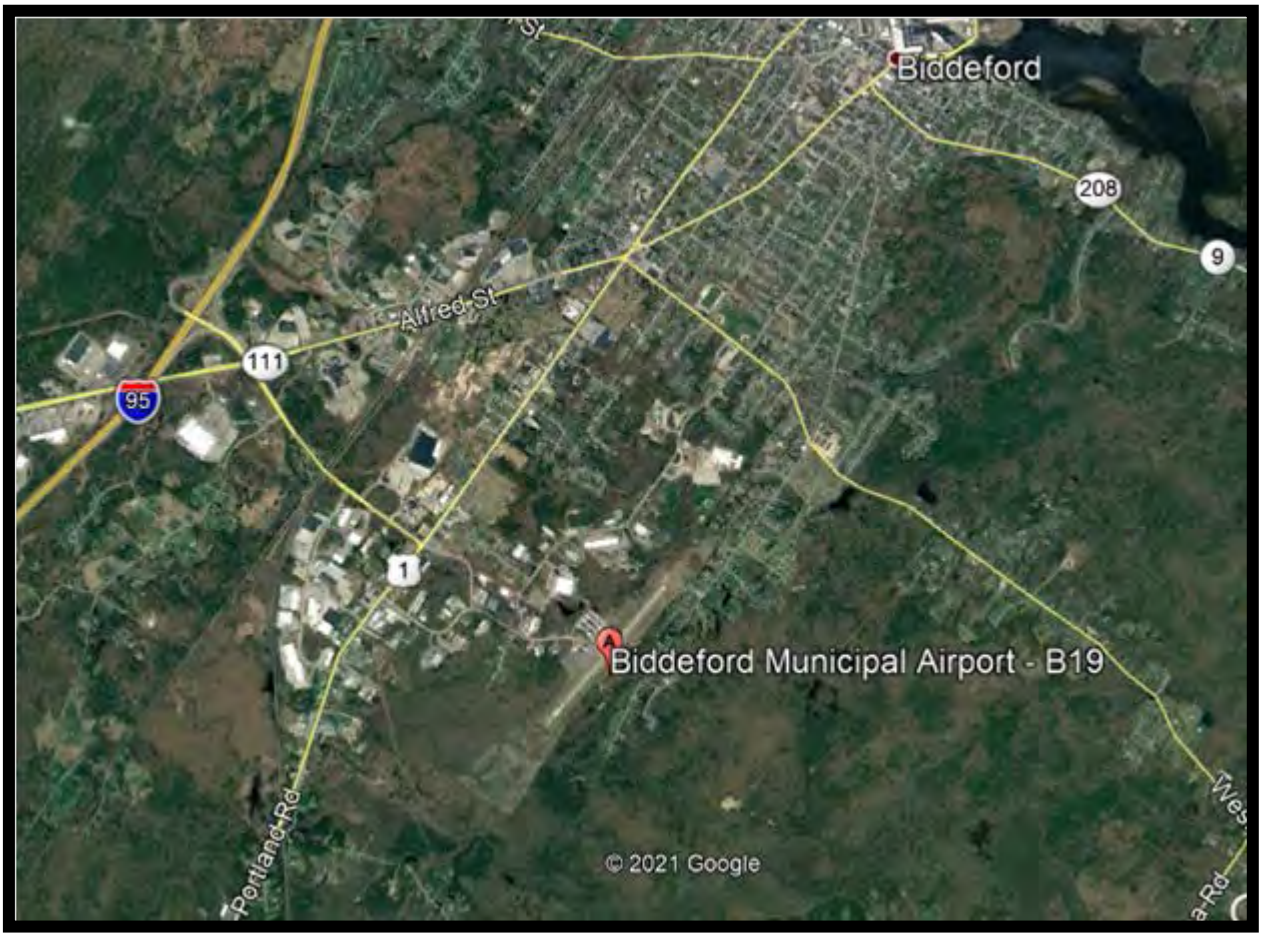
DRAWING NO.
8

Appendix A – Wildlife Hazard Report

# Wildlife Hazard Site Visit and Evaluation

# Biddeford Municipal Airport
# Biddeford, Maine

**FAA AIP Project No. 3-23-0009-014-2020**




**June 20, 2021**

# Wildlife Hazard Site Visit and Evaluation

# Biddeford Municipal Airport
# Biddeford, Maine

**FAA AIP Project No. 3-23-0009-014-2020**

**June 20, 2021**

Prepared for:
Gale Associates

Prepared by:
NewEarth Ecological Consulting, LLC
169 Watson Mill Road
Saco, ME 04072
207.286.3259

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# 1.0 INTRODUCTION

## 1.1 PURPOSE AND NEED

The purpose of the wildlife hazard site visit (WHS) and evaluation presented in this report is to gather information to document and assess potential wildlife hazards at the Biddeford Municipal Airport (hereafter referred to as the "Airport") as recommended by, and in accordance with, the Federal Aviation Administration (FAA) Advisory Circulars (AC) 150/5200-33B, 36A, and 38 (FAA 2007, 2012, 2018). The WHS and evaluation is a cursory-level assessment and intended to provide baseline information to assist the Airport manager and interested parties in improving Airport safety by identifying and mitigating potential wildlife hazards, facilitating future Airport and land use planning, and to determine if a full wildlife hazard assessment is needed to ensure FAA compliance and Airport safety.

## 1.2 BIDDEFORD MUNICIPAL AIRPORT FACILITY

The Airport is an approximately 126-acre public use general aviation facility located at 88 Landry Street, Biddeford, Maine (Latitude 43.46487°/Longitude -70.47372°), in York County (Appendix A, Figure 1). The Airport, FAA Identification Code B19, is owned and managed by the City of Biddeford. Airport facilities include a 3,001-foot-long and 75-foot-wide recently reconstructed asphalt runway (Runway 06-24), 100LL Avgas fuel facility, 30 hangars, vehicle parking lot, and tie-down areas, and is primarily used by local and itinerant recreational flyers. The Airport's annual service volume in 2019 was 7,200 operations with peak month operations estimated at 46 per day. Of these operations, approximately 83% of local and 17% were itinerant. Thirty-Four aircraft are currently based at the Airport. Turkey and deer are identified as ppotential wildlife hazards at or in the vicinity of the Airport (AirNav 2021; Airport IQ 2021).

Future development of the Airport is generally governed by its Airport Master Plan which was last revised in 2005 and is currently being updated (City of Biddeford 2005). According to the 2005 Master Plan, there were no specific plans to expand Airport operations at that time, other than to obtain a modest increase in activity and make the Airport more beneficial to the local and regional communities. The Airport is expected to remain a General Aviation facility, which by FAA definition includes all public-use Airports that do not have scheduled service or that have less than 2,500 annual passenger boardings (FAA 2017).

# 2.0 METHODS

The WHS and evaluation were performed by Certified Wildlife Biologist (CWB) Stacie Grove of NewEarth Ecological Consulting, LLC (NewEarth) whose qualifications and experience meet FAA requirements and guidance per AC 150/5200-36A (FAA 2012). At the request of Airport personnel and the FAA, a single site visit was performed on May 13, 2021.

## 2.1 WILDLIFE HAZARD AND STRIKE DATA HISTORY

The CWB collected and compiled available information on the Airport's wildlife hazard history, documented and suspected wildlife hazards and attractants, wildlife control activities, and Airport operations and procedures relating to wildlife hazards and control. Data review

included, when available, records of strikes and damages; correspondence from pilots regarding near strikes or strike concerns; interviews with staff responsible for Airport operations and scheduling; records of previous and/or ongoing wildlife hazard management or control efforts; existing wildlife control plans; and Federal and State depredation/wildlife control permits and annual permit reports.

## 2.2 WILDLIFE ASSESSMENT

Wildlife assessments were conducted by the CWB during a single site visit from a variety of locations to ensure complete visual coverage of the Airport. The assessments included use of fixed locations along the Airport perimeter as well as meandering surveys throughout key habitats to document the following:

- **Birds** – bird species and evidence of bird activity (i.e., fecal material, regurgitated pellets) on the Airport. Recorded information included general abundance, activity (i.e., flying, perching, foraging), location, type of habitat used, time and date of observations.
- **Mammals** – mammal species and evidence of mammal activity (i.e., scat, tracks, runs, and burrows) on the Airport. Recorded information included general abundance, activity (i.e., crossing site, resting, foraging), location, type of habitat used, time and date of observations.

## 2.3 HABITAT AND ATTRACTANT ASSESSMENT

During the site visit and background data review the CWB evaluated the habitats and land uses on and surrounding the Airport to identify features and areas that provide key components of food, cover, and water for wildlife, which are the primary reasons that wildlife species are drawn to specific areas. The assessment also included evaluation of wildlife usage of the key areas and features, and interactions between wildlife and Airport operations.

### 2.3.1 On-site Wildlife Habitat and Attractants

The on-site evaluation included the use of a site visit to document the habitats and potential attractants (both natural and man-made) on and within a 200-foot area of the Airport. Key on-site attractants may include, but are not limited to:

- Buildings
- Signs, fences, light poles, other structures
- Open water and wetlands
- Trees and shrubs
- Herbaceous vegetation
- Rubbish, garbage, sources of food

### 2.3.2 Off-site Wildlife Habitat and Attractants

The evaluation of off-site attractants included a review of maps, digital databases/Geographic Information Systems (GIS) data, and satellite imagery to identify key habitats and land uses within a 5-mile radius of the Airport. Typical off-site attractants may include:

- Known wildlife breeding/nesting sites
- Waste handling and disposal sites (landfills, transfer stations, composting sites, underwater waste discharges, recycling centers, construction and demolition debris facilities, ash disposal sites)
- Water management facilities (storm water management areas and structures [including artificial marshes], wastewater treatment and discharge facilities, sludge disposal areas)
- Wetlands and waterbodies
- Dredge spoil containment areas
- Agricultural activities
- Golf courses
- Landscaping
- Restaurants and picnic areas
- Federal or state wildlife areas (parks, refuges, conservation lands, etc.)

### 2.3.3 Wildlife and Habitat Relationship

While on-site biologists evaluated nests, burrow, tracks, scat and observed wildlife to assess how wildlife were using the natural and man-made habitats on the Airport.

### 2.3.4 Wildlife Interactions with Aircraft Operations

To the extent possible during the 1-day site visit, aircraft movements were assessed to determine the potential for wildlife interactions with aircraft operations in aircraft operation areas, traffic patterns, approach and departure airspace, and surrounding areas to see if operations and movements increase the risk of wildlife strikes.

## 3.0 RESULTS AND DISCUSSION

### 3.1 AIRPORT WILDLIFE HAZARD HISTORY

The FAA maintains an online searchable National Wildlife Hazard Strike Database (FAA 2021) which contains records of reported wildlife strikes since 1990. Incidents in the database include actual strikes reported by pilots, damage to planes reported by aircraft maintenance personnel and believed to have been caused by wildlife, and reports when someone on the ground sees an aircraft strike or finds animal remains on, or within 200 feet of, a runway and mortality is believed to have been caused by aircraft (FAA 2013). Reporting is voluntary and without question is an underestimate in the number of strikes; however, according to the FAA, between 1990 and 2019, 227,045 strikes were reported in the United States and on average 47 strikes are reported daily (FAA 2020). In 2019, 94 percent of strikes involved birds, 3.2 percent were bats, 2.3 percent were terrestrial mammals, and 0.5 percent were reptiles (FAA 2020).

Two records of strikes have been documented at Biddeford Airport in the FAA's National Wildlife Hazard Strike Database (FAA 2021): an unknown terrestrial mammal on August 24, 2018, with no damages reported; and, a white-tailed deer reported on November 1, 1990, with minor damages noted. Deer and turkey have also been self-reported as potential hazards for pilots to be aware of at the site (AirNav 2021; Airport IQ 2021).

The current Airport Manager noted that since arriving at the Airport in January 2020, operations and animal activities on the site have been abnormal due to Airport closures from the Covid-19 pandemic, as well as significant activities on the site associated with construction and tree removal projects in 2020 and 2021 (Donaher 2021). Due to these activities, no wildlife removals were necessary in 2020 and early 2021. The manager noted that although he was not aware of any additional reports of wildlife strikes and/or damages caused by wildlife at the Airport, deer and several bird species have been problematic for Airport safety in the past and have required the use of lethal measures to remove them. Removal activities have been conducted on the Airport per the Airports US Fish and Wildlife Service (USFWS) Federal Migratory Bird Depredation Permit which, according to the Airport Manager, allows lethal removal of up to five deer, Wild Turkeys, Canada Geese, Herring Gulls, and hawks. Details of the USFWS permit and other reports relating to specific Airport efforts to disperse or remove potentially hazardous species were not available for review at the time of this assessment.

The Airport Manager has had limited exposure to normal activities and potential wildlife hazards at the site, but reportedly has noticed recent increasing numbers of Wild Turkey and Turkey Vultures congregating on and/or above the Airport (Donaher 2021). These species pose a notable concern for Airport staff and pilots, particularly as construction activities and Covid concerns decrease, and Airport operations and animal activities increase as a result (Donaher 2021). According to the Airport, presence of some species such as gulls and Turkey Vultures are likely associated with the Biddeford Transfer Station adjacent to the property. Airport staff indicated that no harassment measures or lethal removals have taken place since January 2020, but it appears that animals are returning and congregating on and/or above the runway and will likely require some form of intervention and management (Donaher 2021). Staff also report that people have been accessing the Airport property on foot, all-terrain vehicles, and snowmobiles; some with their pets. These also present a potential safety and security risk.

In comparison to other aviation facilities in Maine (excluding large commercial Airports – Bangor and Portland), collectively 152 wildlife avoidance maneuvers resulting in near misses, aircraft damage, or crashes were reported in the National Wildlife Hazard Strike Database from 19 of Maine's 50 public Airports (OfficialUSA 2021) between May 1990 and May 2021 (FAA 2021). Of these, 131 incidents (86%) included birds – 55% of which were gull species (FAA 2021). Other sources of wildlife incidents included one domestic dog, one red fox, one skunk, one porcupine, one unknown mammal, and 16 deer (FAA 2021). Most reported incidents (95) involved individual animals, but 44 reports included 2 to 10 individuals, and 13 reports stated that the incident involved a flock of 10-100 birds. Fifteen incidents occurred during the spring (March-May), 59 during the summer (June-August), 71 during the fall (September-November) and seven during the winter (December- February). Seventy-nine incidents took place during the day, 22 during limited light conditions (i.e., dawn, dusk, night), and the remaining 51 records did not indicate a time. Eighty-one of the 152 wildlife incidents reported no significant damages, 24 were reported as minor or an uncertain level of damage, five were reported as substantial (FAA

2021). One incident, which involved a crash that occurred when the pilot performed a maneuver to avoid a bald eagle, did not involve an actual strike but resulted in minor injuries to two people and the aircraft was destroyed. Forty-one additional strikes were determined solely based on remains found on/along the runway and were not reported by pilots or bystanders that observed the actual strike.

## 3.2 WILDLIFE

As discussed below, a total of 55 bird species, six mammals, and 1 reptile were documented during the May 2021 site visit. Additionally, based on observations from other sources, it is likely that numerous additional species could be found on, or above, the Airport throughout any given year.

### 3.2.1 Bird Species

Based on direct observations, audio detections, and/or evidence of use (e.g., feathers, nests, tracks) 55 species of birds were documented on, or within 200 feet of, the Airport during one survey event held in May 2021 (Table 1) (Appendix B, Photographs). Forty (73%) of the bird species detected were observations of individuals or small groups of small-bodied birds (i.e., finches, sparrows, warblers) that were at various locations across the Airport property rather than in large concentrations. The remaining 15 species (27%) observed were medium to large-bodied species which pose a higher threat to Airport safety. No larger flocks were observed. However, large groups of birds are typically more often observed during spring and fall migration. At the time of the May site visit, most species likely have separated from larger flocks to establish individual breeding/nesting territories.

Additionally, based on eBird (one of the largest international citizen-science databases of bird observations in the world), numerous additional bird species have been documented at "Birding Hotspots" within one mile of the Airport (eBird 2021). Based on habitats at hotspots and those available at the Airport, it is likely that at least 35 of these species, as well as dozens of others that pass through unreported during migration, could likely utilize the Airport, or airspaces above the Airport, at some time during the year (Table 1).

Based on anecdotal information provided by Airport staff and pilots, Wild Turkey, Canada Geese, and Turkey Vultures pose the most significant safety threats to aviation activities at the Airport based on their size, reactions to incoming and outgoing aircraft, and the numbers of individuals observed. Each of these species were observed on, or within the airspace above, the Airport during the May site visit.

### 3.2.2 Mammal Species

Based on direct observations and/or evidence of use (e.g., scat, tracks, fur, runs, burrows) six mammal species (chipmunk, coyote, deer, domestic dog, fox, and gray squirrel) were documented on, or within 200 feet of, the Airport during the survey event (Table 1) (Appendix B, Photographs). Airport staff also report occasional sightings of gray fox, racoon, and red fox (Donaher 2021). Fresh evidence of deer and several canine species (e.g., scat and tracks) were noted throughout the Airport, which suggest deer and dogs are relatively common visitors to the

site. Deer are large-bodied animals that tend to occur in small groups and pose a much higher threat to Airport safety than other documented mammals which are smaller-bodied and tend to be solitary unless with their young. Based on direct observations made during the site visit, residents near the Airport are using the Airport property to walk their dogs.

### 3.2.3 Federal or State-listed Species

Two state-listed spotted turtles (Threatened) were observed in a drainage ditch/marsh along the east side of Runway 6 at Lat: 43.462996°; Long: -70.473019° (Table 1) (Appendix B, Photographs). No additional federal or state-listed species are known to occur on the site (MDIFW 2015; USFWS 2021). But there is a high likelihood that bats, many of which are federal and/or state-listed species, utilize open areas of the Airport for foraging and forested areas for roosting (MDIFW 2015; USFWS 2021). Open grassland areas such as those found on the Airport could provide habitat for state-listed upland sandpiper (Threatened) as well as grasshopper sparrow (Endangered); although the grassland area available is generally smaller than what is typically used by these species (MDIFW 2015). Most of the bird species documented are migratory and are protected by the Migratory Bird Treaty Act of 1918 (16 U.S.C. §§ 703–712). The USFWS online Information for Planning and Consultation database (IPaC) identifies 25 migratory bird species as likely to occur on or near the Airport (USFWS 2021). Coordination with agencies responsible for oversight of protected species is mandatory prior to initiating any management actions that could affect such species or their critical habitats, including the removal of nests.

**Table 1. Species Detected at Biddeford Airport and Associated Hazard Rankings.**

| Common Name | Scientific Name | Composite Hazard Ranking[1,2] | Documented May 2021[3] | Identified by other Sources[4] |
|---|---|---|---|---|
| **BIRDS** | | | | |
| Alder Flycatcher | *Empidonax alnorum* | NR | | x |
| American Crow | *Corvus brachyrhynchos* | 41 | G | x |
| American Goldfinch | *Spinus tristis* | 65 | G | x |
| American Kestrel | *Falco sparverius* | 50 | | x |
| American Redstart | *Setophaga ruticilla* | 75 | I | x |
| American Robin | *Turdus migratorius* | 60 | G | x |
| Baltimore Oriole | *Icterus galbula* | NR | I | x |
| Barn Swallow | *Hirundo rustica* | 62 | G | x |
| Black-and-White Warbler | *Mniotilta varia* | 75 | I | x |
| Black-capped Chickadee | *Poecile atricapillus* | 75 | I | x |
| Blackpoll Warbler | *Setophaga striata* | 75 | | x |
| Black-throated blue warbler | *Setophaga caerulescens* | 75 | I | |
| Black-throated green warbler | *Setophaga virens* | 75 | I | x |
| Blue Jay | *Cyanocitta cristata* | NR | G | x |
| Blue-headed Vireo | *Vireo solitarius* | NR | I | |
| Broad-winged Hawk | *Buteo platypterus* | 32 | I | x |
| Brown Creeper | *Certhia americana* | NR | I | x |
| Brown-headed Cowbird | *Molothrus ater* | NR | I | x |
| Canada Goose | *Branta canadensis* | 5 | G | x |
| Cedar Waxwing | *Bombycilla cedrorum* | NR | | x |
| Chestnut-sided Warbler | *Setophaga pensylvanica* | 75 | I | x |
| Chimney Swift | *Chaetura pelagica* | 66 | | x |
| Chipping Sparrow | *Spizella passerina* | 58 | I | x |
| Common Grackle | *Quiscalus quiscula* | 46 | G | x |
| Common Raven | *Corvus corax* | NR | | x |
| Common Yellowthroat | *Geothlypis trichas* | 75 | I | x |
| Coopers Hawk | *Accipiter cooperii* | 32 | | x |
| Dark-eyed Junco | *Junco hyemalis* | NR | | x |
| Downy Woodpecker | *Picoides pubescens* | NR | I | x |
| Eastern Bluebird | *Sialia sialis* | NR | I | x |
| Eastern Kingbird | *Tyrannus tyrannus* | NR | | x |
| Eastern Phoebe | *Sayornis phoebe* | NR | I | x |
| Eastern Towhee | *Pipilo erythrophthalmus* | NR | I | |
| Eastern Wood-Pewee | *Contopus virens* | 75 | | x |
| European Starling | *Sturnus vulgaris* | 47 | I | x |

**Table 1 (continued). Species Detected at Biddeford Airport and Associated Hazard Rankings.**

| Common Name | Scientific Name | Composite Hazard Ranking[1,2] | Documented May 2021[3] | Identified by other Sources[4] |
|---|---|---|---|---|
| Golden-crowned Kinglet | *Regulus satrapa* | NR | | x |
| Gray Catbird | *Dumetella carolinensis* | NR | I | x |
| Great Blue Heron | *Ardea herodias* | 17 | | x |
| Great Crested Flycatcher | *Myiarchus crinitus* | NR | | x |
| Greater Black-backed Gull | *Larus marinus* | 14 | | x |
| Hairy Woodpecker | *Picoides villosus* | NR | | x |
| Herring Gull | *Larus argentatus* | 18 | I | x |
| House Finch | *Haemorhous mexicanus* | 65 | I | x |
| House Sparrow | *Passer domesticus* | 58 | I | x |
| House Wren | *Troglodytes aedon* | 63 | I | x |
| Killdeer | *Charadrius vociferus* | 49 | I | |
| Least Flycatcher | *Empidonax minimus* | NR | | x |
| Lincolns Sparrow | *Melospiza lincolnii* | 58 | | x |
| Magnolia Warbler | *Setophaga magnolia* | NR | | x |
| Merlin | *Falco columbarius* | 32 | | x |
| Mourning Dove | *Zenaida macroura* | 45 | I | x |
| Northern Cardinal | *Cardinalis cardinalis* | NR | I | x |
| Northern Flicker | *Colaptes auratus* | NR | I | x |
| Northern Mockingbird | *Mimus polyglottos* | NR | | x |
| Northern Parula | *Setophaga americana* | NR | | x |
| Olive-sided Flycatcher | *Contopus cooperi* | NR | | x |
| Ovenbird | *Seiurus aurocapilla* | NR | I | x |
| Palm Warbler | *Setophaga palmarum* | 75 | | x |
| Pileated Woodpecker | *Dryocopus pileatus* | NR | I | x |
| Pine Warbler | *Setophaga pinus* | 75 | I | x |
| Prarie Warbler | *Setophaga discolor* | 75 | I | x |
| Red-bellied Woodpecker | *Melanerpes carolinus* | NR | I | |
| Red-breasted Nuthatch | *Sitta canadensis* | NR | | x |
| Red-eyed Vireo | *Vireo olivaceus* | NR | I | x |
| Red-tailed Hawk | *Buteo jamaicensis* | 23 | I | x |
| Red-winged Blackbird | *Agelaius phoeniceus* | 46 | I | x |
| Ring-billed Gull | *Larus delawarensis* | 26 | I | |
| Rock Pigeon | *Columba livia* | 30 | | x |
| Rose-breasted Grosbeak | *Pheucticus ludovicianus* | NR | | x |
| Rough-winged Swallow | *Stelgidopteryx serripennis* | NR | I | x |
| Ruby-crowned Kinglet | *Regulus calendula* | NR | | x |
| Ruby-throated Hummingbird | *Archilochus colubris* | NR | | x |
| Ruffed Grouse | *Bonasa umbellus* | NR | | x |

**Table 1 (continued). Species Detected at Biddeford Airport and Associated Hazard Rankings.**

| Common Name | Scientific Name | Composite Hazard Ranking[1,2] | Documented May 2021[3] | Identified by other Sources[4] |
|---|---|---|---|---|
| Savannah Sparrow | *Passerculus sandwichensis* | 58 | I | x |
| Sharp-shinned Hawk | *Accipiter striatus* | 32 | | x |
| Solitary Sandpiper | *Tringa solitaria* | NR | I | x |
| Song Sparrow | *Melospiza melodia* | 58 | I | x |
| Swamp Sparrow | *Melospiza georgiana* | 58 | | x |
| Tree Swallow | *Tachycineta bicolor* | 76 | G | x |
| Tufted Titmouse | *Baeolophus bicolor* | NR | I | x |
| Turkey Vulture | *Cathartes aura* | 5 | I | x |
| Veery | *Catharus fuscescens* | NR | | x |
| Warbling Vireo | *Vireo gilvus* | NR | | x |
| White-breasted Nuthatch | *Sitta carolinensis* | NR | I | x |
| White-throated Sparrow | *Zonotrichia albicollis* | 58 | I | x |
| Wild Turkey | *Meleagris gallopavo* | 11 | G | x |
| Wilson's Warbler | *Cardellina pusilla* | 75 | | x |
| Worm-eating Warbler | *Helmitheros vermivorum* | 75 | | x |
| Yellow Warbler | *Setophaga petechia* | 75 | | x |
| Yellow-bellied Flycatcher | *Empidonax flaviventris* | NR | I | |
| Yellow-rumped Warbler | *Setophaga coronata* | 75 | I | x |
| | **TOTAL SPECIES** | | **55** | **84** |
| | | | | |
| **MAMMALS /OTHER SPECIES** | | | | |
| American Red Squirrel | *Tamiasciurus hudsonicus* | NR | | x |
| Bats | *Order: Chiroptera* | 47 | | x |
| Coyote | *Canis latrans* | 29 | S | x |
| Domestic Dog | *Canis lupus familiaris* | 3 | I | x |
| Eastern Chipmunk | *Tamias striatus* | NR | I | x |
| Eastern Gray Squirrel | *Sciurus carolinensis* | NR | I | x |
| Fox Species | *Vulpes species* | 41 | I | x |
| Racoon | *Procyon lotor* | 28 | | x |
| Spotted Turtle | *Clemmys guttata* | NR | I | x |
| Striped Skunk | *Mephitis mephitis* | 72 | | x |
| White-tailed Deer | *Odocoileus virginianus* | 2 | S | x |
| | **TOTAL SPECIES** | | **7** | **11** |

[1] Sources: FAA 150/5200-33B, 2007; DeVault et. al., 2011
[2] NR = No Ranking Assigned
[3] F = large flocks (> 10); G = groups (>2 to < 10); I = individuals (1 to 2); S = signs (i.e., tracks, scat, burrow, etc.)
[4]Based on eBird records (eBird 2021); Airport staff (Donaher 2021).

## 3.3 HABITATS AND ATTRACTANTS

### 3.3.1 On-Site Wildlife Habitat and Attractants

Key wildlife attractants identified on or within 200 feet of the Airport are identified in Table 2 and their locations are shown in Appendix A, Figure 2.

**Table 2. On-Site Wildlife Attractants at Biddeford Airport.**

| Feature | Description |
|---|---|
| Open grassland and shrub habitat | Open areas cover much of the Airport. According to Airport staff, open areas and runway edges are mowed every week from May through October, for general maintenance and to control wildlife habitat. Vegetation length is generally not a consideration when planning mowing, and mowing events are not on a set schedule. Small songbirds were observed in the grassland and shrub areas and would likely attempt to nest if undisturbed during the nesting season. Depending on the timing of mowing, mortality from active nests can be a food source for larger species such as fox, coyote, crows, grackles, and vultures. |
| Wetlands | Wetlands occur in narrow drainage features along most of the perimeter of the Airport runways and in larger complexes located west of Runway 24, and to the east, west and south of Runway 6. Wetlands that are not mowed, are comprised predominately of a mix of shrub and herb cover. Open water suitable for ducks is uncommon. Several relatively small-sized passerines and turtles were documented in site wetlands and ditches during surveys. Given the habitat available, larger-sized geese, heron, and bitterns could also likely be found. |
| Elevated natural features | Trees align much of the perimeter of the Airport; but most are at least 200 ft from active runway and taxiway areas. Trees are used as perching, nesting, and/or foraging activities by numerous bird and other wildlife species and many were documented in/along forested areas. The Airport actively removes trees that pose a threat to Airport safety and has completed tree removal activities on each runway end within the past 5 years. |
| Elevated man-made features | Fences, telephone poles and wires, hangars and other buildings are situated along the west side of the Airport runways. Residential housing aligns much of the east side of the Airport property, particularly to the northeast and east of Runway 24. These man-made structures provide nesting and roosting habitat for birds, and many of the residences had bird feeders. Perched birds were observed within and on hangars, buildings, and residences but only two bird nest sites were found on Airport structures. |
| Human-produced food sources | Several rubbish/trash receptacles were present on the Airport, but all were properly sealed, and materials contained. No species were observed at receptacles. Additionally, food sources (i.e., bird feeders, trash bins, compost piles) are present at residential housing to the northeast and east of Runway 24. |

### 3.3.2 Off-site Wildlife Habitat and Attractants

Airport personnel do not have jurisdiction to manage off Airport attractants, but through good relationships and coordination, may be able to influence land uses and planning decisions that can reduce the likelihood of wildlife on the Airport. Key wildlife attractants identified within 5-miles of the Airport are identified in Table 3 and include; residential and commercial development, waterbodies, streams, and wetlands; deer wintering areas; waste handling and disposal sites; open agricultural areas; water treatment facilities; and, a variety of significant wildlife habitats (Appendix A, Figures 3 and 4). Most of these features do not appear to pose a notable threat to operations and safety at the Airport. However, several features located within a mile of the Airport (Appendix A, Figure 4), such as residential development, wetlands/waterbodies, and a transfer station could pose higher risks. Residents have been observed walking, often with dogs, and operating ATVs and snowmobiles on/near the Airport and could pose a safety threat. Food sources at residences could also attract raptors and other large birds and mammals. Additionally, materials deposited at the town transfer station can create an attractant for numerous foraging birds and mammals. Most species visiting the station would not pose a notable concern for Airport safety, but Airport staff have observed many Turkey Vultures hovering near the transfer station and within the approach surface of the Airport (Donaher 2021).

**Table 3. Notable Wildlife Attractants Within 5 Miles of Biddeford Airport.**

| Attractant | Description |
|---|---|
| Landfills/Transfer Stations | Eight landfills located between two and ten miles, and one transfer station 600 feet to the northwest of Runway 06-24. |
| Residences/Commercial Properties | Residences, a school, and several commercial entities are situated within 1,000 feet; the closest being several residences located 250 feet east of Runway 06-24 |
| Wetland and Stream Complexes | On Airport and surrounding much of the Airport. Large wetland complexes several hundred feet to the southeast |

## 3.4 WILDLIFE SPECIES HAZARD RANKING

Hazard rankings have been assigned to many of the most encountered bird and mammal species that have affected flights (Cleary 2010; DeVault et. al., 2011; Dolbeer et. al., 2000; FAA 150/5200-33B, 2007). Although numerous rankings have been developed, the DeVault et. al., 2011 rankings were used in developing management priorities for the Airport in this assessment since their approach is most recent, includes a higher number of species and guilds, and takes into consideration species size, behaviors, and the potential damages and human injury that may result from those collisions. Their composite ranking also reflects three variables: the percentage of total strikes on record for the species or species group that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on the flight. Those species of the highest safety concern at Airports are ranked by DeVault et. al. (2011) based on a scale from 77 (least threat) to 1 (highest threat); see Appendix C for the full list of species and their associated composite

hazard rankings. The composite hazard rankings can help focus hazardous wildlife management efforts on those species or groups that represent the greatest threats to safe air operations. In general, small birds and mammals are assigned a relatively low hazard ranking status because most collisions with these would likely result in no bodily injury and little to no damages to aircraft. Larger bodied species and/or species that tend to congregate in large flocks have higher ranking since impacts generally result in relatively significant structural damages and high potential for human injury. Fifty-five birds, six mammals and one reptile (61 species) were documented during the May site visit. However as noted, numerous other species have been reported in the vicinity of the Airport and based on the habitats available could utilize the Airport, or airspace above it. Therefore, because of the likelihood of occurrence at the site, these species were included in the composite hazard ranking analysis (Appendix C). Of the 91 birds and 11 mammals likely to occur on or near the Airport (102 species total), 57 are species that have been assigned a composite hazard ranking based on nationwide FAA records from actual airstrikes (DeVault et. al., 2011; FAA 150/5200-33B, 2007) (Appendix C).

The remining species do not have an assigned hazard ranking due to low air strike occurrences and low threat to operations. Except for Common Raven, these species are generally small-bodied and were not found in large concentrations at the Airport, thus present a relatively low threat to safety. Based on records of airstrikes (DeVault et. al., 2011; Dolbeer et. al., 2000; FAA 150/5200-33B, 2007), species size, flocking behavior, size of aircraft utilizing the Airport, and documented occurrences on the Airport, 27 species are believed to pose the highest safety threat to Airport operations (Table 4). One species, Common Raven, does not have a DeVault et. al., (2011) hazard ranking due to low records of strikes but was included in the list of 27 priority species based on their abundance in the region, size, and flocking tendencies. Based on the factors considered (e.g., size, number of incidents involving species reported to FAA, likelihood of presence on the Airport, etc.), the remaining species are likely to pose a low threat to Airport safety.

**Table 4. Species Likely to Pose the Most Significant Threat to Biddeford Airport Operations.**

| Common Name | Scientific Name | Composite Hazard Panking[1] |
|---|---|---|
| White-tailed Deer | *Odocoileus virginianus* | 2 |
| Domestic Dog | *Canis lupus familiaris* | 3 |
| Canada Goose | *Branta canadensis* | 5 |
| Turkey Vulture | *Cathartes aura* | 5 |
| Wild Turkey | *Meleagris gallopavo* | 11 |
| Greater Black-backed Gull | *Larus marinus* | 14 |
| Great Blue Heron | *Ardea herodias* | 17 |
| Herring Gull | *Larus argentatus* | 18 |
| Red-tailed Hawk | *Buteo jamaicensis* | 23 |
| Ring-billed Gull | *Larus delawarensis* | 26 |
| Racoon | *Procyon lotor* | 28 |
| Coyote | *Canis latrans* | 29 |
| Rock Pigeon | *Columba livia* | 30 |

**Table 4 (continued). Species Likely to Pose the Most Significant Threat to Biddeford Airport Operations.**

| Common Name | Scientific Name | Composite Hazard Panking[1] |
|---|---|---|
| Broad-winged Hawk | *Buteo platypterus* | 32 |
| Coopers Hawk | *Accipiter cooperii* | 32 |
| Merlin | *Falco columbarius* | 32 |
| Sharp-shinned Hawk | *Accipiter striatus* | 32 |
| American Crow | *Corvus brachyrhynchos* | 41 |
| Fox Species | *Vulpes species* | 41 |
| Mourning Dove | *Zenaida macroura* | 45 |
| Common Grackle | *Quiscalus quiscula* | 46 |
| Red-winged Blackbird | *Agelaius phoeniceus* | 46 |
| European Starling | *Sturnus vulgaris* | 47 |
| Bats | *Order: Chiroptera* | 47 |
| Killdeer | *Charadrius vociferus* | 49 |
| American Kestrel | *Falco sparverius* | 50 |
| Common Raven | *Corvus corax* | no rank assigned |

[1] Source: DeValt et. at., 2001

## 4.0 RECOMMENDATIONS

The overall goal of the recommendations provided herein is to reduce presence of high-risk wildlife on the Airport thereby reducing the risk of airstrikes and collisions. Measures, when implemented correctly and adapted as needed, would address not only high-hazard species but numerous other potential threats as well. Ideally, this is accomplished through management actions described below that involve:

1) Habitat and Attractant Control - make habitats or attractants less desirable for wildlife, so species will seek alternate areas to meet their basic needs for food, water, cover and reproduction;
2) Behavioral Modification - result in changes to wildlife behaviors so that areas are avoided or cannot be accessed; or,
3) Removal - physically remove a species from the area.

In general, a stepwise approach to the management of potential hazardous wildlife is recommended, whereby invasive control measures are utilized only when those that cause less impact and stress on the species have failed. Coordination with agencies responsible for oversight of protected species (e.g., USFWS, MDIFW) is mandatory prior to initiating any management actions that could affect federal or state-protected species and habitats.

The Airport may wish to conduct additional monitoring (hands on or through use of fixed surveillance cameras) prior to initiating any costly or labor-intensive management actions to identify high use areas, trails used in animal movements, roost sites, etc. This can provide

additional information on the types and numbers of animals that are using the Airport and significantly facilitate decisions on the best approach for control and where and when to utilize the control methods.

Most wildlife species could potentially pose a safety risk under certain circumstances. Numerous additional species, some of which may fall into high hazard ranking, likely also utilize habitats at the Airport but were not documented during this assessment or by other sources. As such, it is crucial that the Airport maintain detailed records of species observations, strikes and near hits, and that species or operations are adapted as appropriate.

## 4.1 HABITAT AND ATTRACTANT CONTROL

The objective of habitat and attractant control is to identify key natural habitats and attractants then implement measures to reduce the quality of it (change size, height, species composition) or remove it. Habitat management often can easily be implemented at low cost and is typically the most effective approach to reduce potential for wildlife strikes. However, although widely used by Airports to control hazardous wildlife species, few studies have been performed under operational Airport conditions to determine the effectiveness of the techniques and those conducted to date reveal conflicting results (Barras and Seamans 2002). With this in mind, each approach should be closely monitored and if necessary, adapted quickly if desired outcomes are not achieved.

### 4.1.1 On-site Habitats and Features

**Grasslands/Open Habitat**

Open areas are found throughout most of the Airport property (Figure 2) and are periodically mowed; although, there does not appear to be a specific mowing schedule or target grass length for mowing. Based on discussion with staff, strike records, and this assessment, the mowing efforts appear to be adequately minimizing wildlife safety threats in these areas. However, turkey and geese are present in site and pose a high safety threat. Monitoring of open areas should continue. and the following management actions applied when and where needed:

- Repeated disturbance through mowing. This tends to minimize use by small mammals and most birds alike. The current recommendation is to maintain mowed areas at a length between 6 and 12 inches (Barras et. al., 2002; Washburn et. al., 2004). This has an important added benefit of promoting habitat for several grassland species of concern in Maine, which pose a low threat to Airport safety.
- If mowing is performed, remove grass clippings.
- Should larger-bodied birds such as geese, turkey become problematic, longer grass length (up to 3 feet) may be needed. Grass length longer than 12 inches may deter foraging of larger birds, but also may attract larger-sized nesting species.
- Limited and controlled use of weed killer to reduce fast-growing vegetative food sources. However, there may be concerns regarding use of potentially hazardous materials and effects on secondary species.

- Limited and controlled use of insecticides to remove invertebrate food sources. However, there may be concerns regarding use of potentially hazardous materials and effects on secondary species.
- Limited and controlled use of fertilizer to grow grass to desired height sufficient to repel birds.

**Wetland Habitat**

Wetlands and a small water-filled drainage ditches occur throughout much of the site (Figure 2) and can be significant attractants to wildlife, especially larger-bodied birds. Medium to Large-bodied species noted in these areas during the assessment or by Airport staff include great-blue heron, ducks, American Crow, Common Grackle, as well as many smaller-bodied bird species; most of which were individuals that sporadically visited the habitat features to forage. Based on this assessment, the wetlands do not appear to be hosting high levels of birds or mammals that would pose a significant threat to Airport safety. However, the areas should be monitored, and the following habitat management options considered where and when needed:

- Eliminate the wetland features through filling or draining. However, this would likely result in ponding on the airfield and runway which is a more significant safety hazard than wildlife use of the existing wetlands and waterbodies. Additionally, much of the wetlands and drainages are known to be used by state-listed turtles (i.e., spotted turtle). The MEDEP and the USACE would need to be contacted for any activity affecting a wetland or waterbody.
- Avoid mowing in wetland areas when soils are unstable and susceptible to rutting which would increase standing water on site. This has an added benefit of minimizing potential impacts to state-listed turtles.
- Ensure drainages are free of debris and functioning properly to eliminate water from the site. However, state-listed spotted turtles have been documented within wetlands and drainages, particularly on the Runway 6 end of the site. Care must be taken not to alter their habitat or cause direct mortality of species without consultation and approval from appropriate state agencies.

**Tree/shrub Habitat**

Much of the perimeter of the Airport is surrounded by trees and shrub habitat although most are at least 200 feet from active runways (Figure 2). Birds were documented in the trees and shrubs on the property and occasionally were seen in large flocks (i.e., crows, jays, grackles, doves, starlings, and hawks). Presence of birds was sporadic and most appeared to be moving through the Airport property and not congregating. As with all habitats on site, these areas should be monitored, and the following habitat management actions taken where and when needed:

- Top or remove roost and/or nest trees.
- Remove fruit and berry producers close to sensitive areas.
- Plant fruit and berry trees in target areas to draw species away from sensitive areas.
- Avoid continuous stands.

- Space any new plantings to avoid continuous canopy wall-like barriers.
- Avoid conifers that would provide year-round habitat.

**Food Sources**

In general, the Airport should continue with the good housekeeping practices that keep food sources such as trash and food waste inside buildings or in wildlife-proof closed containers. Additionally, the grounds should be monitored for presence of potential natural food sources such as carcasses, which should be removed from the site and properly disposed of. Most of the evidence of fox and coyote/dog activity were found on and along the paved runway where these species are likely scanning the areas for smaller dead organisms that may have been killed on the runway by Airport activities.

### 4.1.2 Off-site Habitats and Features

Habitats and attractants within five miles of the Airport are comprised of manmade features that include water management facilities, landfills and transfer stations, ash and sludge disposal sites, deer wintering areas, agricultural areas, as well as a diversity of natural habitats that include wetlands, lakes, streams and open areas. Most do not pose a significant threat to Airport safety, and there are no known reports of strong associations between wildlife activity at the Airport and outside sources, although it is possible that the nearby transfer station is an attractant for Turkey Vultures that have been noted on/above the Airport (Donaher 2021). As a precaution, Airport staff should coordinate closely with transfer station staff to determine if the station is a source of concern for Airport safety, and if monitoring and management actions are necessary. Some landfills/transfer stations utilize dispersal mechanisms to dispel congregating wildlife from the station, but this can result in dispersal onto adjacent properties and airspaces. If such activities are occurring, the timing of events should be relayed to pilots using electronically-transmitted Notices To Airmen (NOTAMS) or other forms of notifications.

Use of signage, coordination with nearby residents, and structural measures (i.e., large boulders, wooden blockades, felled trees, gates, etc.), may help to deter unwanted uses such as dog walking, hiking, and ATV and snowmobile use on Airport property. Airport staff should continue to coordinate closely with local land use planners, developers, and elected or appointed public officials to help guide incompatible land uses away from the Airport environs and to encourage compatible land uses to locate around Airport facilities. These concepts should be incorporated into periodic Master Plan updates.

## 4.2 WILDLIFE BEHAVIORAL MODIFICATION

Based on this assessment, behavioral modifications would likely address some of the most significant safety threats and are recommended at the Airport as a step in addressing concerns and prior to use of lethal measures. The objective of wildlife behavioral intervention and control is to evaluate wildlife distribution, movements, and behaviors and implement measures to change animal behavior though the use of deterrents or by excluding animal access (e.g., fencing, netting).

### 4.2.1 Exclusion

Deer and dogs are two of the highest priority hazards known to be present on the Airport (Table 4). Based on FAA reports, existing permits, and input from Airport staff, despite past removal efforts deer remain a significant concern for Airport safety. Perimeter fencing, when installed properly and maintained, is the most widely used exclusion method to reduce threats to Airport operations and safety from deer, and other medium to large-bodied mammals. Perimeter fencing also has the added benefit of improving Airport security and significantly curtailing undesirable, and in some cases illegal, uses of Airport properties.

Man-made structures such as hangars and other structures also can provide habitat for nesting small-medium bodied and/or flocking birds such as pigeons, sparrows, and starlings and burrowing mammals such as groundhogs, chipmunks, skunks. These species generally do not themselves pose a high-risk to operations, but they can be a food source for more significant threats such as raptors and coyote. Airport structures at Biddeford are relatively new, well-designed, and well-maintained, and the closed-bay style hangars on concrete slabs minimize nesting/burrowing opportunities (Appendix B. Photographs). Only two bird nests were observed in the roofline on Airport buildings and no burrows were noted. Doors should remain closed to exclude birds, and areas should be monitored for wildlife use. Should conditions change and wildlife uses increase, spikes, screens, netting, etc. can be installed to deter nesting and burrowing.

### 4.2.2 Deterrents

While exclusion fence can address mammals on the Airport, it does not address bird species, and the fence itself can provide habitat for birds to perch on. If habitat manipulations are ineffective at controlling wildlife, deterrents can be used. Deterrents can be highly effective and may be the best option for addressing wildlife use of wetland and pond areas, and buildings found at various locations on the Airport. However, wildlife often eventually become desensitized when the result of the deterrent is not lethal. Overall, planned but random timing of deterrent use, and use of a variety of deterrents, achieves best results.

- Use of a vehicle and horn to disperse animals.
- Visual deterrents such as scarecrows, animal models.
- Bird spider, spike or reflective tape deterrents.
- Fixed radio controlled, or vehicle mounted acoustics such as sirens or alarm calls – must know correct species, some species will be attracted to the distress call of other animals.
- Cartridge, cracker shell, and pyrotechnics that create noise and/or smoke.
- Lasers – must be used under low light, can pose a safety threat to humans, some birds unresponsive.
- Trained falcons or dogs.
- Drones – FAA approval required due to airspace restrictions.

## 4.3 WILDLIFE AND NEST REMOVAL

Due to the overall low safety threat, no wildlife or nest removals are recommended at the Airport at this time. However, should the need arise, and if low-impact approaches are ineffective at dispelling the species, removal efforts may be necessary. In all cases, lethal measures should only be used when repeated efforts to address the species have failed and appropriate approvals and permits must be in place. Use of previously attempted non-lethal measures to deter species use of the area should be well-documented and provided to federal, state, and local entities to support the need for physical removals of wildlife or nest sites.

### 4.3.1 Live Removal

Live removals involve the use of bait and traps to capture and remove the animal from the site and the safe relocation to an alternate approved location. In some cases, the use of tranquilizers may also be necessary. Although non-lethal, relocation can be highly stressful for the animal and may cause negative impacts to wildlife in the habitat the animal is released in. Removals must be performed by a qualified person, and coordination with federal, state and local agencies is necessary to determine applicable rules and regulations that may apply. This approach will also typically require habitat or behavioral modifications to ensure others do not inhabit the newly available territory/habitat.

### 4.3.2 Lethal Removal

Lethal removals involve the euthanasia of the species and should only be used as a last resort and conducted per a current approved depredation permit requirements. Removals typically involve the use of traps, firearms, poisons, and other predators such as falcons or trained dogs, to permanently eliminate the animal from the site. The approach is highly effective but may have negative effects on public relations. As with non-lethal removals, activities must be performed by a qualified person and in coordination with federal, state and local agencies. This approach will also typically require habitat or behavioral modifications to ensure others do not inhabit the newly available territory/habitat.

### 4.3.3 Nest Removal

Removal can be an effective method to deter species from the Airport; particularly large raptors or birds nesting in hangar areas, but nests may only be removed when inactive and unoccupied, and done only after coordination with USFWS and MDIFW to ensure removal is allowed. A USFWS permit would be required for removal of active nests of any migratory species under the Migratory Bird Act.

## 4.4 OPERATIONAL MEASURES

The Airport is advised to develop an approach and process of monitoring and recordkeeping to identify and address potential wildlife hazards appropriate for its size and activity, staff, budgets, and available technology. At a minimum, the following general monitoring and recordkeeping actions are recommended:

- Prepare a wildlife hazard management and control plan.
- Conduct regular inventories of attractants, species and risk assessment.
- Work with city planners to ensure continued appropriate land uses near the Airport.
- Coordinate as needed with adjacent property owners to address potential attractants.
- Maintain daily log of strikes, near hits, observations, and control efforts.
- Ensure all wildlife strikes and near hits are reported to the FAA National Wildlife Aircraft Strike Database (http://wildlife-mitigation.tc.faa.gov).
- Develop a strategy and plan for addressing known potential hazards.
- Implement a plan and schedule to evaluate effectiveness of wildlife hazard management and control efforts.
- Provide training for Airport staff on wildlife hazard identification, hazard management and reporting, and educate pilots on near miss and strike reporting.
- Ensure relevant updates are made to the Airport Master Plan and wildlife hazard management and control plan.

## 5.0 SUMMARY OF SPECIFIC RECOMMENDED WILDLIFE HAZARD MANAGEMENT ACTIONS

Species identified in Table 4 have been documented on, or near, the Airport. Although most would be present as individuals or small groups that would quickly pass by or across the Airport and not likely lingering on the facility, potentially hazardous wildlife does occasionally occur on the site and measures have been employed in the past to deter their presence. Several management actions identified below are recommended to ensure continued and long-term Airport safety (Table 5).

The single most important potential avian threats to Airport safety are large bird species known to occur on the site; Wild Turkey, Canada Geese, Turkey Vultures, and more generally gulls and raptors. The presence of turkeys on site is noted by FAA records (AirNav 2021, Airport IQ 2017), and Turkey Vultures have been identified as a significant recent concern by Airport staff and pilots. These species appear to be potential threats, but have not caused any actual accidents or recent near misses, and have not required the use of deterrents or lethal removals by Airport staff within the past year and a half; although Airport operations and wildlife activities have been abnormal since March of 2020 (Donaher 2021). Since presence of these potential threats are sporadic and species tend to rapidly depart the area, close evaluation of bird activity on the property and coordination between pilots and Airport staff regarding presence of species is key. Airport staff can then disseminate this information to pilots and can plan internal monitoring and actions accordingly in accessing the threat level and response needed, if any.

**Table 5. Biddeford Airport Wildlife Hazard Management Recommendations.**

| Approach | Measure | Frequency |
|---|---|---|
| Operational | Direct coordination with landowners | As needed to ensure pets and unauthorized personnel do not pose a safety risk. |
| Operational | Develop and implement plan for wildlife hazard monitoring, management, and recordkeeping | Develop plan within the year and update annually. Officially record every strike or near hit event and closely monitor needed actions. |
| Habitat | Mowing | As needed between July 15th and April 1st, to maintain vegetation length in fields at between 6 – 12 inches, minimum to exclude larger bird species. Or, conduct repeated weekly frequent mowing at minimum, beginning early in the spring to prevent species from nesting. |
| Behavioral | Exclusion - Perimeter Fence | Plan for installation within 5-years. |
| Behavioral | Deterrents – pyrotechnics, whistlers | As needed to dispel congregating birds. Avoid use of materials that could result in fires. |
| Behavioral | Deterrents – physical barriers | Install in known nesting areas of hangars and buildings needed. Block access trails to deter walking of domestic dogs and ATV/Snowmobile use on the site. |

Deer, coyote, and domestic dogs are also known to occur frequently on the Airport. Residential housing, some of which have dogs, abut much of the north (Runway 6) end of the Airport, and deer wintering areas are located within 1-mile of the site. The presence of deer on site is also noted by FAA records (AirNav 2021, Airport IQ 2017). Deer have been identified as a significant concern by Airport staff and pilots to the extent that several were lethally removed by Airport staff prior to January 2020. These species can pose a notable threat to Airport safety, and in fact are the highest-risk species documented on site (Table 4). Installation of a perimeter exclusion fence is recommended to address these species as well as other mammals that may pose safety threats. Fencing would also provide a secondary benefit of curtailing unwanted uses of the site and improving Airport security. The fence will require periodic monitoring and upkeep that should be included in annual budgets.

Mowing is an ongoing effort at the Airport, but there does not appear to be a specific schedule associated with mowing events. Where feasible, mowing in areas within, and immediately adjacent to, the runways should be timed to avoid peak nesting seasons for low-risk grassland bird species known to breed on site (April 15th through July 15th). This will minimize mortality

caused when mowing during active nesting and reduce foraging opportunities for higher-risk large-bodied scavengers such as vultures, crows, ravens, coyote and fox, and has an added benefit of promoting habitat for several grassland bird species of concern in Maine. Ideally, vegetation should be maintained at a height of between 6 and 12 inches minimum to reduce the quality of habitat for larger species, such as Canada Geese and Turkey, which are less likely to forage in long grasses (Washburn et al 2004). Should the Airport wish to deter nesting altogether, mowing should be done at higher frequencies (minimum of weekly) and begin in early spring to deter birds from attempting to nest on the site. The effects of mowing on species should be monitored since mowing and grass heights can reduce habitat suitability for some species but may simultaneously improve the habitat for others. Additional bird surveys may be required to ensure the longer grass height is not attracting species of higher hazard rating to the site. Avoid mowing in wetlands when soils are unstable since this will cause rutting and water retention and could negatively affect state-listed turtles known to occur in wetlands and drainages of the Airport. Bag clippings to minimize habitat for rodents which can attract larger predators such as raptors.

The use of a combination of deterrents is recommended in areas where species pose a threat, but cannot be addressed through fence installation and mowing, such as wetlands, man-made structures, and where congregations of animals occur within active Airport areas. Combined random use of several different deterrent methods typically has the best results (see list in Section 4.2.2). Bird spikes, spiders, and tape are especially effective at deterring bird use of hangars, poles, and other man-made structures. Species may become desensitized, so efforts should be monitored and adapted. Buildings should be well-maintained to discourage use by wildlife and known access points to nest sites, burrows, should be blocked after the area is assessed to ensure wildlife are not present. Pilots should also be encouraged to keep hangar doors closed and if necessary, install measures in known loafing and nesting areas to deter birds.

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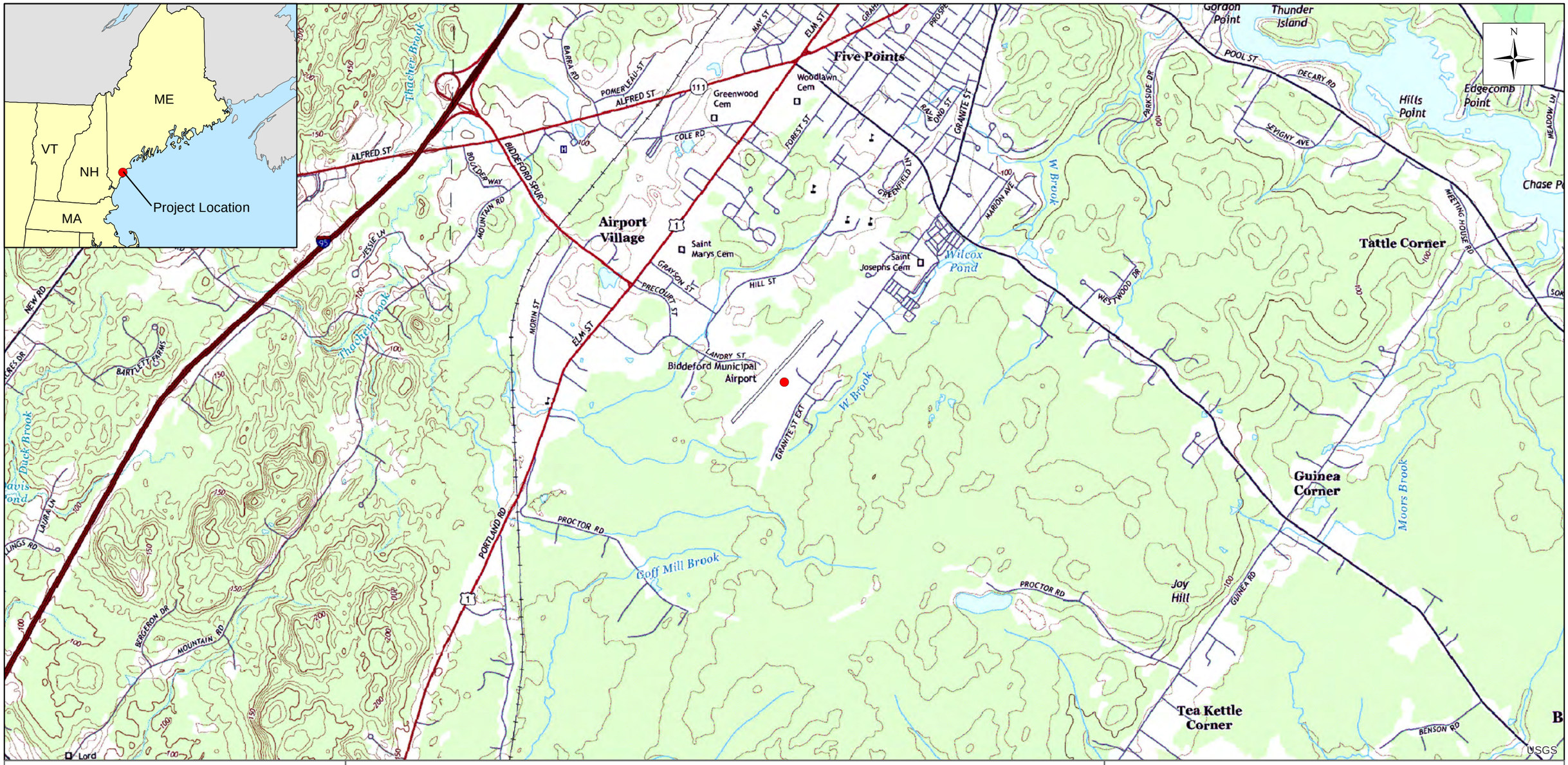
# APPENDIX A

# FIGURES




Prepared For:

**Gale Associates**

Prepared By:

NewEarth
ECOLOGICAL CONSULTING, LLC

## Legend

Project Location

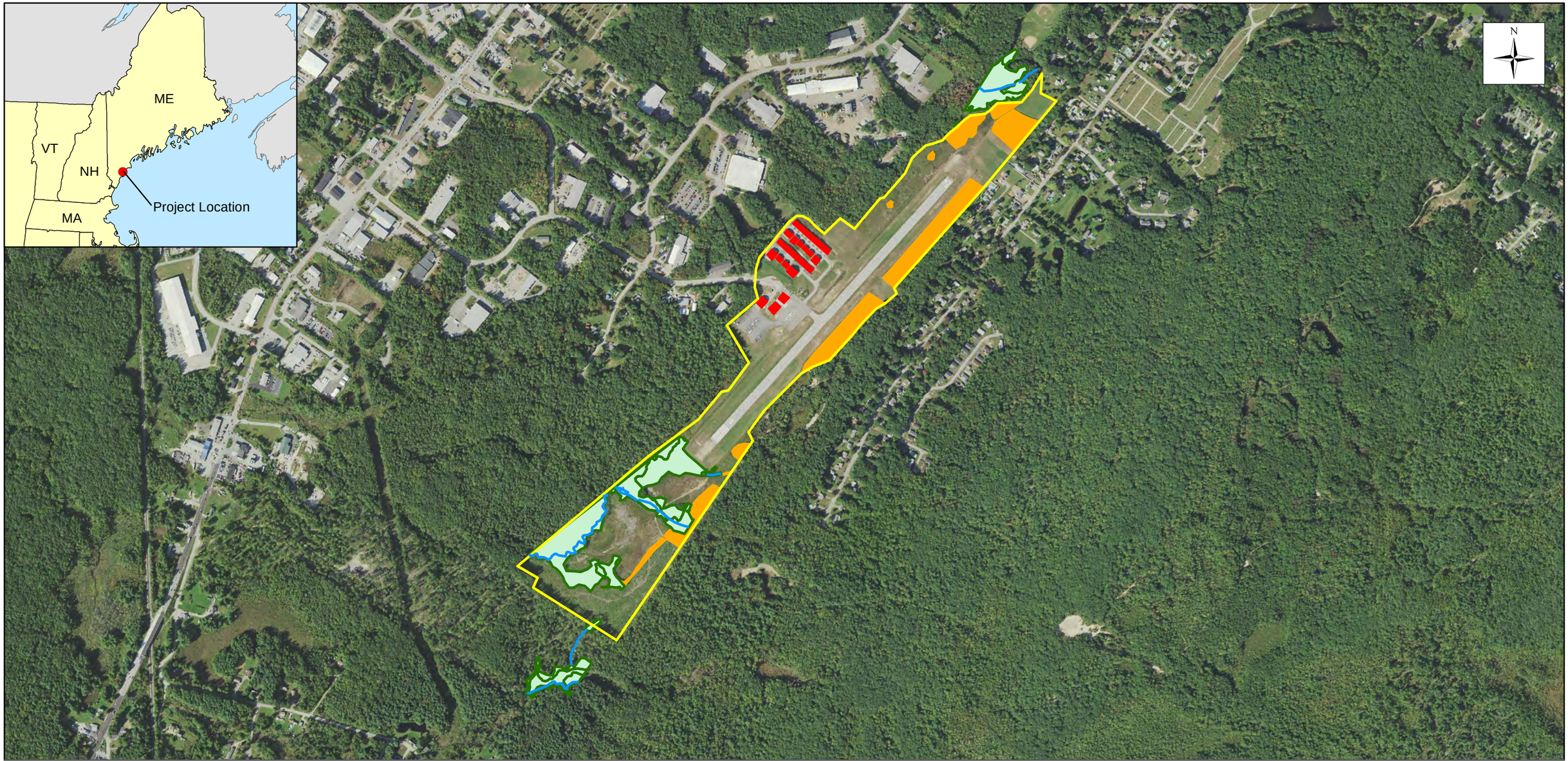
0 0.25 0.5 1 1.5 2 Miles

Figure 1. Site Location and Topography

Biddeford Municipal Airport
Wildlife Hazard Site Visit & Evaluation
Biddeford, Maine

Source: USGS Topo Map, 2014.

Date: 5/28/2021

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## Legend

Streams
Tree Line
Buildings
Wetlands
Shrubs

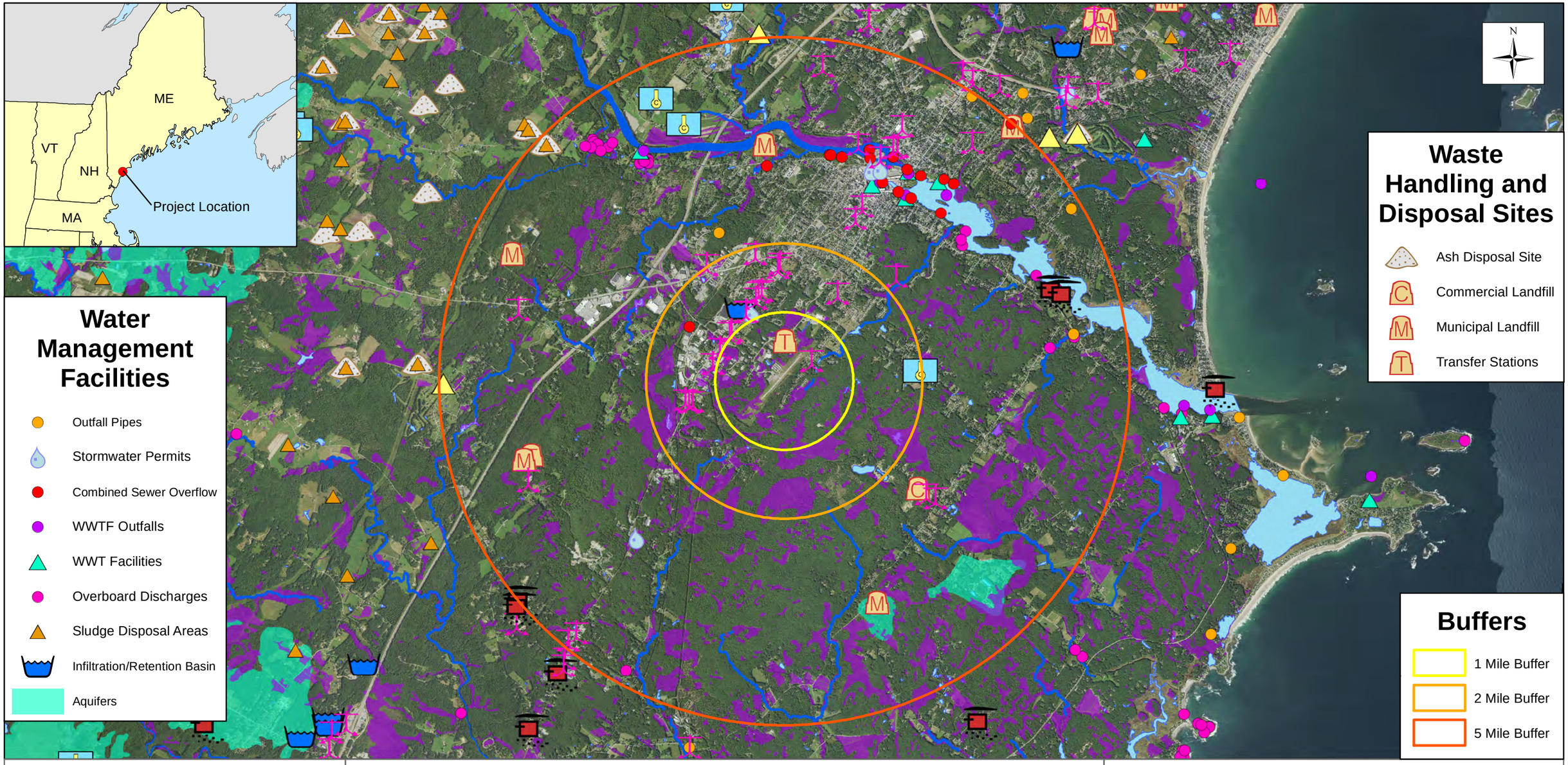
0 500 1,000 2,000 3,000 4,000 Feet

Figure 2. Potential On-site Wildlife Attractants

Biddeford Municipal Airport
Wildlife Hazard Site Visit & Evaluation
Biddeford, Maine

Source: NewEarth, 2015 and 2021; USDA NAIP, 2018.

Date: 6/4/2021

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## Legend

- Streams / Rivers
- Wetlands
- Surface Water
- Golf / Country Clubs
- Agricultural Chemical Use
- Engineered Subsurface Wastewater Disposal System
- Underground Injection Site

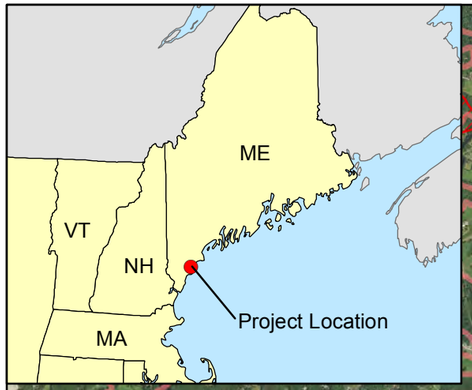
0 0.5 1 2 3 4 Miles

# Figure 3. Potential Off-site Wildlife Attractants

Biddeford Municipal Airport
Wildlife Hazard Site Visit & Evaluation
Biddeford, Maine

Source: Maine Geolibrary, 2021; MaineDEP EGAD, 2021; MaineDEP LAWB Permit by Rule, 2021; MaineDEP LAWB WWTF Outfalls, 2021; MaineDEP LAWB Overboard Discharges, 2021; USDA NAIP, 2018.

Date: 5/28/2021




N

## Buffers

- 1 Mile Buffer
- 2 Mile Buffer
- 5 Mile Buffer

Prepared For:

**Gale Associates**

Prepared By:

NewEarth
ECOLOGICAL CONSULTING, LLC

## Wildlife Habitat

- Wild Brook Trout Habitat
- Potentially Significant Vernal Pool
- Significant Vernal Pool
- Natural Community
- Tidal Waterfowl/Wading Bird Habitat
- Medium or High Value Inland Waterfowl/Wader Habitat
- Deer Wintering Areas
- Rare Animal

0 0.5 1 2 3 4 Miles

Figure 4. Wildlife Areas

Biddeford Municipal Airport
Wildlife Hazard Site Visit & Evaluation
Biddeford, Maine

Source: Maine Geolibrary, 2021; MaineDEP EGAD, 2021; USDA NAIP, 2018.

Date: 5/28/2021

# APPENDIX B

# PHOTOGRAPHIC DOCUMENTATION

## Biddeford Municipal Airport

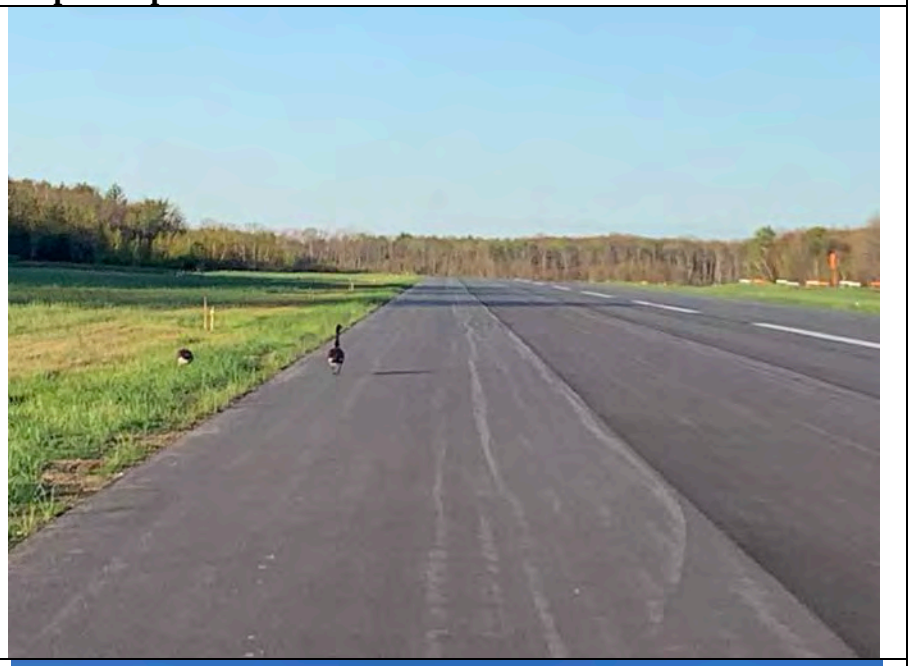

## Biddeford Municipal Airport

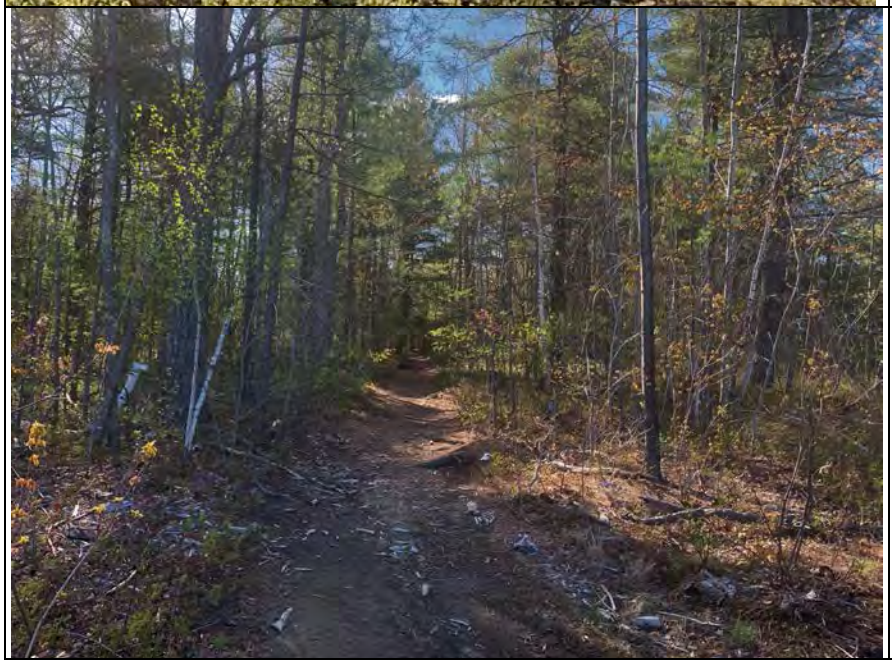

## Biddeford Municipal Airport

## Biddeford Municipal Airport

## Biddeford Municipal Airport

## Biddeford Municipal Airport





# APPENDIX C

# WILDLIFE HAZARD RANKINGS

**Table 1.** Ranking of 77 bird and mammal species or groups (1 = most hazardous) as to relative hazard to aircraft in airport environments (i.e., ≤500 ft [152 m] above ground level), based on a composite rank. The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused any level of damage to the aircraft, the percentage of total strikes that caused substantial damage to the aircraft, and the percentage of total strikes that caused an effect on flight (EOF). See Dolbeer et al. (2000) for detailed definitions of damage and EOF. Strike data are from the Federal Aviation Administration National Wildlife Strike Database, for strikes that occurred in the United States from 1990 to 2009.

| Species[a] | Total strikes reported | % With damage | % With substantial damage | % With EOF | Damage rank | Substantial damage rank | EOF rank | Composite rank | Relative hazard score |
|---|---|---|---|---|---|---|---|---|---|
| Mule deer (*Odocoileus hemionus*) | 47 | 96 | 38 | 83 | 1 | 1 | 1 | 1 | 100 |
| White-tailed deer (*Odocoileus virginianus*) | 814 | 87 | 36 | 68 | 2 | 2 | 3 | 2 | 88 |
| Domestic dog | 21 | 53 | 26 | 75 | 4 | 4 | 2 | 3 | 71 |
| Other geese | 20 | 68 | 32 | 32 | 3 | 3 | 8 | 4 | 61 |
| Canada goose (*Branta canadensis*) | 776 | 51 | 16 | 34 | 7 | 9 | 7 | 5 | 46 |
| Turkey vulture (*Cathartes aura*) | 159 | 46 | 16 | 34 | 10 | 7 | 6 | 5 | 44 |
| Other ducks | 77 | 49 | 24 | 30 | 8 | 5 | 11 | 7 | 48 |
| Great horned owl (*Bubo virginianus*) | 29 | 52 | 16 | 27 | 6 | 8 | 17 | 8 | 44 |
| Double-crested cormorant (*Phalacrocorax auritis*) | 24 | 52 | 13 | 29 | 5 | 13 | 13 | 8 | 43 |
| Brown pelican (*Pelecanus occidentalis*) | 31 | 35 | 13 | 38 | 14 | 14 | 5 | 10 | 40 |
| Wild turkey (*Meleagris gallopavo*) | 38 | 37 | 6 | 43 | 13 | 28 | 4 | 11 | 40 |
| Sandhill crane (*Grus canadensis*) | 66 | 43 | 10 | 28 | 11 | 19 | 15 | 11 | 37 |
| Glaucous-winged gull (*Larus glaucescens*) | 27 | 48 | 9 | 28 | 9 | 21 | 16 | 13 | 39 |
| Bald eagle (*Haliaeetus leucocephalus*) | 74 | 40 | 7 | 30 | 12 | 25 | 10 | 14 | 36 |
| Great black-backed gull (*Larus marinus*) | 20 | 26 | 21 | 22 | 18 | 6 | 23 | 14 | 32 |
| Osprey (*Pandion haliaetus*) | 77 | 32 | 12 | 26 | 16 | 15 | 19 | 16 | 32 |
| Great blue heron (*Ardea herodius*) | 132 | 32 | 8 | 28 | 15 | 23 | 14 | 17 | 31 |
| Ring-necked pheasant (*Phasianus colchicus*) | 45 | 26 | 14 | 22 | 20 | 10 | 26 | 18 | 29 |
| Herring gull (*Larus argentatus*) | 291 | 25 | 13 | 24 | 23 | 12 | 21 | 18 | 29 |
| Snowy owl (*Bubo scandiacus*) | 28 | 23 | 12 | 26 | 24 | 17 | 20 | 20 | 28 |
| Mallard (*Anas platyrhynchos*) | 221 | 31 | 11 | 21 | 17 | 18 | 28 | 21 | 29 |
| Great egret (*Ardea alba*) | 24 | 26 | 4 | 29 | 21 | 32 | 12 | 22 | 28 |
| Red-tailed hawk (*Buteo jamaicensis*) | 534 | 26 | 8 | 21 | 19 | 24 | 27 | 23 | 25 |
| California gull (*Larus californicus*) | 23 | 14 | 14 | 20 | 33 | 11 | 30 | 24 | 22 |
| Cattle egret (*Bubulcus ibis*) | 112 | 17 | 6 | 27 | 32 | 27 | 18 | 25 | 23 |
| Ring-billed gull (*Larus delawarensis*) | 362 | 21 | 8 | 20 | 26 | 22 | 33 | 26 | 23 |
| Franklin's gull (*Larus pipixcan*) | 26 | 9 | 9 | 23 | 41 | 20 | 22 | 27 | 19 |
| Raccoon (*Procyon lotor*) | 23 | 18 | 12 | 14 | 28 | 16 | 40 | 28 | 20 |
| Coyote (*Canis latrans*) | 231 | 14 | 3 | 31 | 36 | 41 | 9 | 29 | 22 |
| Rock dove (*Columba livia*) | 1,035 | 18 | 6 | 19 | 29 | 26 | 34 | 30 | 20 |
| Swainson's hawk (*Buteo swainsoni*) | 24 | 17 | 4 | 20 | 31 | 33 | 31 | 31 | 19 |
| Other hawks | 34 | 14 | 4 | 22 | 34 | 37 | 25 | 32 | 18 |
| Laughing gull (*Larus atricilla*) | 106 | 14 | 4 | 21 | 35 | 34 | 29 | 33 | 18 |
| Mew gull (*Larus canus*) | 21 | 25 | 0 | 16 | 22 | 52 | 37 | 34 | 19 |
| Peregrine falcon (*Falco peregrinus*) | 44 | 18 | 5 | 7 | 30 | 29 | 53 | 35 | 14 |
| Laysan albatross (*Phoebastria immutabilis*) | 29 | 22 | 0 | 17 | 25 | 53 | 35 | 36 | 18 |
| Rabbits (Leporidae) | 78 | 11 | 3 | 15 | 37 | 39 | 39 | 37 | 13 |
| Upland sandpiper (*Bartramia longicauda*) | 32 | 8 | 4 | 16 | 43 | 36 | 36 | 37 | 13 |
| Short-eared owl (*Asio flammeus*) | 58 | 10 | 4 | 11 | 39 | 35 | 43 | 39 | 12 |
| Black-bellied plover (*Pluvialis squatarola*) | 20 | 18 | 0 | 16 | 27 | 54 | 38 | 40 | 15 |
| Red fox (*Vulpes vulpes*) | 31 | 8 | 0 | 22 | 42 | 55 | 24 | 41 | 14 |
| American crow (*Corvus brachyrhynchos*) | 141 | 10 | 3 | 13 | 40 | 40 | 41 | 41 | 12 |
| Spotted dove (*Streptopelia chinensis*) | 46 | 7 | 4 | 10 | 48 | 31 | 45 | 43 | 10 |
| Barn owl (*Tyto alba*) | 174 | 11 | 3 | 9 | 38 | 38 | 49 | 44 | 11 |
| Mourning dove (*Zenaida macroura*) | 1,313 | 7 | 3 | 13 | 45 | 42 | 42 | 45 | 10 |
| Blackbirds | 976 | 7 | 2 | 10 | 44 | 46 | 44 | 46 | 9 |
| European starling (*Sturnus vulgaris*) | 1,408 | 7 | 2 | 10 | 47 | 43 | 46 | 47 | 9 |
| Bats (Chiroptera) | 44 | 5 | 5 | 8 | 55 | 30 | 51 | 47 | 8 |
| Killdeer (*Charadrius vociferus*) | 553 | 6 | 1 | 7 | 51 | 48 | 52 | 49 | 7 |
| American kestrel (*Falco sparverius*) | 536 | 4 | 1 | 7 | 57 | 47 | 55 | 50 | 6 |
| Zebra dove (*Geopelia striata*) | 54 | 4 | 2 | 6 | 56 | 44 | 59 | 50 | 5 |
| Snow bunting (*Plectrophenax nivalis*) | 84 | 1 | 0 | 20 | 66 | 66 | 32 | 52 | 10 |
| Common myna (*Acridotheres tristis*) | 21 | 6 | 0 | 6 | 50 | 58 | 56 | 52 | 6 |
| Bank swallow (*Riparia riparia*) | 49 | 5 | 0 | 9 | 54 | 61 | 50 | 54 | 6 |
| Meadowlarks | 361 | 3 | 2 | 6 | 61 | 45 | 60 | 55 | 5 |
| Woodchuck (*Marmota monax*) | 41 | 7 | 0 | 3 | 46 | 56 | 68 | 56 | 5 |
| Horned lark (*Eremophila alpestris*) | 372 | 3 | 1 | 6 | 60 | 49 | 61 | 56 | 4 |
| Sparrows | 1,799 | 3 | 0 | 6 | 62 | 51 | 58 | 58 | 4 |
| Northern harrier (*Circus cyaneus*) | 24 | 5 | 0 | 5 | 52 | 59 | 62 | 59 | 5 |
| American robin (*Turdus migratorius*) | 159 | 2 | 0 | 10 | 64 | 65 | 47 | 60 | 5 |
| Burrowing owl (*Athene cunicularia*) | 20 | 6 | 0 | 0 | 49 | 57 | 73 | 61 | 3 |
| Barn swallow (*Hirundo rustica*) | 486 | 2 | 0 | 3 | 65 | 50 | 69 | 62 | 2 |
| Wrens | 28 | 4 | 0 | 4 | 58 | 62 | 66 | 63 | 3 |
| Terns | 45 | 5 | 0 | 0 | 53 | 60 | 74 | 64 | 2 |

**Table 1.** (*continued*)

| Species[a] | Total strikes reported | % With damage | % With substantial damage | % With EOF | Damage rank | Substantial damage rank | EOF rank | Composite rank | Relative hazard score |
|---|---|---|---|---|---|---|---|---|---|
| Finches | 55 | 0 | 0 | 10 | 71 | 71 | 48 | 65 | 4 |
| Chimney swift (*Chaetura pelagica*) | 34 | 0 | 0 | 6 | 70 | 70 | 57 | 66 | 3 |
| Common nighthawk (*Chordeiles minor*) | 38 | 3 | 0 | 0 | 59 | 63 | 75 | 66 | 1 |
| Pacific golden-plover (*Pluvialis apricaria*) | 204 | 1 | 0 | 4 | 67 | 67 | 64 | 68 | 2 |
| Purple martin (*Progne subis*) | 57 | 2 | 0 | 2 | 63 | 64 | 72 | 69 | 2 |
| Western sandpiper (*Calidris mauri*) | 31 | 0 | 0 | 7 | 76 | 76 | 54 | 70 | 3 |
| Cliff swallow (*Petrochelidon pyrrhonota*) | 164 | 1 | 0 | 2 | 68 | 68 | 71 | 71 | 1 |
| Skunks (Mephitidae) | 30 | 0 | 0 | 4 | 74 | 74 | 63 | 72 | 2 |
| Nutmeg mannikin (*Lonchura punctulata*) | 26 | 0 | 0 | 4 | 72 | 72 | 67 | 72 | 2 |
| Chestnut manikin (*Lonchura malacca*) | 28 | 0 | 0 | 0 | 69 | 69 | 76 | 74 | 0 |
| Wood warblers | 30 | 0 | 0 | 4 | 77 | 77 | 65 | 75 | 2 |
| Tree swallow (*Tachycineta bicolor*) | 109 | 0 | 0 | 2 | 75 | 75 | 70 | 76 | 1 |
| Opossum (*Didelphis virginiana*) | 25 | 0 | 0 | 0 | 73 | 73 | 77 | 77 | 0 |

[a] Other geese = snow goose (*Chen caerulescens*), brant (*Branta bernicla*), greater white-fronted goose (*Anser albifrons*); other ducks = 23 species in the family Anatidae; other hawks = Cooper's hawk (*Accipter cooperii*), sharp-shinned hawk (*A. striatus*), rough-legged hawk (*Buteo lagopus*), red-shouldered hawk (*B. lineatus*), broad-winged hawk (*B. platypterus*), ferruginous hawk (*B. regalis*); blackbirds = red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*); meadowlarks = eastern meadowlark (*Sturnella magna*), western meadowlark (*S. neglecta*); sparrows = 19 species in the family Emberizidae; wrens = house wren (*Troglodytes aedon*), Carolina wren (*Thryothorus ludovicianus*), marsh wren (*Cistothorus palustris*); terns = common tern (*Sterna hirundo*), arctic tern (*S. vittata*), Caspian tern (*S. caspia*), least tern (*S. antillarum*), fairy tern (*S. nereis*); finches = house finch (*Carpodacus mexicanus*), American goldfinch (*Carduelis tristis*); wood warblers = 13 species in the family Parulidae.

necessitated no repair or replacement of components (although some costs might have been incurred due to delay or aircraft inspection after landing). Also, by definition, strikes resulting in substantial damage also are included in the calculation for any level of damage, but not all strikes resulting in an effect on flight caused damage. Following Dolbeer et al. (2000), we ranked the 77 species–groups for each of the 3 hazard criteria (i.e., percentage of strikes with damage, percentage of strikes with substantial damage, and percentage of strikes with an effect on flight) from 1 (most hazardous) to 77 (least hazardous). We created a composite rank by summing those category ranks and then ordered species or groups from most to least hazardous, including tied ranks. We then calculated a relative hazard score (Dolbeer et al. 2000) by summing the scores of the 3 hazard criteria for each species–group, and scaling to a maximum of 100.

We assessed hazard scores in relation to avian body mass, body density, and group size. We obtained body mass data from Dunning (1993). When body mass estimates were provided for both sexes, we averaged them. For body masses of "groups" we calculated a weighted average using the number of strikes for each species in that group. We obtained mean bird body densities for 14 species (Seamans et al. 1995; T. W. Seamans, unpublished data). Unpublished density estimates were for American white pelicans (*Pelecanus erythrorhynchos*), double-crested cormorants (*Phalacrocorax auritus*), horned larks (*Eremophila alpestris*), American kestrels (*Falco sparverius*), red-tailed hawks (*Buteo jamaicensis*), great black-backed gulls (*Larus marinus*), and common nighthawks (*Chordeiles minor*). For all species, we used "plucked" body density estimates (Seamans et al. 1995); methods used to estimate density were identical for published and unpublished species. Bird flock size is poorly reported in the FAA National Wildlife Strike Database (Dolbeer et al. 2000), although all strikes are reported as involving single or multiple birds. Consequently, we used the percentage of strikes in which multiple (>1) birds were struck as our group-size estimate.

We log-transformed bird body masses to normalize them before assessing possible autocorrelation among predictor variables. We used relative hazard score as the dependent variable in all analyses and species–group as the sample unit. We first examined bivariate scatterplots of relative hazard score against log body mass and relative hazard score against percentage of strikes involving multiple birds, then used either linear or quadratic regression (based on best model fit) to assess relationships between these variables.

## RESULTS

Considering birds and mammals combined, the top 3 species in composite ranking were large mammals (mule deer [*O. hemionus*], white-tailed deer, and domestic dog; Table 1). The next most hazardous mammal species were raccoon (*Procyon lotor*) and coyote (*Canis latrans*), with composite rank scores of 28 and 29, respectively. Based on relative hazard score, the top bird species–group was other geese (snow goose [*Chen caerulescens*], brant [*Branta bernicla*], and greater white-fronted goose [*Anser albifrons*]), which was 61% as hazardous as mule deer. Percentage of strikes with damage ranged from 95.6% (mule deer) to 0% (9 species–groups), percentage with major damage ranged from 37.8% (mule deer) to 0% (28 species–groups), and percentage with effect on flight ranged from 83.3% (mule deer) to 0% (5 species–groups; Table 1).

Considering birds only, other geese was the most hazardous species–group, followed by a 3-way tie between Canada geese (*Branta canadensis*), other ducks (23 species in the family Anatidae), and turkey vultures (Table 2). These 3 species–groups were 73–78% as hazardous as other geese